RiskWi$e Behavioural Science Progress update - November 2025

Key Learnings So Far

The results presented below are useful in identifying trends, but not in understanding why they occur. As such, these results would ideally be used by groups to present to stakeholders and ask probing questions that go towards exploring the 'why'. To guide this, follow up questions that could be used by groups in workshop or event settings are proposed.

1. Decision comfort is generally low across common decisions

In only 24% of cases did growers identify they had high decision comfort. Much more likely was substantial discomfort (39%). The highest discomfort was with carbon farming decisions (noting a small sample size of 11), while only Lentil decisions had more than one in three growers identifying high decision comfort. This highlights the value of addressing decision comfort as a key sales pitch for RiskWi$e.

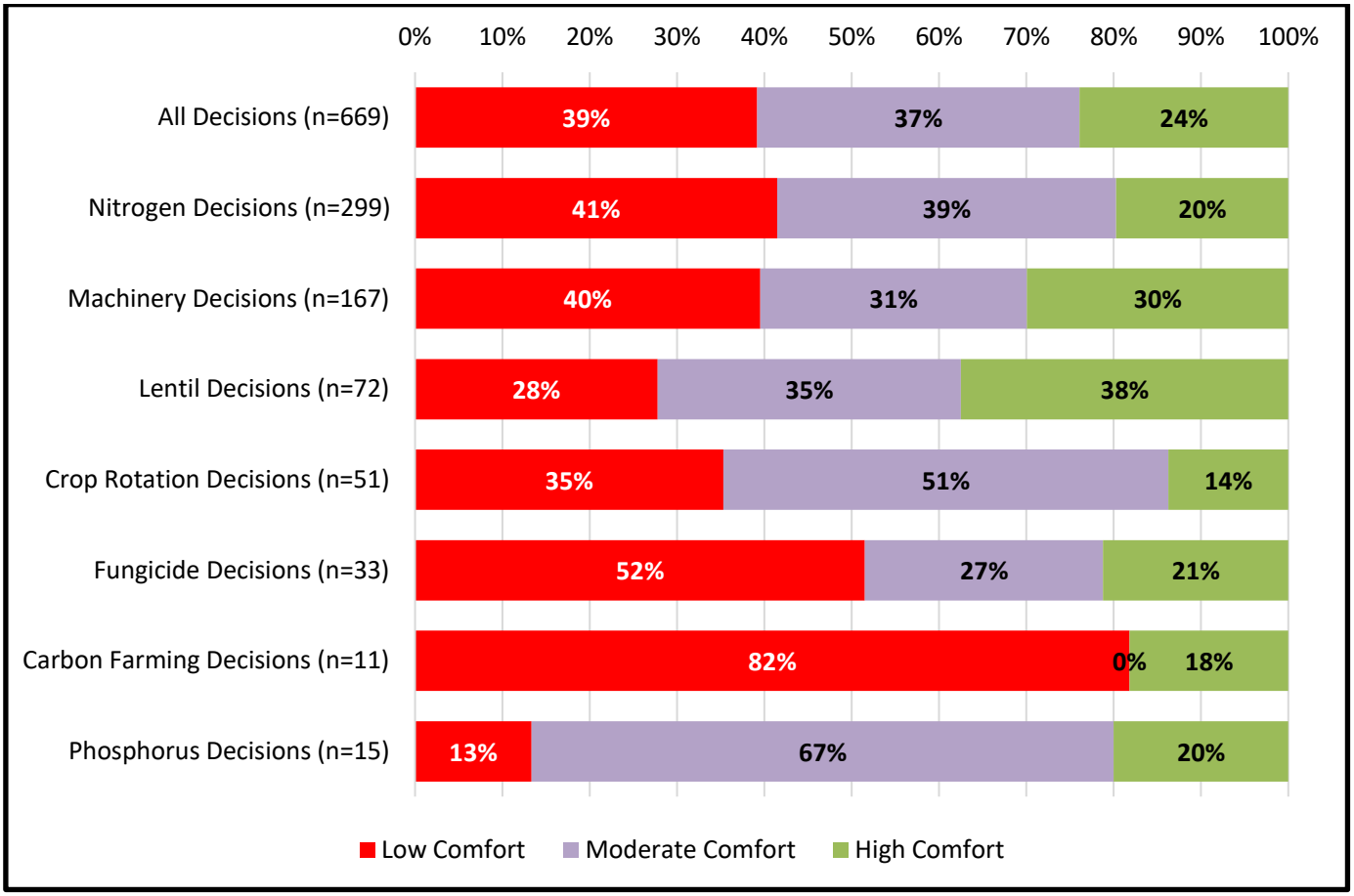

Figure 1: Grower comfort in different decisions.

Follow up questions for groups might include:

- Why do you think you don't have substantial comfort in making this decision?
- What characteristics of the decision lead you to discomfort?
- Are there things that you can do to reduce discomfort? What is different between those in the room who do have high comfort to those that do not? What can we learn from each other?

2. Common difficult decisions are identified

There are three decisions that are clearly identified as the most difficult nationally: land purchase and leasing (30% high difficulty; 77% some difficulty), machinery and infrastructure investments (22% high difficulty, 77% some difficulty) and grain marketing (20% high difficulty, 78% some difficulty). For each of these, 4 in 5 respondents have some level of difficulty. The top two difficulties are both large, strategic and irregular investment decisions that can often feel difficult to reverse, are not trailable, have complex methods of analytics to predict outcomes and have a large opportunity cost. Whilst grain marketing is a regular decision, it involves substantial volatility and uncertainty. The most difficult agronomic decision is nitrogen application.

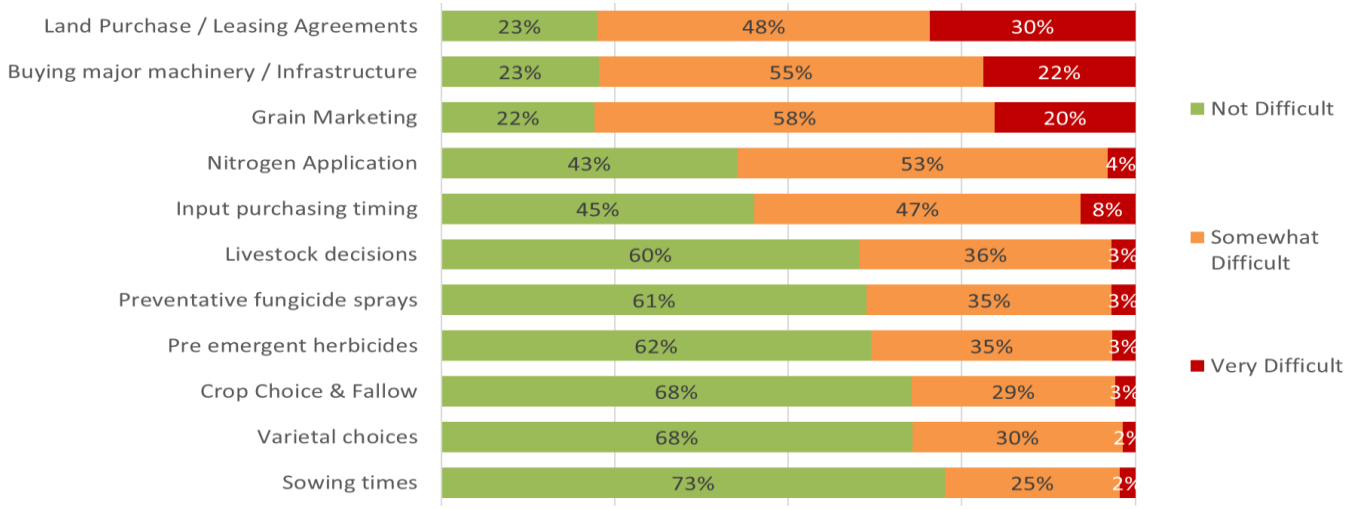

Figure 2: Difficulty of various decisions (national)

In Queensland, an additional set of decisions was explored, highlighting some further challenging decisions (denoted with *). Achieving net zero and succession planning both were ranked as the most difficult decisions with nearly all respondents identifying some level of difficulty.

