Understanding farmer decision-making (and thereby reducing waste in agricultural research funding)

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The general ‘problem’

- Non-adoption, ‘mal-adoption’ or ‘dis-adoption’ of practices and technologies shown to have benefits to farm businesses and natural resources.
  - Returns on research investment by RD&E agencies
  - Adaptation pressures outstrip actual on-farm adaptation (eg cost-price, climate change)
  - Stretching the extension resources
  - Known broader benefits from investment in ag innovation

Two dairy industry studies

	Feedbase project	Farm business project
Conducted	2017-18	2018-19
Problem foci	'Underperformance' on feed production	Low attention to farm business management
	Drivers of, and barriers to, innovation Some focus on approaches to FBM	Evaluating current interest and skill levels for FBM Drivers of and barriers to participation in FBM programs
Methods	Interviews with farmers (f), advisors (A), service providers (S) Compare with 'ideal' model of decision-making with actual	
Geography	Three dairy regions of Vic.	7 dairy regions of NSW
Sample	153 f, 19 A,S, 5 producer group discussions	50 f, 10 A,S, 3 FBM educators Favours 'progressive innovators and 'dairy enthusiasts'
	Recruited by regional industry development officers	

Key research elements

- Behavioural (cognitive sciences)
  - Especially heuristics and processing ideas
- Social and occupational identities
- Rural and family sub-cultures
- Learning styles
- Contrasting actual decision-making with an ‘ideal’ model (rational, reflective, evidence-based

Interview foci

Common to both

- Farm description, business structure and operation
- Farm history, personal work history and works preferences
- Attituded to industry futures

Feedbase

- Feed system
  - Feed system (past, present & future)
  - Pasture management
  - Fertiliser and seed decisions
- Drivers of, and barriers to, changing practices

Farm business management

- Defining FBM & relative priority of FBM
- Indicators of business performance
- Reasons for attention and inattention to FBM
- How operational and investment decisions are made
- Sources of advice and information
- What could industry do better with FBM?
- DA farmer typology

Some key findings

Did farmers see a ‘problem’?

Feed mgt

- Advisers/researchers see feed prodn. underperformance
- BUT generally farmers do not see potential for gains on **own** farms

Farm biz

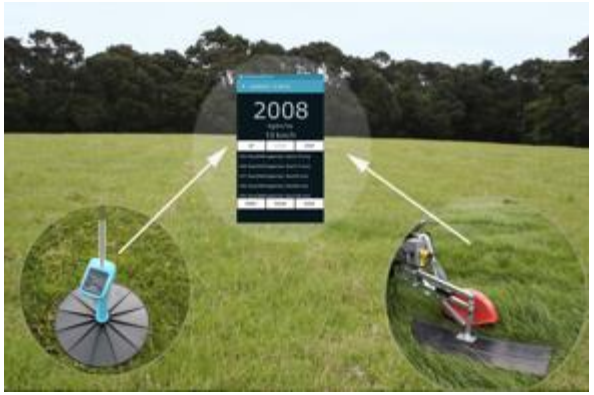
- Advisors see big deficiencies
- Farmers acknowledge importance of FBM
- Acknowledge it **should** have importance in own business
- Not matched by actual priority

Predominance of ‘naturalistic’ management

The ‘rational/technical’ farmer	Studies observations
Use of formal economic analysis	Almost none
Clear goals, plans, communications	<10% with business plan; <30% with long-term goals Goals are not necessarily shared or discussed
	Incidental communication predominates
Financial management	Simple bookkeeping, strong tax and bank focus (not for mgt)
Feed budgets	<10% use a feed budget tool or similar
Grazing rotation plan	50% use some plan but vaguely articulated
Moisture measurement (for irrigation)	<10% use sensors or probes
Soil testing	>90% but variable uses of tests
Industry benchmarking tool (DairyBase)	<25% uptake and even less regular use Most entry and analysis by advisors
Comparison of characteristics to select crop and pasture varieties	Cost; what they are familiar with; what seed company agronomist says; trial and observation
Analyses of marginal costs and benefits for decision-making	Heuristic thresholds: water prices, feed prices, feed costs per cow, milk prices
Other decision support tools	Almost nothing noted

Heuristics rule

Which of these are used to measure the quantity of available pasture and from that decide on grazing rotation?



