6 References


Dwyer, E., Gunner, E., & Shepherd, K. (2009). The Changing Climate: Impacts and adaptation options for South Australian primary producers (pp. 60): Primary Industries and Resources SA and Rural Solutions SA.


Stone, R. C. (2014). Constructing a Framework for National Drought Policy: The Way Forward - The way Australia developed and implemented the National Drought...


Appendices

7.1. Appendix A: Introductory letter/invitation to participate in research

Research Project:

Exploring the relationship between path dependence and flexibility in farm systems

Dear ________,

I wish formally to invite you to participate in my research on the above topic. The details of the study follow and I hope you will consider being involved. I am conducting this research project for my PhD at the University of New England and in conjunction with the Department of Primary Industries, Victoria.

My supervisors at the University of New England are Dr. Vic Wright, Dr. Geoff Kaine and Prof. Ray Cooksey. Dr. Vic Wright can be contacted by email at vwright@une.edu.au or by phone on 02 6772 1307. Dr. Geoff Kaine can be contacted by email at geoffkaine@yahoo.com.au or by phone on 0448807084 and I can be contacted by email at lisa.cowan@dpi.vic.gov.au or phone on 03 5833 5270.

Aim of the Study:

The aim of this study is to increase our understanding of how farmers manage variability in order to inform how policy, research and extension might be used to help farmers manage the increased variability from climate change.

One component of the study will be interviews with dairy farmers. These interviews will have the following characteristics.

Time Requirements:

An in-person interview lasting approximately 1-2 hours at a time and location convenient to you.

Interviews:

There will be a series of open-ended questions that allow you to describe your farm business. I am interested in how you have set up your production system and what has influenced these production decisions.

I will be recording and then transcribing the interview. Following the interview, a transcript will be provided to you if you wish to see one. As well, if you would like to review the summary of your property this will be made available.

Any information or personal details gathered in the course of the study will remain confidential. No individual will be identified by name in any publication of the results. All names will be replaced by pseudonyms; this will ensure that you are not identifiable.
Participation is completely voluntary. If you decide to participate, you are free to withdraw your consent from the project and discontinue at any time without having to give a reason and without consequence if you decide not to participate or withdraw at any time.

The notes from these interviews will be kept in a locked filing cabinet at my office. The transcriptions and other data will be kept in the same manner for seven (7) years following thesis submission and then destroyed. Only the investigators will have access to the data.

Research Process:
It is anticipated that this research will be completed by September 2013. The results may also be presented at conferences or written up in journals without any identifying information.

This project has been approved by the Human Research Ethics Committee of the University of New England (Approval No. HE11/058, Valid to 01/04/2012).

Should you have any complaints concerning the manner in which this research is conducted, please contact the Research Ethics Officer at the following address:

Research Services
University of New England
Armidale, NSW 2351.
Telephone: (02) 6773 3449 Facsimile (02) 6773 3543
Email: ethics@une.edu.au

If you are interested please call me on 0400 377 728 or email me on lisa.cowan@dpi.vic.gov.au. We can then discuss a date and time that will be suitable to you.

Thank you for considering this request and I look forward to further contact with you.

Regards,

Lisa Cowan
Consent Form for Participants

Research Project: Exploring the relationship between path dependence and flexibility in farm systems

I have read the information contained in the Information Sheet for Participants and any questions I have asked have been answered to my satisfaction. Yes/No

I agree to participate in this activity, realising that I may withdraw at anytime. Yes/No

I agree that research data gathered for the study may be published using a pseudonym. Yes/No

I agree to the interview having my voice recorded and transcribed. Yes/No

Participant ........................................ Date ........................................

Researcher ........................................ Date ........................................
Contact list for the research project:
Exploring the relationship between path dependence and flexibility in farm systems

Ms. Lisa Cowan,
University of New England and
Department of Primary Industries
Phone: 03 5833 5270
Mobile: 0400 377 728
Email: lisa.cowan@dpi.vic.gov.au

Dr. Vic Wright
University of New England
Phone: 02 6772 1307
Email: vwright@une.edu.au

Dr. Geoff Kaine
University of New England
Phone: 0448807084
Email: Geoffkaine@yahoo.com.au

Prof. Ray Cooksey
University of New England
Phone: 02 6773 2563
Email: rcooksey@une.edu.au
7.2. Appendix B: Interview guide

**Dairy Farmer Interview Guide**
*(Topics to cover, not intended to be a script)*

**Farm context:**
Can you tell me about your dairy farm?
   - Biophysical context
   - Main source of family income?

Can you tell me about the history of the farm?
   - What was it like when you took over running the farm?