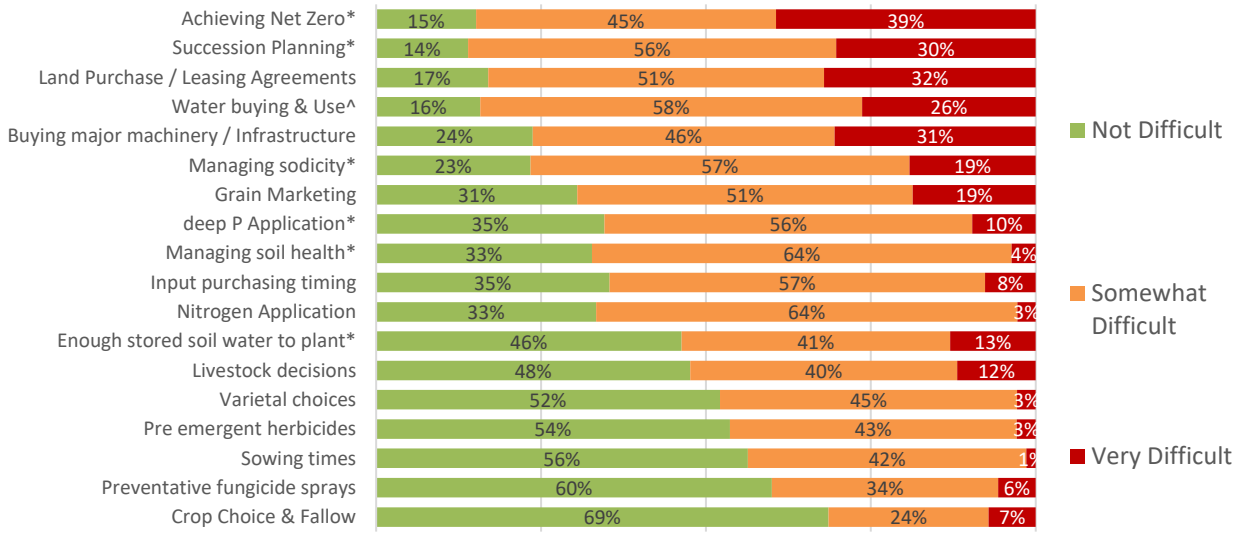

Figure 3: Rankings of difficulty from Queensland with additional decisions explored.

<u>Follow up questions for groups might include:</u>

- Why do you think you are finding difficulty in making this decision?
- What characteristics of the decision lead you to find it difficult?
- Are there things that you can do to reduce the difficulty? What is different about those in the room who find the same decision easy? Anything to learn from each other?

3. Strengths and areas of potential improvement in grain grower decision making are identified

While both seeking information and thinking in probabilities are widely undertaken by growers, the consistent trends regardless of decision type show that the weakest elements of grain grower decision making are decision review, running calculations (using spreadsheets, tools and software), having a calculation-oriented mindset, having a profit-orientated mindset and being open to risks (Figure 6). Such evaluations highlight areas where RiskWi$e can target to help improve decision making processes.

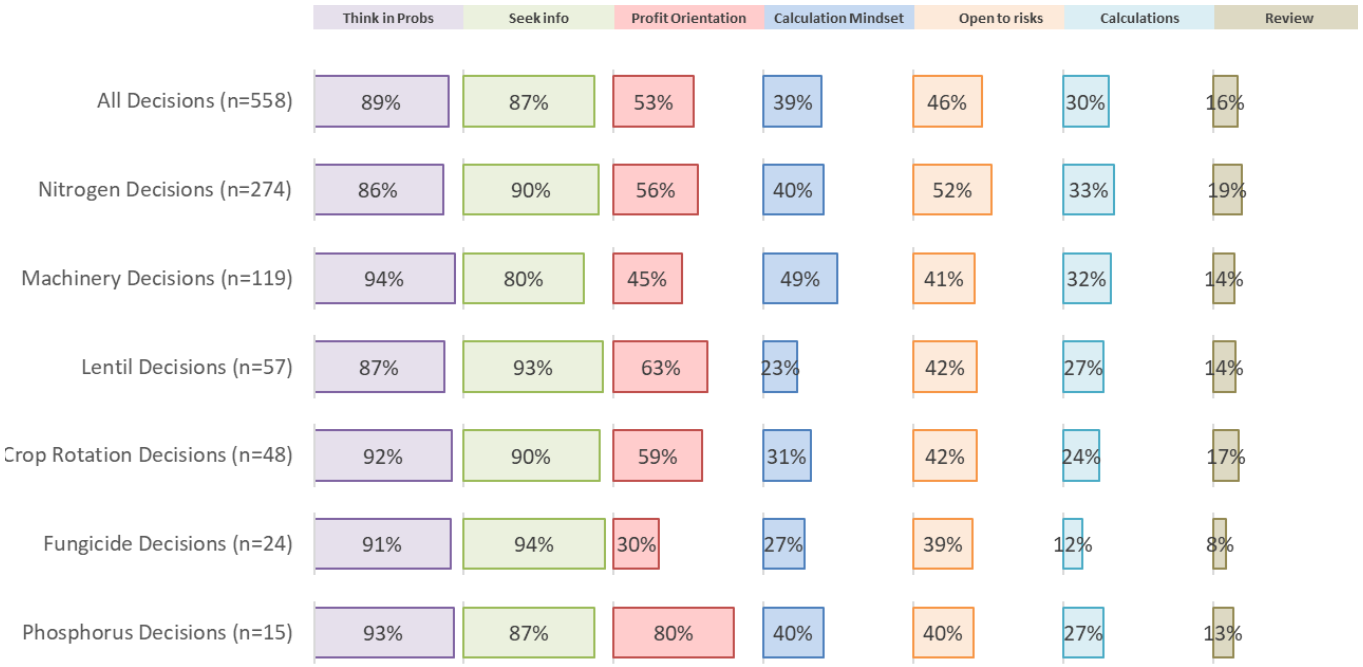

Figure 4: Individual component results across the seven components of the decision baseline framework.