Feedbase practice change Barriers & Drivers

- Concerns about seasonal and market conditions
- Cash flow and financial position
- Time availability (as they see it)
- Labour availability and quality
- Policy uncertainty
- Farm layout and infrastructure
- High self-reliance (non engagement)
- Social and learning preferences
- Stage of life or achievement (winding down or contentment with current state)
- Non-growth business stage of the farm business
- Succession problems
- Risk averseness

- Seasonal conditions and climatic trends;
- Financial position and market signals (milk prices, water prices, debt levels and cash flow);
- Positive perceptions of the future of the industry;
- Being in, or considering a period of business growth;
- Generational change;
- The innovations of other farmers;
- Education, training and exposure to other systems; and
- ‘Benchmarking’ (broadly defined).

What drives attention to FBM?

Farmers v Consultants etc

- Business maturity
- Task specialisation
- A growth orientation & debt
- Peer groups or networks that compare finances
- Experience in other ‘managerial’ industries
- Financial pressure
- Business transition or succession
- Learning experiences

- Cost-price pressures
- Deregulation of the industry (to increase market pressures)
- Increasing use of internet/video
- Changing priorities of banks
- Succession
- Marital/relationship changes/breakdowns

Decision factors in major investment decisions

- Improved manageability of the system
- Getting to the ‘right’ size
- Time to ‘recover’ the cost of investment
- Peer experience with similar investments
- Upfront cost
- Setting the farm up ‘for the future’
- Do they want to manage more people?
- Land as base for farming (not an investment)

Additional considerations for tech & operational

- Long-run money saving
- Labour saving/requirement
- Local applicability
- Interest in, or attractiveness of, the innovation

- Avoiding ‘stagnation’
- Gut feel/intuition
- Cash availability
- The smaller the decisions, the greater use intuition

Perspectives on biz indicators

Farmers v Consultants etc

- Cash flow and/or availability
- Ability to meet bills for inputs
- Costs (especially for feed)
- Profit (only a bit over 10% of respondents)

- Cash flow/cash in bank
- Disposable income
- Tax liability
- Debt costs
- Milk production rates
- Direct costs

What encourages participation in industry training

- The quality and reputation of renowned industry presenters
- Being able to see other farms and see what other farmers are doing
- Peer sharing of information
- Getting together with (positive) people
- Built around particular (usually simple) tools or management systems
- Proximity of events (limited inclination to travel)
- Personal contact with trusted advisors
- Perceived relevance of knowledge (to location & farm system)

Applying cognitive and social lenses to the field observations

Thinking, fast and slow (Kahneman 2011)

- A dual processing metaphor of cognition
- Assumes people are ‘cognitive misers’
- Fast thinking (rapid, intuitive and dominant)
  - Use of heuristics and approximations
- Slow thinking (deliberate, effortful, rare)
- Supported by an array of empirical studies of choice-making, identifying different heuristics and biases and their effects

The dairy context

- High intensity task & decision environment
- Long days & being ‘tied’ to the operational side
- Managing multiple markets
  - Inputs (especially feed)
  - Commodity
  - Water
- Looking for decision shortcuts and rules of thumb
  - Observation and recollection
  - Using decision support tools to get the idea
  - Following ‘relevant’ role models

Social factors

- Social identities
  - What do farmers in our region/industry think and do?
  - What ideas and people are ‘out’ groups?
  - Occupational (farm system) identities
- Work preferences & occupational identity
  - Favouring, cows, grass, machinery etc
- Family enculturation
  - What’s important on the farm and in life
  - How do we do things?
  - Risk attitudes
  - What age does succession start/take place?

Intuitive management

- The default approach
- Functional in a dynamic environment
- Low cognitive load
- Coordinates own experience

- Less suited to ‘new’ problems
- Can overlook feedback
- Inaccurate over time
- May miss new tech & management innovations
- Problems of over & underconfidence

Limiting 'rational' analyses 1

Tendency	Effect of:
Evaluating information	
Affect heuristic	Being guided by emotional responses to things. How we feel about something not what we think of it.
Availability heuristic	Stronger influence of recent events and discussion of recent events; easily accessible and/or processed information; and vivid or memorable events.
Anchoring effect	Relying on a base point to evaluate information, rather than comparing things equally.
Focussing effect	Focussing on one particular aspect of an issue, rather than other aspects that may also be important.
Illusory correlation	False correlations between events or trends.
Regressive tendency	Downplaying high and low probabilities (regressing to the 'mean').
Clustering illusion	Overestimating the effect of small patterns/clusters.
Optimism preference	Focusing on favourable outcomes.
Financial decision-making	
Loss aversion	Weighting losses more than gains; an inclination to protect nest eggs.
Hyperbolic discounting	Allocating high value to immediate income.
Sunk cost fallacy	Continuing with a course based on previous investment.
Declining utility of wealth	The value of wealth declines with increasing wealth (motivation to accumulate may decline).

