

UNLOCKING THE VALUE OF NATURE: NSW CENTRAL & TABLELANDS REGION FINDINGS



***Farming for the Future* is a world-leading research and change activation program. It was initiated by the Macdoch Foundation in 2021 in response to the increasing urgency for agriculture to play an active role as a nature-based solution to climate change and biodiversity loss whilst continuing to produce high quality food and fibre.**

Farming for the Future's Livestock Pilot Program was funded by philanthropy, Meat & Livestock Australia and Australian Wool Innovation, and undertaken in collaboration with Australian producers and their trusted advisors between 2022 and 2024. It aimed to produce the first national-scale evidence base linking on-farm natural capital to business performance.

Farming for the Future's Livestock Pilot Program surveyed 130 livestock businesses in selected broadacre farming regions of NSW, Victoria, Tasmania and Western Australia. It collected fine scale natural capital information alongside detailed financial and production data via remote sensing, expert ecological observations and producer interviews. The resulting dataset is the largest of its kind in the world and reveals insights into the role natural capital can play in supporting the productivity, profitability and resilience of Australian producers.

In this document we summarise findings from *Farming for the Future's* Livestock Pilot Program, as they relate to the Central & Tablelands study region. This region encompasses specific subregions in central and northern parts of NSW (Figure 1).

We surveyed a total of 54 farms in the NSW Central and Tablelands study region, with farms ranging in size from 428 ha to 6741 ha (mean farm size 2050 ha). We collected farm-scale production and financial data for the 5-year period from 2017 – 2022.

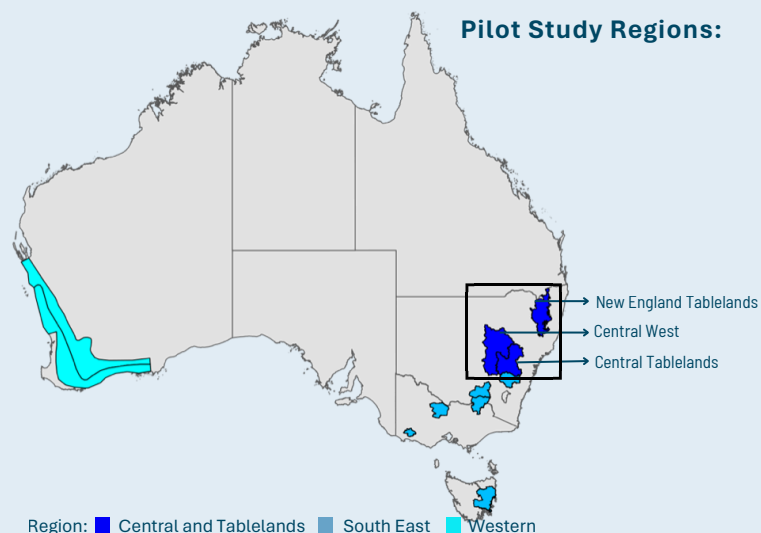


Figure 1: Farming for the Future's Central & Tablelands study region.

Farm Business relationships in the Central & Tablelands study region

We have used statistical techniques to isolate the effect of natural capital (as distinct from other potential effects associated with rainfall, land capability and farm management and other factors) on farm business performance.

We test for the effect of natural capital using six different natural capital metrics: Proximity, Ground cover, Forage condition, Ecological condition, Aggregation and Connectivity. We measure farm business performance using four key indicators: production efficiency, livestock gross margin, earnings before interest and tax (EBIT) and resilience. Links to documents containing additional details on how each of these were calculated are provided on the final page of this document.

The heatmap below shows all statistically significant natural capital-business performance relationships identified from our analysis of farms in the NSW Central & Tablelands study region. Of the 24 natural capital - business performance relationships tested, 4 were positive (3 with strong or moderate statistical evidence and 1 with weak statistical evidence), 3 were non-linear (i.e. they could be positive or negative at different natural capital levels), and only 1 was negative (with weak statistical evidence; Figure 2).