Follow up questions for groups might include:

- Nearly all growers identify thinking in probabilities, but to what extent / how is it that you think in probabilities?
- Formal review of decision processes is limited. What constraints do you have to reviewing your decision process? Do you know how? Are you too time poor? Have you already moved onto the next decision?
- Using tools, spreadsheets and software is limited. Why do you choose not to use these to inform your decision? Are the tools not known, too hard to use, take too long or too hard to interpret? Do you feel no need to use it because your intuition is already strong enough? Have you outsourced to your advisor? What drives a lack of tool use?
- Risk tolerance is generally low. What causes you to be risk averse? Emotional scars? Debt? Fear of a bad upcoming season?
- Calculation guided intuition best serves good decision making. Why do you tend to defer to intuition? Time constraints? A lack of pathways to use and interpret calculations? Mental load?

4. Integrated profit risk decision making has substantial space for improvement

While Learning 3 focuses on individual elements, we can also assess the collective decision process. In doing so, only 2% of respondents did all seven elements of the decision framework to a strong extent, and even the strongest decision type (Lentil decisions) had 5% of elements done strongly together. The average aggregate score was 67%. This highlights that as a collective decision process; there is a lot of potential improvement to be made.

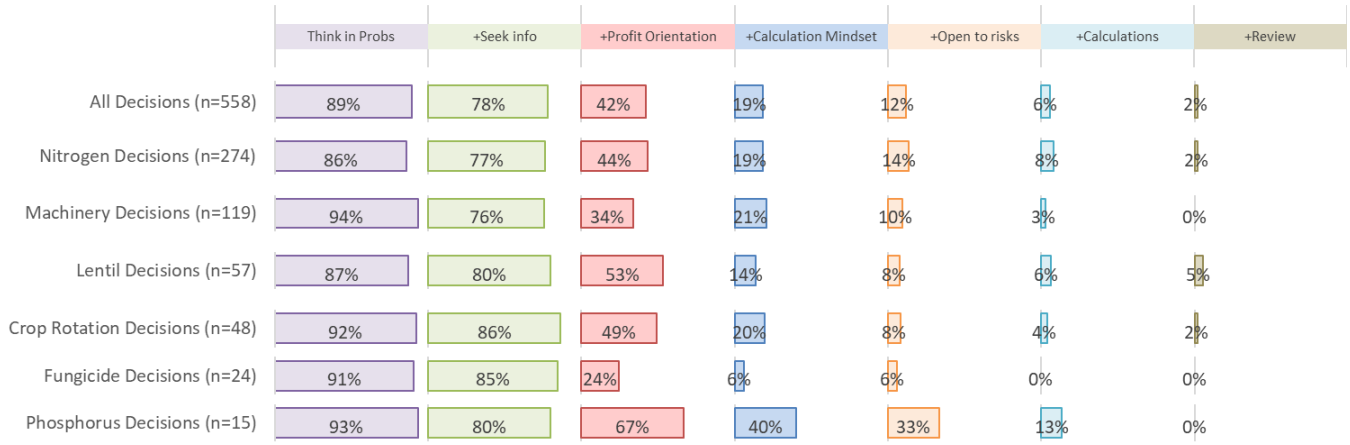

Figure 5: Collective component results across the seven components of the decision baseline framework.

5. While advisor decision processes are usually more robust than growers, they also have room for improvement

Across all six compared components (advisors seeking advice from advisors and growers has been removed), advisors are always more likely to have a stronger decision process. This is particularly true for elements that are shown to be less well done by growers (see learning 3): review and use of tools, spreadsheets and software. Despite this, there remains areas for improvement. For example, 3 in 5 advisors still do not implement a decision review process, 2 in 5 remain risk averse and 2 in 5 are intuition guided. Collectively, only 7% strongly apply all six assessed elements.

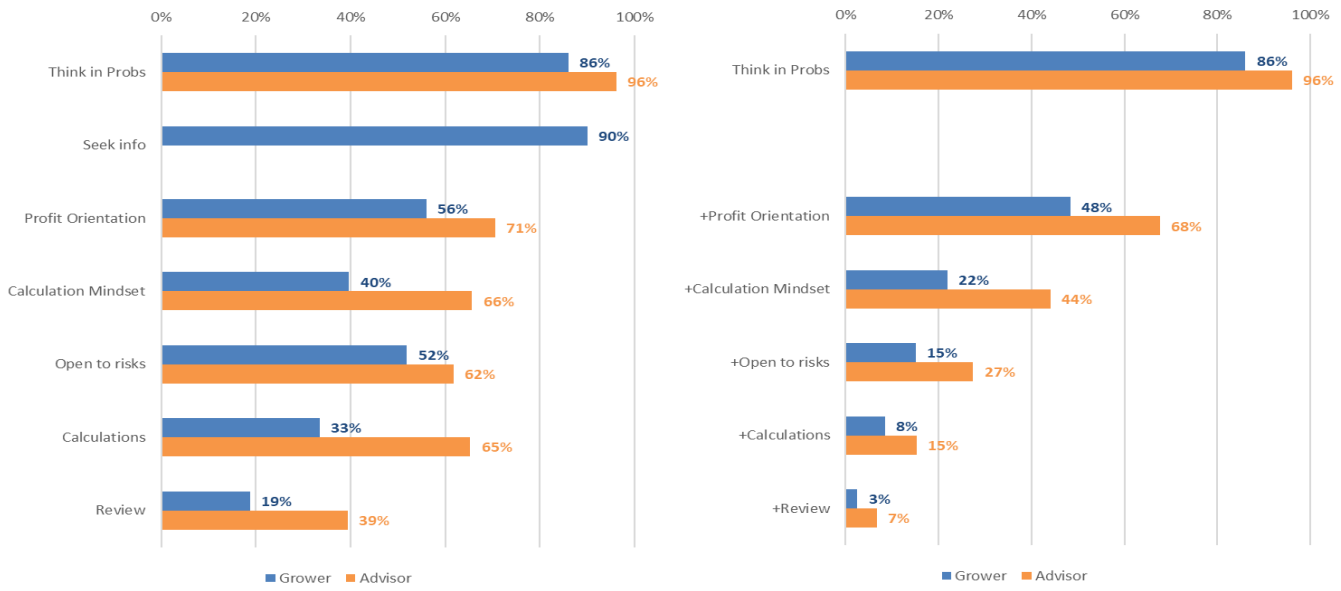

Figure 6: A comparison to grower and advisor decision making processes.

Follow up questions for groups might include:

- How do advisors structure their review approach, given it is more prevalent amongst them?
- For each element, what makes advisor approaches different?

6. Advisors are not just used for analytics

By exploring the perception of grower's calculation-intuition base and that of their local advisor, it is clear that advisors are not only used to provide calculation guidance. In only about half of respondents was the advisor perceived to be more analytical than the grower themselves. This shows that there are additional reasons, like regional knowledge of what is occurring that drive advisor use.