How have things been going for the last five years or so?

**From a change in practice angle:**
In the past five years or so, can you tell me about what kinds of major changes you have made?
   - Why did you think a change was needed at the time?
   - What triggered the change?

For each major change identified:
   - Why did you decide to do that?
   - When you were making the decision do you remember what some of your other options were?
   - Why didn’t you choose the alternatives you were thinking about?

   - What happened when you made that change?
   - If you wanted to to now, could you go back to the way you did things before you made the change?

Have there been any changes that you have made to the farm that had unexpected outcomes?
   - Or that ended up constraining other things in the farm?
   - What did you do about it?

Is there anything you have thought about doing or would like to do but haven’t been able to do? Why?

Have you thought about getting out of dairy and into a different type of farming?
   - Why?
   - What do you think would be the barriers to you changing?
7.3. Appendix C: Farm Narratives – on attached CD

7.4. Appendix D: Coding Rules

Path dependence

Coding for critical junctures

A critical juncture is a decision point in which a change in the state of the farm or environment triggers a need to make a change to farm structure. Triggers for change here indicate a threat to achieving business objectives or the potential of missing an opportunity in relation to the farm business.

<table>
<thead>
<tr>
<th>Criteria for coding*</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes to family circumstances that alters who does or will own the farm or who is making farm management decision</td>
<td>death in the family, buying or inheriting the farm, includes consequences of related changes to finances</td>
</tr>
<tr>
<td>Changes to family circumstances that alter the capacity to match expectations regarding the farm to family needs</td>
<td>Workforce available, number of family members farm is supporting, competing family needs such as paying for children to go to university or spending time with family</td>
</tr>
<tr>
<td>Changes to the primary producer’s objectives regarding the farm</td>
<td>Retiring or ‘winding back’ the business.</td>
</tr>
<tr>
<td>Significant** changes in access to critical inputs.</td>
<td>Irrigation water, purchased feed</td>
</tr>
<tr>
<td>Significant changes to output price or desired characteristics of the output as determined by the supply chain</td>
<td>Changing milk prices</td>
</tr>
<tr>
<td>Significant natural disasters</td>
<td>Flood, Fire</td>
</tr>
<tr>
<td>Identification by the primary producer that current farm practices are a threat to achieving farm business objectives.</td>
<td>Cows die due to poor nutrition</td>
</tr>
<tr>
<td>Identification by the primary producer that a different farm configuration will better utilise the input mix to achieve farm objectives.</td>
<td>Desire to access the winter milk incentive</td>
</tr>
</tbody>
</table>

*Multiple criteria may be present at a single critical juncture

** Significance is identifiable in the primary producer’s decision to act upon the change by altering farm system structure. This means that what is significant for one primary producer may not be for another, depending on context.
**Farm control theory**

**Coding for adaptations**

- Adaptations are performance-preserving changes to the farm production system structure.
- Adaptations are made in response to changes the farmer perceives in the environment. The environment in which change can be perceived includes the farmer’s knowledge and personal goals.
- Adaptation assumes a degree of short-term irreversibility.
- Some adaptations are indicative of trialling change and are highly reversible.
- The activation of tactics in response to variability in inputs is not adaptation.

<table>
<thead>
<tr>
<th>Criteria for coding*</th>
<th>Examples of adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes to farm management practices</td>
<td>Switching from the use of bulls to AI in herd breeding</td>
</tr>
<tr>
<td>Alter the set of farm outputs</td>
<td>Selling bulls, selling whole milk not butter</td>
</tr>
<tr>
<td>Refine, redevelop existing production system structure</td>
<td>Laser grade, upgrade or alter irrigation system</td>
</tr>
<tr>
<td>Replace or add new production system components</td>
<td>Put in milk vat, replace old dairy, put in a bore, recycle dam, feed pad, calving pad</td>
</tr>
</tbody>
</table>

*Adaptations occur in the production system. Changes to inputs used (that do not necessitate a change in structure for their use) or higher order changes (such as farm finances) are not adaptations, though they may lead to adaptations.

**Images**

**Coding for changing plans at the strategic image**

The plan image represents the collection of activities that comprise the farm system. The plan is defined by goals.