NATURAL CAPITAL METRICS	BUSINESS PERFORMANCE INDICATORS			
	PRODUCTION EFFICIENCY	LIVESTOCK GROSS MARGIN	EBIT	RESILIENCE
PROXIMITY				0.039
GROUND COVER	0.001			
FORAGE CONDITION	0.003	0.094	0.041	0.001
ECOLOGICAL CONDITION				<0.001
AGGREGATION				
CONNECTIVITY		0.082		
	Moderate or strong statistical evidence for a positive relationship at $p < 0.05$			
	Weak statistical evidence for a positive relationship at $p < 0.1$			
	Statistical evidence of a non-linear relationship			
	Weak statistical evidence for a negative relationship at $p < 0.1$			
	Moderate or strong statistical evidence for a negative relationship at $p < 0.05$			

Figure 2: Summary of natural capital – farm business performance relationships. Figures are p value showing statistical significance level. Blank squares are cases where no relationship was detected between natural capital metrics and farm performance indicators.

The positive relationships between natural capital and farm productivity, profitability and resilience reported by *Farming for the Future's* Livestock Pilot Program point to specific situations where natural capital investment may help producers to achieve their business objectives. Details of most impactful relationships for each of the business performance indicators are detailed in the following pages. Note that Gross Margin and EBIT are discussed together for this region, as these two business performance indicators showed very similar relationships with natural capital in this study region.

It is important to note that the sample sizes analysed for Central & Tablelands study region to date are small; more information and additional analyses would be required to establish causal relationships. All relationships presented in this document should be discussed with an experienced farm advisor to assist with interpretation of the *Farming for the Future* research findings and implementation of any natural capital management changes. A list of farm advisors and accountants who have participated in the *Farming for the Future* program is provided on the final page of this document.



NATURAL CAPITAL FOR PRODUCTION EFFICIENCY

What is production efficiency?

Production efficiency is a comparative measure of how efficiently an enterprise produces output, using its inputs, compared to other similar enterprises. It can be thought of as the ratio of output produced to inputs used. Production efficiency calculations relate exclusively to the livestock enterprise operations of participating farm businesses.

Which elements of natural capital support production efficiency?

The natural capital element that had the greatest impact on livestock production efficiency in the south-eastern region was **Forage condition**.

Forage condition measures the capacity of a pasture to provide palatable forage to livestock while maintaining essential ecosystem functions to ensure long-term production viability and landscape resilience.

Moving from the lowest to the highest Forage condition scores observed on farms in the Central & Tablelands region was associated with an increase in production efficiency of +6%.

What might be driving this relationship?

Forage quality, including crude protein content and leafiness/stage of growth (which affects digestibility) are considered key determiners of palatability – i.e. the degree to which livestock find a plant desirable. A higher forage condition score is likely to be associated with a higher volume of high-quality pasture that is a desirable food source for grazing livestock.

Perennials also contribute to flow and storage of soil carbon, improve soil structure and prevent compaction, reduce runoff and erosion during high rainfall events and provide litter for nutrient cycling and to prevent soil drying. These are important factors for managing risks associated with a more variable climate and may help to provide forage for livestock during difficult weather or climate events.

How can I improve my Forage condition score?

Forage Condition could be improved by increasing the density and diversity of palatable perennial grass species (exotic and/or native). Valuable annual pastures and legumes also increase values when filling gaps within a perennially dominated pasture.

Other considerations

Ground Cover also showed a strong statistical relationship with the production efficiency of farms in the NSW Central and Tablelands regions. This was a threshold effect, whereby ground cover scores up to ~0.75 improved production efficiency but further increases to ground over beyond this level came as a trade-off with production efficiency.