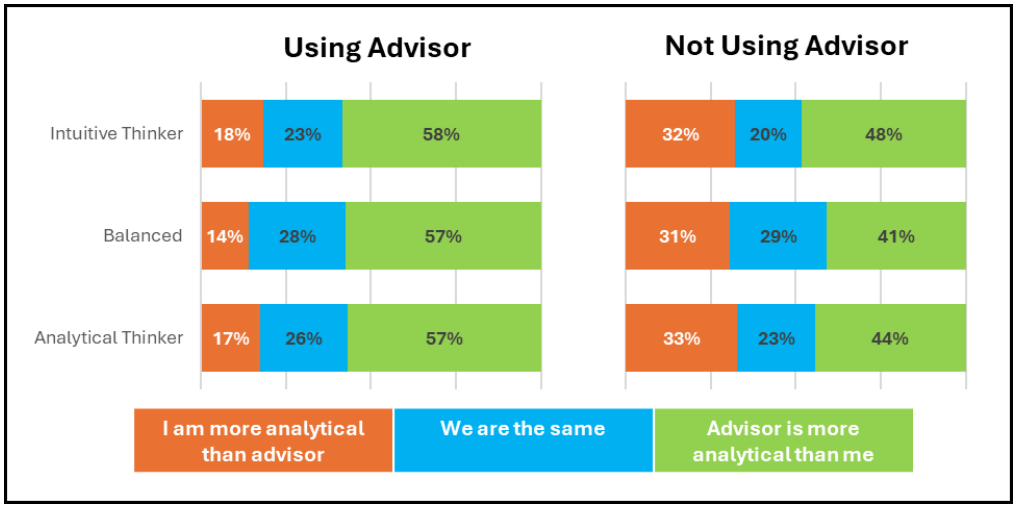

Figure 7: Comparison between growers perception of their intuition-calculation balance and perception of local advisor intuition and calculation.

Follow up questions for groups might include:

- For those using advisors, if not for analytics why do you choose to use an advisor?
- For those not using advisors, what are the main reasons to not use one?

7. There are two divergent approaches prevalent in Nitrogen decision making by grain growers

Using a principal component analysis of grower nitrogen decision making, a two-class result is established. These two classes diverge in key areas of calculation and logic to inform decision making. This result provides the first quantification of decision making in Australian grain systems that conforms with the concept of Fast and Slow thinking. It also highlights that amongst Australian grain growers about half fit into each category. This has strong implications on how to interact with growers on their decision making – given these are two divergent ways of thinking towards the same decision.

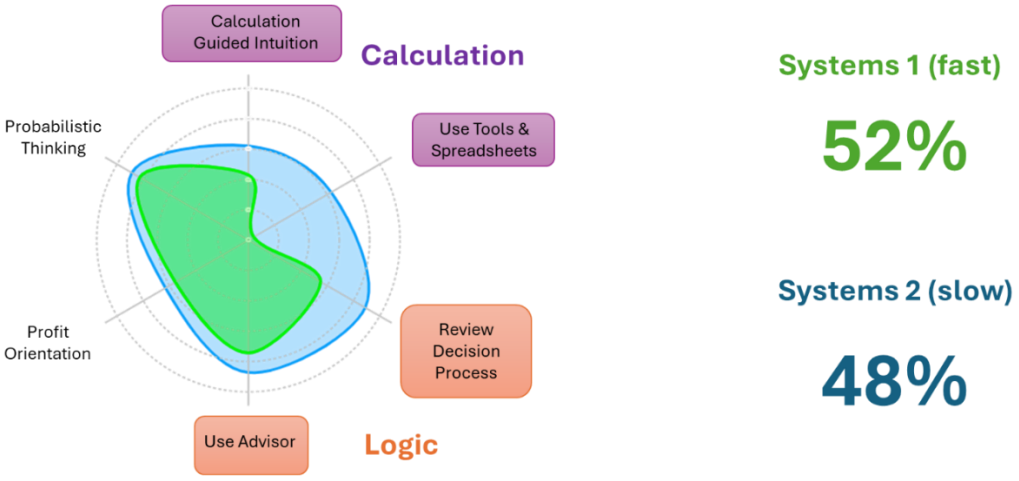

Figure 8: PCA analysis highlight two distinct decision approaches (Fast and Slow) in Australian Nitrogen decision making.

Follow up questions for groups might include:

- Do you associate with either approach?
- Do you perceive benefits from either approach?
- Do you see how the elements lead to a slower decision process?

8. More robust decision making has benefits to comfort and risk attitude

Growers with higher aggregate decision scores for their aggregate decision process are more likely to have higher decision comfort and less risk aversion ($p<0.05$). This provides a key logic to support the 'why' of RiskWi$e – if you strengthen your process, you are likely to have higher comfort and be less risk averse (therefore likely to lead to stronger overall profitability by maximising profit in the good years).

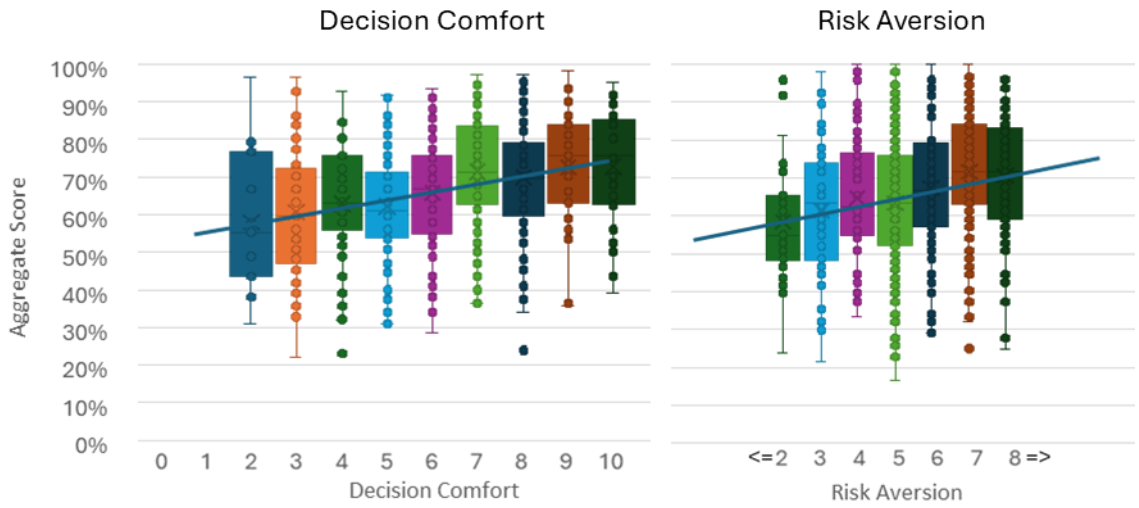

Figure 9: Grower Aggregate decision scores compared with comfort and risk aversion.

Likewise, through the principal component analysis, slow thinking is associated with higher comfort and lower risk aversion.