Limiting rational analyses 2

Tendency	Effect of:
Resistance to new ideas	
Confirmation bias	A tendency to search for evidence to support current views.
Desirability bias	Preferring 'good news' over bad news (Tappin, McKay, and van der Leer 2017).
Status quo preference	Preferring current state or situation.
(Limited) belief revision	Only making small concession to even strong contrary evidence.
Memory and hindsight	
Choice supportive effect	Favourable recollections of one's own past choices (Mather, Shafir, and Johnson 2000).
Hindsight bias	Seeing past events as more predictable than they were.
Consistency effect	Aligning past beliefs & ideas with present ones.
Communications effects	
Framing effects	Acceptance of argument or evidence varying with how they are framed.
Halo effect	Response is to personal characteristics of presenter or source.
Reactive devaluation	Response is based on dislike or distrust of source of information.
Illusion of truth	Belief develops through familiarity with the concept, slogan or phrase.
False consensus effect	Overestimating others' agreement with your attitudes and beliefs.

Together, these effects suggest:

- We are not necessarily good intuitive scientists, statisticians or economists
- Emotion is influential
- We are (mostly) not utility maximizers
- We take mental shortcuts to conclusions, excluding a lot of potentially relevant information
- Positions once formed can be hard to overturn
- There is often instinctive rejection of challenges to our thinking

Implications and recommendations

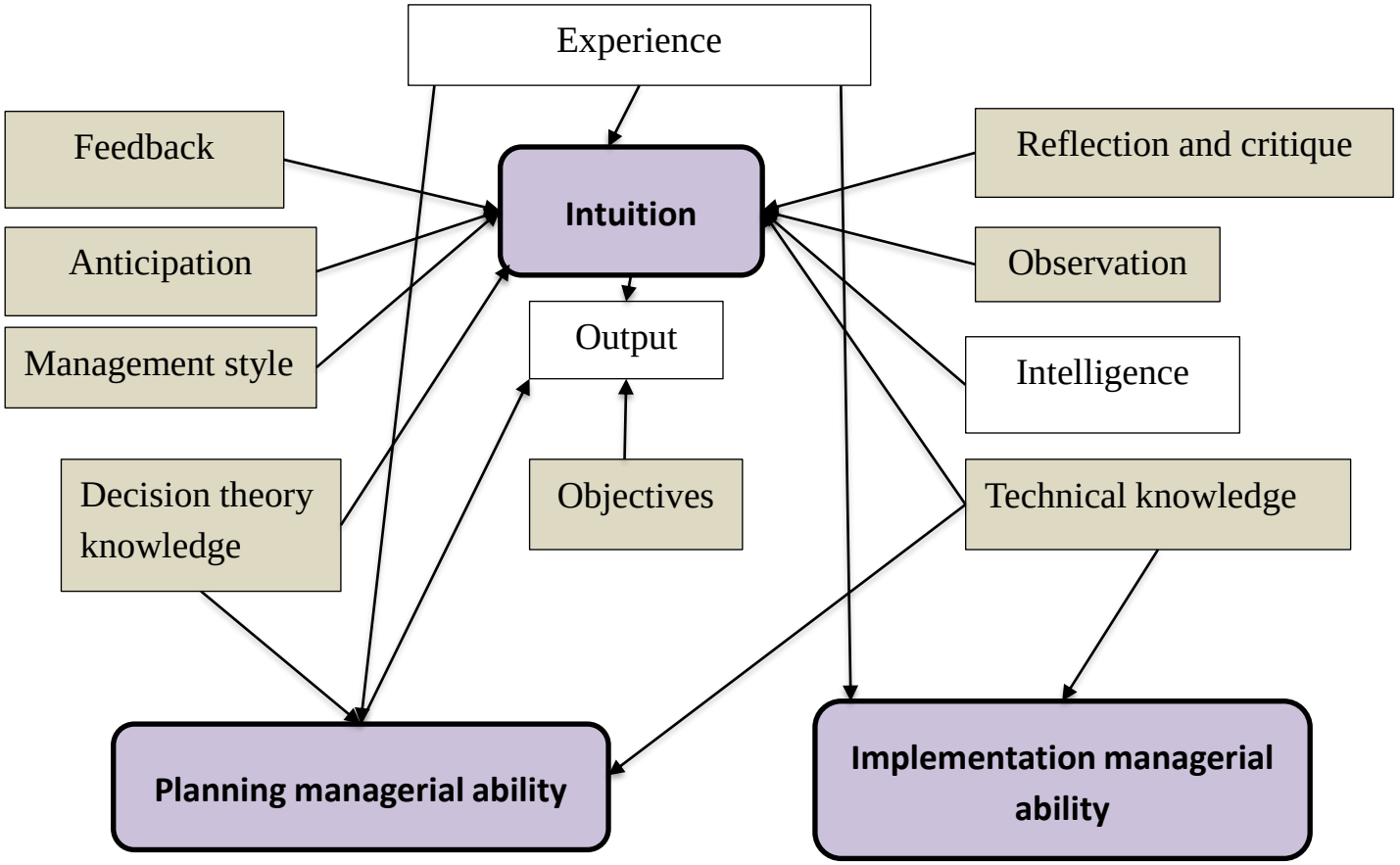
Incompatible paradigms?