PRODUCTION EFFICIENCY AND FORAGE CONDITION

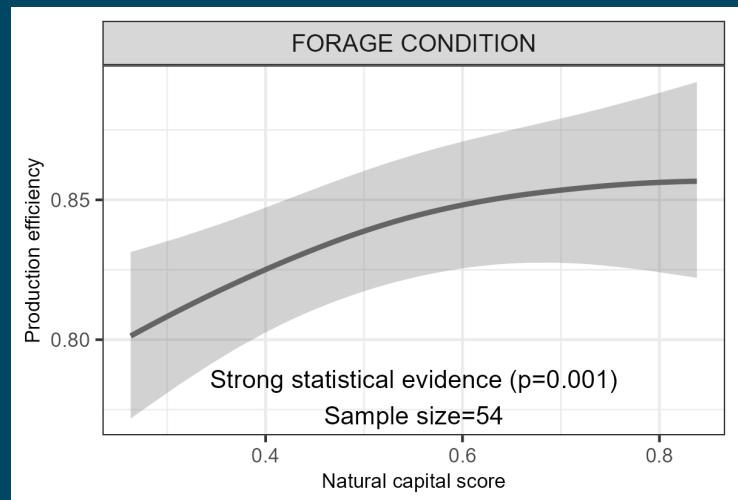


Figure 3: Centra & Tablelands study region relationships between Production efficiency margin and Ecological condition.

NATURAL CAPITAL FOR GROSS MARGIN AND EBIT

What is gross margin?

Gross margin is a measure of variable profit for a particular activity, enterprise, or business. It does not include fixed costs or costs associated with farm infrastructure. In these reports, gross margin calculations relate exclusively to the livestock enterprise operations of participating farm businesses. In our analyses, we present gross margin on a per hectare basis (per hectare of livestock area).

What is EBIT?

EBIT = Earnings Before Interest and Tax. EBIT is a measure of whole farm profit. It includes all farm income, variable and fixed costs, and depreciation / amortisation of farm infrastructure. EBIT refers to earnings across the whole farm business, not just the livestock enterprise.

Which elements of natural capital support gross margin and EBIT?

The natural capital element that had the greatest impact on livestock gross margin and EBIT in the NSW Central and Tablelands region was **Forage Condition** (Figures 4 and 5).

GROSS MARGIN AND FORAGE CONDITION

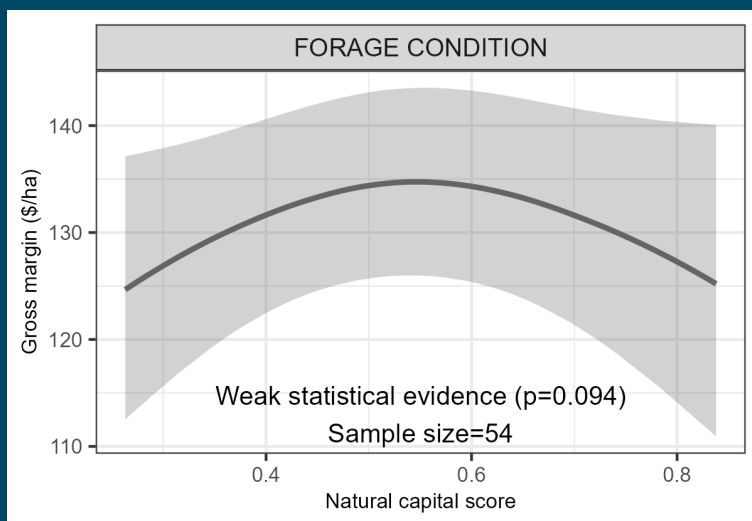


Figure 4: Central & Tablelands study region relationships between gross margin and Forage condition