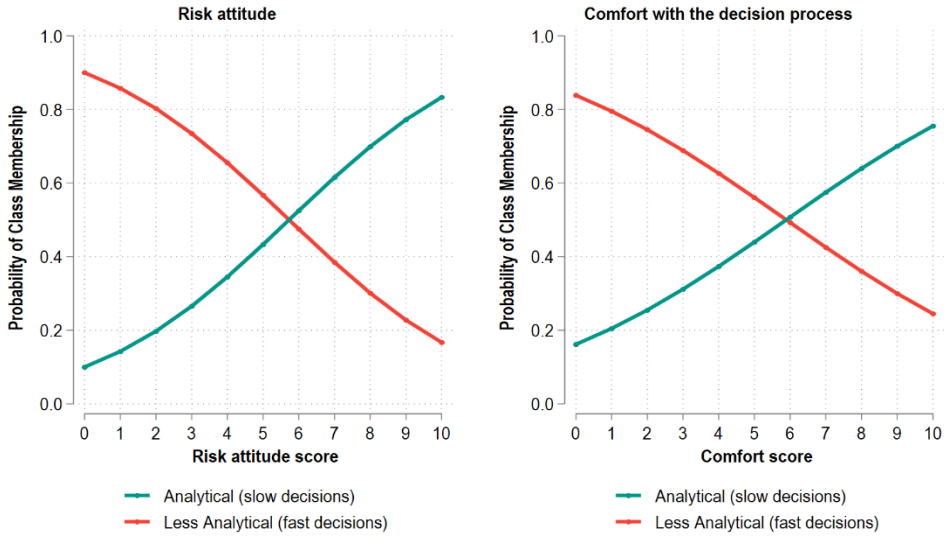

Figure 10: Slow and fast thinking compared with risk attitude and decision comfort.

Follow up questions for groups might include:

- Do you think that increasing your aggregate score or slowing down will lead you to higher comfort or less risk aversion? Why or why not?

9. Decision making is often not dominated by logic (head)

Growers estimate that on average only one third of their decision process (for either nitrogen or machinery decisions) is driven by the head (calculations and logic). This is roughly similar to advisors, while researchers tend to think that they are more head dominant in their decision making. Gut (intuition) is the next most likely component for growers, but hands (practicalities) are second for advisors. This has important considerations for researchers when designing extension content: their way of thinking may not be consistent with the groups of people they are looking to influence. It also highlights that providing numbers alone is unlikely to resonate and create change – we must also consider beyond the numbers when looking to address decision making approaches.

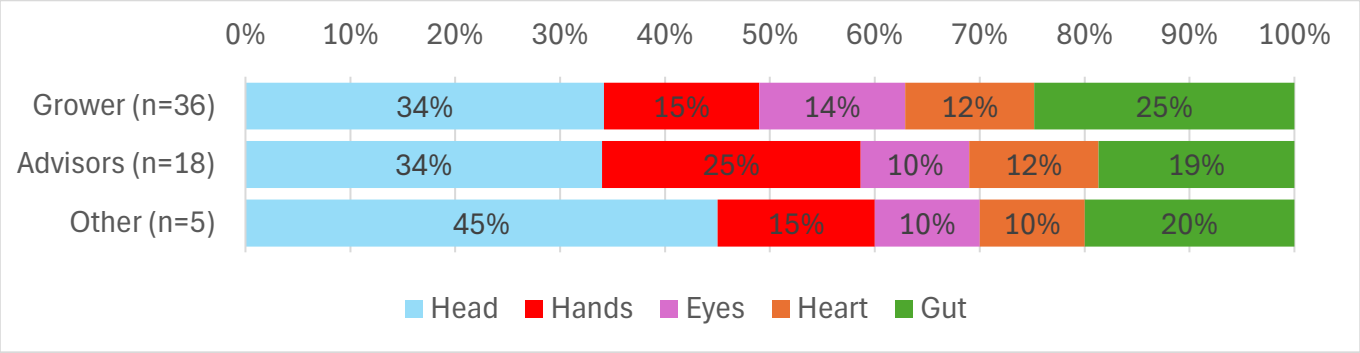

Figure 11: Comparison of average composition of decision making for three groups: Growers, Advisors and Researchers

From our sample of respondents in South Australia, 39% are head dominant thinkers, 28% are gut dominated thinkers, 7% are hand dominated thinkers and 4% are eyes dominant thinkers. Nobody was identified as a heart dominant thinker, while the remaining identified a balanced approach to their decisions. This again highlights the need not to only look for numbers as what is needed to influence decision making and seek methods to provide content to match potential audience mixes.

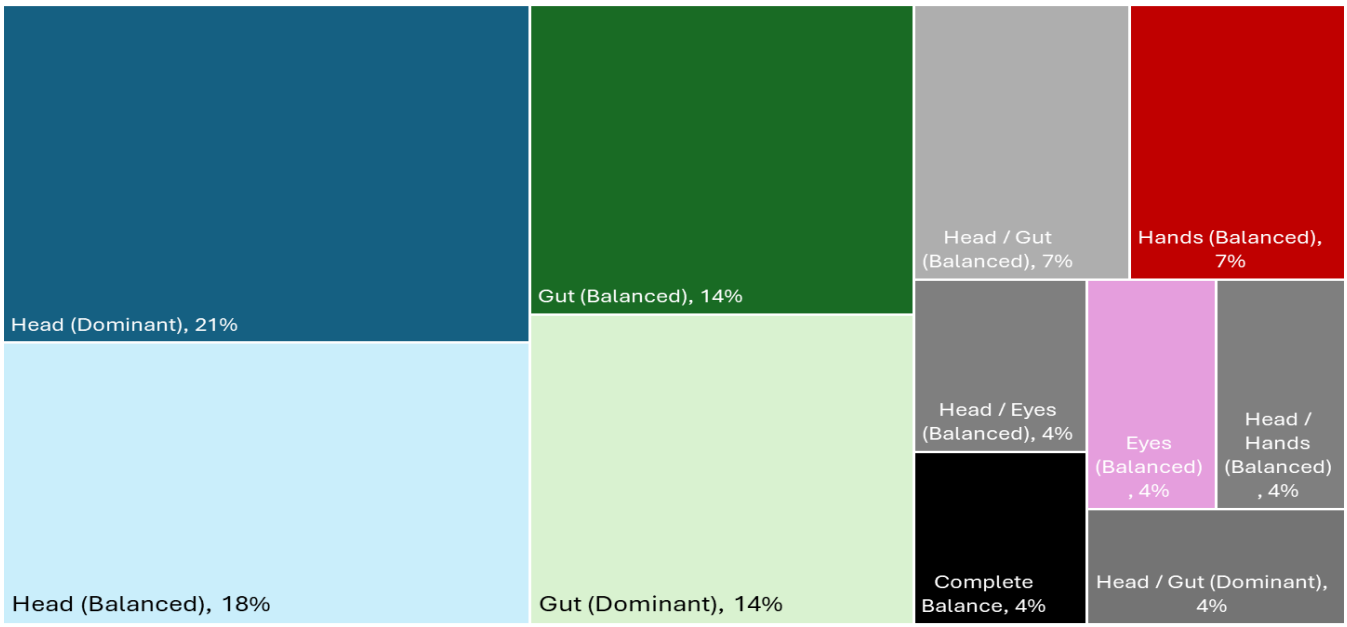

Figure 12: Dominant grower decision making profiles.

Follow up questions for groups might include:

- Which elements do you most associate with in your decision process?
- What are the benefits and constraints to each component?

N.B. the ambition is to continue to roll out this workshop to expand the learnings possible from this set of data.