<table>
<thead>
<tr>
<th>Criteria for coding changes in plans*</th>
<th>Examples of plan image changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alteration of one or more activity within the plan</td>
<td>A farmer redevelops the paddocks to improve irrigation and pasture production.</td>
</tr>
<tr>
<td>Removal of an activity from the farm plan</td>
<td>A farmer stops herd testing</td>
</tr>
<tr>
<td>The addition of a new activity to the plan</td>
<td>A farmer starts pregnancy testing as a part of farm breeding practices</td>
</tr>
</tbody>
</table>

*Changes to plans can occur in the production system, in the management of inputs and outputs and in higher order aspects of the business such as farm finance. Hence changes in plans are not necessarily synonymous with adaptations.
Coding for changing goals at the trajectory image

The trajectory image represents the collection of goals that the primary producer holds regarding the farm business as well as other aspects of life. The value image defines the relevant goals within the trajectory image. Changes to goals can lead to changes in farm plans.

<table>
<thead>
<tr>
<th>Criteria for coding changes to goals</th>
<th>Examples of goal image</th>
</tr>
</thead>
<tbody>
<tr>
<td>A change in personal goals that intersect with farm goals / plans</td>
<td>Farmer wants to retire and wind back production on the farm</td>
</tr>
<tr>
<td>A change in farm business goals due to changes in context (business or environment)</td>
<td>Farm identifies improved business opportunities by shifting to a different enterprise</td>
</tr>
</tbody>
</table>

Coding for changing principles at the value image

The value image consists of an individual’s values, morals and ethics. These are described collectively as ‘principles’

<table>
<thead>
<tr>
<th>Criteria for coding changes in principles</th>
<th>Examples of value image changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A change in personal principles by the farm manager that explicitly influences goals and plans of the farm</td>
<td>A farmer changes his beliefs regarding the use of pesticides and the environment</td>
</tr>
</tbody>
</table>

Value chain

Of immediate importance to this research is the distinction between primary and support activities, given support activities are more likely to influence other functions of the farm system.

Coding for support functions

There are four support functions, with different criteria for coding. Changes in support functions imply changes to primary functions.

<table>
<thead>
<tr>
<th>Criteria for coding changes support functions</th>
<th>Examples of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure: - Changes in farm or family finance - Alterations to infrastructure that are not technology change. This includes changes to aggregates such as herd size.</td>
<td>- Increased debt accrued when installing a rotary dairy - The purchase or lease of new land to increase the size of the farm business.</td>
</tr>
<tr>
<td>Human Resource Management: Alterations to how the labour units used in the farm business are accessed, managed, trained and compensated. This includes family members as</td>
<td>- Bringing in a share farmer and modifications to succession planning are both examples of HRM support function changes.</td>
</tr>
</tbody>
</table>
well as consultants and contractors.

Technology development:
- Changes in practices and technologies used on farm to ones that have not been used before
- Technology development does not include reverting back to practices used previously (which would be an operations or infrastructure change, depending on context)
- The adoption of a new grain variety
- Changing from rotational to strip grazing
- The installation of a rotary dairy

Procurement:
- Changes to how the farmer accesses inputs for the farm system.
- Purchasing carryover water to manage a variable water supply for the following season.
- Sourcing different types of feed during the drought

Coding for primary activities

While there are five primary activities in a value chain, farmers predominantly focus on inbound logistics and operations, as this is where they have to greatest control.

<table>
<thead>
<tr>
<th>Criteria for coding changes in primary functions</th>
<th>Examples of change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inbound logistics:</strong> Changes in how inputs are received, stored and distributed within the farm system</td>
<td>The amalgamation of water entitlements, that enables the farmer to distribute water across different blocks of land is an example of a change to inbound logistics</td>
</tr>
</tbody>
</table>
| **Operations:** Changes to the day to day business practices, including the activation of tactics. | Drying off pasture during drought
Reverting back to previously used practices which do not require structural change. |
| **Outbound logistics:** Changes to how outputs are collected, stored and physically distributed to buyers | Alterations to on farm storage capacity of milk, such as changing the milk vat. |
| **Marketing & sales:** Changes to how the farm output is marketed and purchased by product buyer | Given dairy farmers function within a commodity production industry, this is not applicable to dairy farming in Australia |
| **Service:** Changes to services provided to enhance or maintain the value of the product | Given dairy farmers function within a commodity production industry, this is not applicable to dairy farming in Australia |

7.5. Appendix E: Farm Matrices – on attached CD

7.6. Appendix F: Classifying sources of critical junctures – on attached CD

7.7. Appendix G: Identified linkages between critical junctures and reinforcing decisions – on attached CD