EBIT AND FORAGE CONDITION

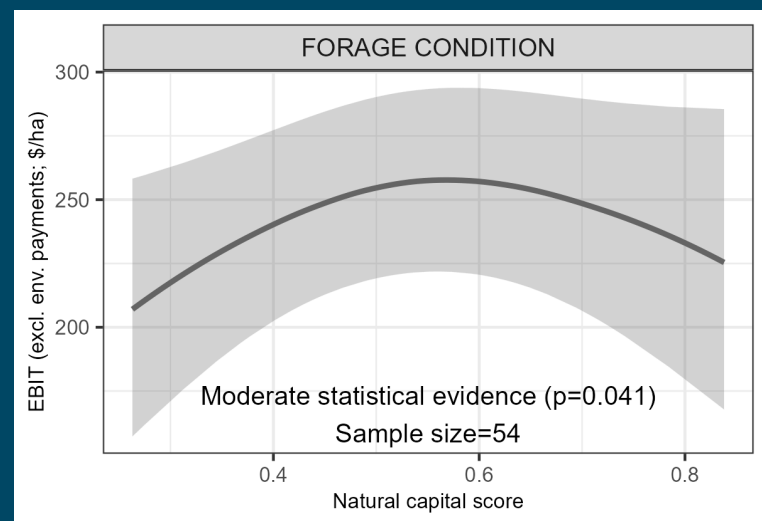


Figure 5: Central & Tablelands study region relationships between EBIT and Forage condition

Forage Condition measures the capacity of a pasture to provide palatable forage to livestock while maintaining essential ecosystem functions to ensure long-term production viability and landscape resilience.

The relationship between business performance (gross margin or EBIT) and Forage Condition was non-linear: improving Forage Condition was associated with improved business performance up to a point (Forage Condition score of ~0.6), but further improvements to Forage Condition came as a trade-off with a farm's financial performance.

Moving from the lowest to the optimal Forage Condition scores observed for this region was associated with an increase in livestock gross margin of +\$10 per ha and increase in EBIT of +\$45 per ha.

What might be driving this relationship?

Forage Condition can bring a range of production benefits (as described on the previous page in relation to the production efficiency – Forage Condition relationship observed in the the NSW Central and Tablelands region. But improving Forage Condition may be expensive, and at some point (Forage Condition score of ~0.6) the cost of further improvements to Forage Condition may outweigh the associated production benefits.

How can I improve my Forage Condition score?

Forage Condition could be improved by increasing the density and diversity of palatable perennial grass species (exotic and/or native). Valuable annual pastures and legumes also increase values when filling gaps within a perennially dominated pasture.

NATURAL CAPITAL FOR RESILIENCE

What is resilience?

Financial performance relative to variation in rainfall. This is calculated based on EBIT values. We developed a resilience metric that reports on financial performance relative to underlying variability in rainfall using the equation:

$$\text{Resilience} = 1/\text{standard deviation (EBIT)} / \text{standard deviation (rainfall)} * \text{performance decile}$$

The performance decile was rated from 1 (lowest decile EBIT for the relevant year) to 10 (highest decile EBIT for the relevant year). This term accounts for the relative performance of a farm in different years. For example, EBIT of \$300 ha may represent above-average performance in a drought year but below-average performance in a good season. Our resilience metric was averaged across all years of the time series and scaled between 1 and 100 (with 100 being most resilient).

Which elements of natural capital support resilience?

The natural capital element that had the greatest impact on Resilience in the NSW Central & Tablelands region was **Ecological Condition**.

Ecological Condition indicates how much or how little our farming landscapes have changed from their original (reference) condition (where a value of 1 = reference condition, 0 = completely modified).

Moving from the lowest to the highest Ecological Condition scores observed on farms in the NSW Central and Tablelands region was associated with an increase in Resilience of +15.

Other natural capital indicators that were positively associated with production efficiency in the NSW Central and Tablelands region are: Forage Condition.