10. Self-assessed capacity gaps exist in decision making processes.

Based on self-assessments, growers and advisors tend to see that they are not very good at controlling emotional memory, understanding the role of identity or relationship in decision making, although is some cases many think that they do it well. This highlights potential areas of discussion between people who think they do it well and people who don't. Counter to this, elements of the head and hands are generally perceived to be done well by the majority of respondents.

Element	Average	Not Doing Well	Doing Really Well	Component
Control Emotional Memory	1.2	41%	26%	Gut
Role of Identity	2.8	26%	19%	Heart
Role of Relationships	3.3	22%	37%	Heart
Define Assumptions	3.7	8%	25%	Eyes
Clear Frame of Success	4.1	17%	21%	Eyes
Clear Decision Boundaries	4.1	8%	33%	Eyes
Identify Biases	4.3	13%	42%	Eyes
Apply Past Experience	4.4	15%	44%	Gut
Apply Rules of Thumb	4.6	11%	48%	Gut
Cash/Credit	5.6	4%	54%	Hands
Inputs/Machinery	5.9	8%	65%	Hands
Risk Attitude	6	7%	56%	Heart
Good Mental State	6	7%	59%	Heart
Seek Advice	6.2	4%	56%	Head
Collate Data	6.4	4%	64%	Head
Labour/Skills	6.5	4%	65%	Hands
Do Calculations	6.7	4%	76%	Head
Farm Practicalities	7.3	4%	81%	Hands

Follow up questions for groups might include:

- These is a tendency to either do it well or not, so for those who think they do it well, how do you control emotional memory in your decision making?
- How do people approach the framing of identity and relationships in their decision making?
- Elements of the eyes are often the most poorly understood. What assumptions do people make when making this decision?
    - *N.B. the above are examples, but similar questions could be framed for each element.*

11. Many important components are not seen that way by growers and advisors

More than one third of respondents do not think that controlling emotional memory, having clear decision boundaries, having a clear frame of success, knowing how to usefully apply experience and being in a good mental state are important to making a good decision. These elements are known to be important to making a good decision, highlighting that a capacity gap may exist in understanding their decision process. No Element was perceived be important b more than 50% of respondents, despite all elements being crucial to a sound decision making process.

Element	Average	Don't think it is important	Think really important	Component
Control Emotional Memory	1.8	33%	19%	Gut
Clear Decision Boundaries	1.8	38%	8%	Eyes
Clear Frame of Success	2	38%	17%	Eyes
Apply Past Experience	2.1	33%	19%	Gut
Role of Identity	2.3	26%	19%	Heart
Role of Relationships	2.4	22%	19%	Heart
Good Mental State	2.4	44%	33%	Heart
Define Assumptions	2.5	29%	17%	Eyes
Apply Rules of Thumb	2.7	19%	30%	Gut
Identify Biases	2.8	17%	17%	Eyes
Risk Attitude	3	15%	26%	Heart
Do Calculations	3.4	24%	40%	Head
Collate Data	3.8	16%	28%	Head
Cash/Credit	4.6	19%	42%	Hands
Labour/Skills	4.7	12%	46%	Hands
Farm Practicalities	5.3	8%	50%	Hands
Inputs/Machinery	5.3	4%	46%	Hands
Seek Advice	5.4	4%	44%	Head

Follow up questions for groups might include:

- Why are each of these elements important or not important?
- How does each element influence decision making?

Framework Details

Two independent but interrelated frameworks have been developed. The first formalises the formally 'baseline' data collection through RiskWi$e (known as 'decision benchmarking'), while the second proposes a way to undertake a decision 'health check'. Both are detailed below. Both frameworks have been shared with the NPL and other key individuals within RiskWi$e to seek feedback and amended accordingly.

Decision Benchmarking

Conceptually, distinguishing between "good" and "right" decisions can help frame growers' behaviour under uncertainty. "Good" decisions (those consistently based on evidence and reviewed over time) are more likely to be "right" in terms of long-term outcomes [1]. However, understanding and measuring what constitutes a 'right' decision remains absent when applied to primary data on agricultural decision-making.

This work applies a framing grounded in principles of sound decision-making as widely identified in the literature. Our applied framing (Fig. 1) identifies and integrates the following elements as core to an effective review of decision processes:

1. **Scenario framing**: Considering multiple futures into decision making is integral to framing risky decisions, given by definition these decisions have multiple possible outcomes that are potentially impactful. Behavioural decision-making literature highlights that considering multiple potential outcomes improves robustness and mitigates biases such as overconfidence when risk is involved. Evaluating alternative scenarios engages more analytical thinking and enhances adaptability under risk [2].
2. **Risk Tolerance**: Understanding one's risk aversion or tolerance is integral to framing how risk is managed. For example, farmers' risk aversion is known to significantly affect nitrogen decisions, often limiting optimally high fertiliser use and constraining yield potential.
3. **Seeking information and advice**: Sourcing information to inform decisions is crucial to making a strong decision. Both formal and informal networks strongly influence decision-making, be they though advisory services or though peer networks [3].
4. **Undertaking calculations and integrating them into decisions**: Decision-making that prioritises analytical or evidence-based reasoning over intuitive judgement is more likely to produce robust outcomes under uncertainty [4]. In agricultural contexts, [2] and [5] emphasise that structured, calculation-based approaches help growers better manage risk and complexity, especially when supported by tools and iterative review.
5. **Lens of risk (production vs. profit):** A narrow, production-focused risk lens may limit decision-making, given a production focus may ignore shifts in pricing in input and output markets. Expanding the risk lens to profitability encourages a more holistic evaluation of outcomes and trade-offs [6].
6. **Review process**: A major form of 'slowing' thinking is the implementation of iterative review processes (reflective loops), which improve decision quality by embedding cycles of evaluation and adaptation [7]. Such reflective evaluation is critical to adaptive learning and enhances future decision-making.