Farm management & Researchers

- Multiple potential innovations to consider
- Cognitively & physically intense environment that exacerbates fast thinking
- Focus on system constraints and balancing multiple objectives
- Within the farm culture
- An evolutionary system

- Able to focus on limited number of innovations (in a project)
- Training and peer review processes to encourage slow thinking
- Strong focus on marginal benefits of single innovation
- At least partly external to farm culture
- From one project to the next

Decision-making model



Adapted from Nuthall & Old 2018

What encourages reflective thinking?

- Crises or family decisions (but these can also be paralysing)
- What peers are doing or saying
- Using a consultant or advisor
- Coming from outside the industry or a dairy family
- Training and education
- Exposure to other agricultural or business systems
- System shocks, seasons, markets, succession
- Extension that works with intuitive styles

The influence of advisers

- Forms of usage
  - Part of the business
  - Check in every few years
  - Brought in at strategic points
  - Farm business ‘grows out’ of them
- Like joining a team or club
- Highly influential (direct and indirect)
- Limited or no direct use of industry research
- Recycling the practices of ‘top’ farmers

Aligned extension strategies 1

- Strong relationships in the RDE ecosystem
- Use simple and several financial indicators
- Working with the business and life stages of farmers
- Describe the impact on system manageability
- Redefining social & work identities
- Facilitating peer pressure & ‘benchmarking’ (eg discussion groups)
- Coordinated knowledge transfer
  - Known presenters with some ‘new’ perspectives
  - Work on combining personal and web interactions
  - Whiteboard **and** paddock together

Aligned extension strategies 2

- Establish basic skills before higher level campaigns (don't trust self-assessments of skills & knowledge)
- Communication that:
  - Draws on accessible or memorable events
  - Uses relevant metaphors
  - Emphasizes alignments with interests, skills and work preferences
- Informal benchmarking systems
  - Discussion groups (but are not for all)
  - Case studies across a range of farm types (different types of slightly aspirational comparators)
- Lighthouse projects (the over the fence effect)
- 'Lifting' people out of their industry and locale to see other situations

At the industry level

- Coordinated industry messaging on key innovations & recommendations
- Streamlining the implementation foci
- Managing funders & providers' expectations
  - Innovation is not a 'conversion' process
- Evaluate investment in, and design of, decision-support tools
- Use multiple communication pathways (text, journals, workshops, social media)

Limitations to the research

- Challenges to the theoretical base
  - Behavioural experiments usually not real-world
  - Reflective thinking may increase with what's at stake (bigger decisions)
  - Its just very fast rationality based on experience
- Skewed samples (recruitment)
- Findings may be particular to industry/regions
- Will it change over time (with higher levels of education and exposure?

The 2 dairy industry project reports and this presentation are available through the APEN host.

Questions & comments