RESILIENCE AND ECOLOGICAL CONDITION

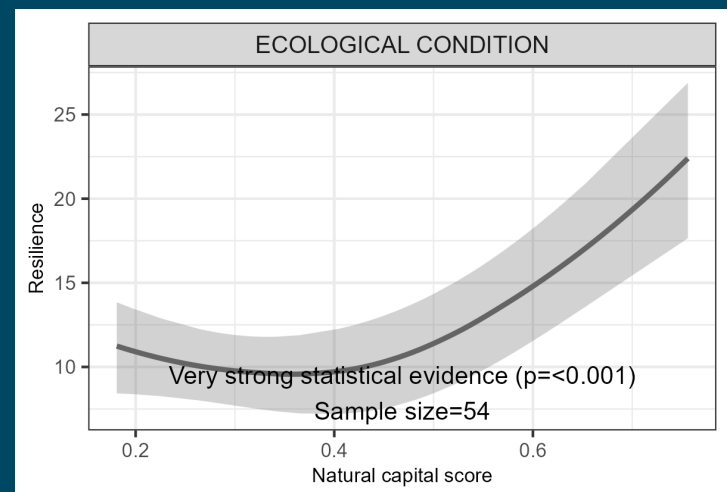


Figure 6: Central & Tablelands study region relationships between resilience and Ecological condition

What might be driving this relationship?

Ecological Condition is a strong predictor of native plant diversity, and native ecosystems can provide many benefits to farm production including habitat for beneficial species (such as pollinators and pest predators) and maintaining genetic diversity which can help with landscape resilience.

How can I improve my Ground cover score?

A farm's Ecological Condition score is generated by measuring the extent of canopy cover, the ratio of native to exotic plants and shrubs and the extent of their cover, and evidence of tree regeneration. These metrics are then compared to the reference condition for the original biome (forest, woodland, shrubland, grassland) of the landscape.

Depending on the original biome of an area, Ecological Condition values could be increased over time with diverse environmental plantings, natural tree and shrub regeneration and changes to ground layer native grass and forb diversity.

Other considerations

There was moderate statistical evidence of a negative relationship between Resilience and **Proximity**.

A NOTE ON DIFFERENT FARM TYPES

Different farms use and rely on natural capital in different ways. The results in this brochure summarise the findings for a typical farm in our farm sample from the NSW Central and Tablelands region. These farms tended to have relatively low inputs, and relatively high levels of on-farm vegetation (ground cover and canopy cover).

But farms that are not typical of the region (or not typical of our farm sample in the region) may benefit more from different natural capital interventions from those described here:

Intensive farms with very high inputs appear to benefit most by improving their

- **Ecological Condition** (for Production Efficiency and Resilience) and
- **Ground cover** (for EBIT and Resilience).

For these farms, improving Forage Condition can have a negative impact on farm business performance.

Mixed farms with moderate input levels appear to benefit most by improving their

- **Ecological Condition** (for Production Efficiency, EBIT and Resilience) and
- **Proximity** (for Production Efficiency, gross margin and EBIT, but this has a negative relationship with Resilience).

NEXT STEPS

Over the next five years, *Farming for the Future* aims to secure funding to enable it to expand its research activities to apply to other types of agriculture and include farm enterprises across all Australian states and territories. This will enable the creation of a dataset that is representative of the breadth of farm operation types, sizes, and locations across the Australian landscape, and help build a financially prosperous, climate-resilient agriculture sector for Australia.

OTHER RESOURCES

Expert farm advisors familiar with the *Farming for the Future* Research can be found on our webpage:

[Farmingforthefuture.org.au/about-us](https://farmingforthefuture.org.au/about-us)

Farming for the Future publishes its findings and related reports as linked below on its webpage:

[Farmingforthefuture.org.au/resources](https://farmingforthefuture.org.au/resources)

 [Farming for the Future program summary](#)

 [Example Natural Capital Farm Report](#)

 [Initial livestock pilot findings](#)

 [Natural Capital Methods paper](#)

[Our peer-reviewed research publication can be found in the link below](#)

 [Agricultural Systems Vol 231 Jan 2026](#)





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