[1] Hunt 2025

[2] Armitage et al. 2008

[3] Pickering et al. 2020

[4] Kahneman 2011

[5] Nicholson et al. 2015

[6] Hazell & Norton 1987

[7] Ensor & de Bruin 2022

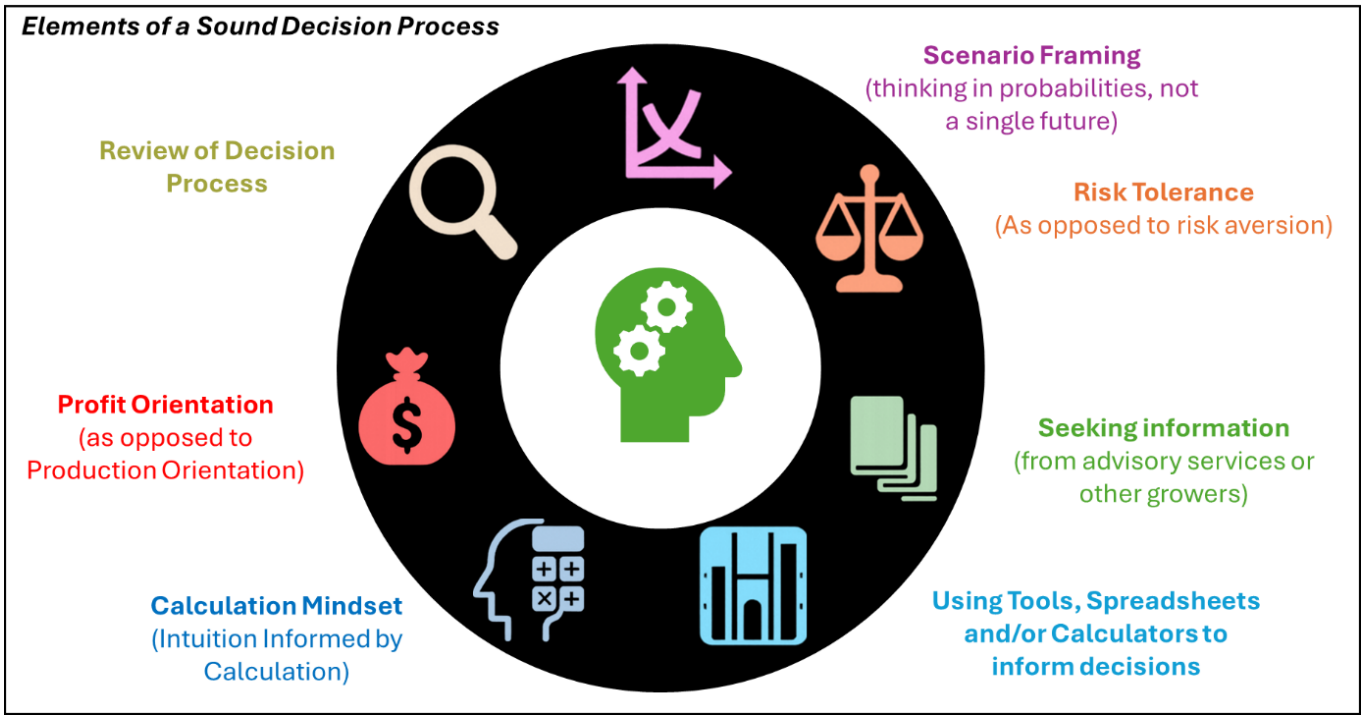

Figure 13: Integrated elements of a sound decision making process applied to baseline Australian grain grower decision making.

By combining these elements, an implementable assessment framed within 'Slow and Fast' thinking framework [4] can be applied. System one thinking is constituted by fast, intuitive thinking that may be characterised by limited reasoning, review and/ or calculation, while system two (slow) thinking reflects more deliberate understanding of mindsets, review, calculation and wider decision framing. As discussed by [8], this acknowledges that intuition plays a crucial role in agricultural decision-making but should be strategically informed by renewed logic to ensure accuracy.

[8] Nuthall & Old 2018

Framework Implementation:

The below table provides the implementation of the decision baseline framework, including the possible responses to each decision and additionally collected demographics.

Table 1: Implementation framework for the decision benchmarking activites.

Question	Type	Scale / Options
Framework Related		
Which statement best describes how you approach your nitrogen management decision process?	Categorical	I think about a single target outcome (single scenario), I consider multiple possible outcomes (multiple scenarios)
What is your risk attitude when considering nitrogen management decisions?	Likert	0 = Very risk averse, 10 = Not at all risk averse
Which sources do you use for nitrogen management decisions? • Agronomic advisor, • Farm business advisor, • Discussions with other growers, • Decision support tools (e.g., software, others' spreadsheets)	Categorical	Yes, No
What balance guides you between intuition (gut-feel informed by past experience) and numerical calculation (data-driven) when making a nitrogen management decision?	Likert	0 = Only intuition, 10 = Only calculation
What balance do you take between production or profitability expectations when making nitrogen management decisions?	Likert	0 = Only production, 10 = Only profitability
Have you undertaken any review of how you made your last nitrogen management decision process (not outcome)?	Categorical	New decision (not made before), No review process, A quick think, Informal discussions, Formal review
Outcome Related		
How comfortable are you with your decision process (not outcome) when making current nitrogen management decisions?	Likert	0 = Very uncomfortable, 10 = Very comfortable
Perception Related		
What balance do you believe advisors/consultants are guided by when advising on nitrogen management decisions between intuition and numerical calculation?	Likert	0 = Only intuition, 10 = Only calculation
Demographics		
Location	Categorical	Regions
Age	Numerical	years
Farm Size	Numerical	Ha
Farm Type	Categorical	Crops Only, Mixed Crop-Livestock
Role	Categorical	Grower, Advisor, Other

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In-Depth Decision Health Check

The decision health check is designed as a more in-depth framework though which to evaluate how a current decision is made, as opposed to the baseline that can be achieved within a 10-minute period. This decision check requires a one-to-two-hour workshop to complete. The health check framework proposes 18 elements that compose a decision process. These elements are based around 5 parts of the body, coined a 'whole of body decision review'. The origins of the framework come from the GRDC Farm Decision Making handbook[9], though the additional two elements of hands (practicalities) and eyes (perception) are explicitly added to increase the robustness of the framework. This has been based on a wider review of non-agronomic peer reviewed literature, given that the majority of work to date in Australia has not progressed beyond grey literature. Figure 2 provides the framework summary of each of the 18 elements, while table two provides more details and justification, as well as corresponding academic sourcing.

Framework Implementation:

After presentation of each element and subsequent discussion, participants are asked to weight each element from -10 to +10 for three questions:

- How much is this a part of my decision?
- How well do I do this?
- How important is getting this right important to making a good decision

[9] Nicholson et al. 2015

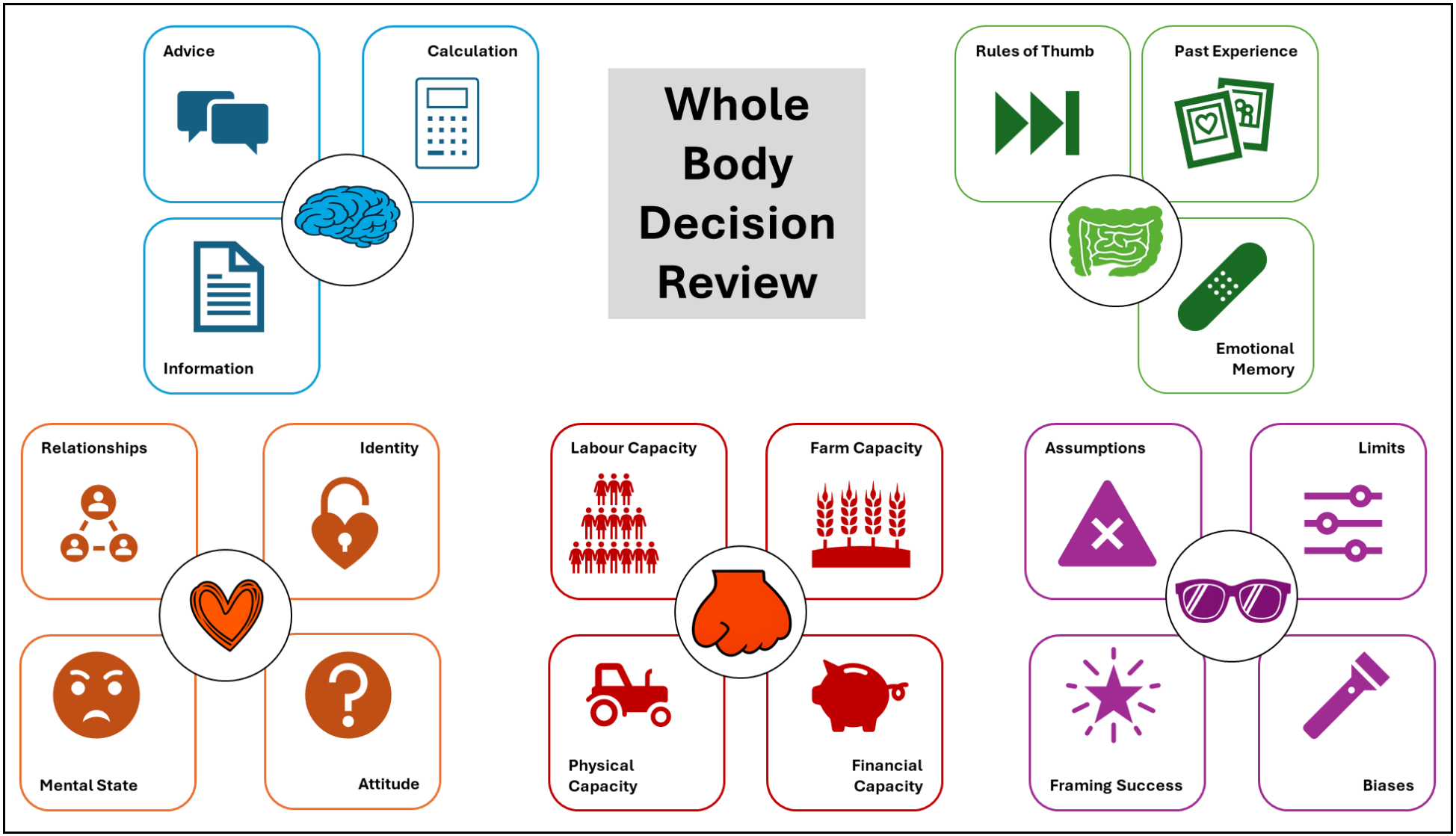

Figure 14: The proposed decision health check framework to discuss various elements of how a decisins is or was made.

Table 2: Details and justification of each component of the deision health check framework.

Element	Component	Description	Supporting Logic	Peer reviewed citation
Head 	Information	I have collated relevant data and information	Decisions improve when relevant information is integrated into a structured process that clarifies options and trade offs.	Hayden et al. 2021
	Calculation	I have calculated and compared possibilities	Quantitative comparison and model based evaluation strengthen choice consistency by reducing noise and clarifying expected outcomes.	Morelli, Casagrande, Forte 2022
	Advice	I have discussed with advisors and peers	Advice seeking can improve accuracy (when quality signals are clear).	Hütter and Ache 2023
Heart 	Identity	I feel this is me	Identity and values influence goal selection, shaping choice criteria and persistence in farming and business decisions.	Hayden et al. 2021
	Mental state	I feel I am in a good space to make this decision	Mental states can impact risk perception, attention and evaluation.	Ferrer and Mendes 2017
	Relationships	I feel this is the right call for my family business community	Relational commitments influence strategic choices and acceptance of trade offs.	Hayden et al. 2021
	Risk Attitude	I feel comfortable with the uncontrollables	Risk attitudes and tolerance shape option selection under uncertainty, influencing willingness to act.	Morelli, Casagrande, Forte 2022
Gut 	Past experience	I am aware of how experiences apply to this decision	Experience guides pattern recognition and rapid evaluation, improving decision speed in familiar domains.	Morelli, Casagrande, Forte 2022
	Rules of thumb	I am aware of the shortcuts I apply to this decision	Heuristics can be adaptive in uncertain environments, enabling fast evaluation when information is limited.	Acciarini et al. 2021
	Emotional memory	I am aware of how past events shape my reaction	Emotional memory can guide option evaluation, guiding choice through physical and emotional signals.	Bedia and Di Paolo 2012
Eyes 	Framing success	I see what I want from this	Framing shapes preferences by altering perceived gains and losses, which can shift choices even when objective facts are constant.	Acciarini et al. 2021
	Limits	I see what I am including and leaving out	Bounded attention and scope definition influence judgments through selection and omission effects.	Morelli, Casagrande, Forte 2022
	Assumptions	I see the key assumptions I have made	People are often unaware of the assumptions and biases shaping their choices, and that these hidden influences can lead to decisions that appear rational but are actually distorted.	Newell and Shanks, 2014
	Biases	I see why I favour one option over another	Systematic biases such as overconfidence and anchoring affect professional decisions across domains, altering evaluation and choice.	Berthet 2022
Hands 	Farm capacity	I have adapted for my farming system	Strategic choices reflect fit with system level constraints and capabilities, balancing financial and non financial factors.	Hayden et al. 2021
	Physical capacity	I have adapted for available inputs and machinery	Resource and equipment constraints shape feasible sets and timing of actions in farm management.	Hayden et al. 2021
	Financial capacity	I have adapted for cashflow and constraints	Liquidity and capital structure constrain option execution and risk exposure in farm expansion and operations.	Hayden et al. 2021
	Labour capacity	I have adapted for available people and skills	Labour availability and skills determine implementability and productivity, shaping practical decision boundaries.	Hayden et al. 2021

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Data Collection / Framework Implementation

To date, the decision benchmarking has been implemented with 939 respondents (of which 396 have been during 2025), while the decision health check has been implemented with 59 respondents. The details of this are provided in Table 3.

Table 3: Summary of data analysed to date across the decision benchmarking and decision health check studies.

Decision Benchmarking

Dataset Summary					
Responses		Total	Grower	Advisor	Other
		939	705	196	38
Respondent Type					
2023		411	312	82	17
2024		132	96	25	11
2025		396	297	89	10
Topic Assessed					
Nitrogen Decisions		440	315	102	23
Machinery Decisions		216	185	28	3
Lentil Decisions		93	74	14	5
Crop Rotation Decisions		89	51	37	1
Fungicide Decisions		44	33	9	2
Carbon Farming Decisions		20	11	5	4
Phosphorus Decisions		15	15	0	0
Sowing Decisions		9	8	1	0
Cash Flow Decisions		6	6	0	0
Grain Marketing Decisions		5	5	0	0
Acid Soil Decisions		2	2	0	0
GRDC Region					
Southern		524	425	84	15
Northern		274	163	90	21
Western		141	117	22	2
Action Research Group					
Northern	NSW	194	124	49	21
Southern	Mallee (SA and Vic)	178	148	26	4
Southern	SA - Mid North Region	175	148	26	1
Southern	Eyre Peninsula	171	129	32	10
Western	WA	141	117	22	2
Northern	QLD	80	39	41	0

Decision Health Check

Group	HART	MSF	Total
Decision	Nitrogen Top Dressing	Machinery Replacement	All
Grower	28	8	36
Advisor	17	1	18
Researcher	5	0	5
Total	50	9	59