

Key learnings for mixed farming systems drought resilience 2025

Charles Sturt University Wagga Wagga trial site (Ashmont Farm)

By Gulbali Institute Research Team, March 2026

Summary

At the Charles Sturt University Ashmont Farm trial site in Wagga Wagga, the 2025 season of the Southern NSW Drought Resilient Mixed Farming System Long-term Field Trials project Wagga provided an important test of system resilience with decile 2-3 rainfall (a dry or moderate drought season), delayed crop sowing opportunities, and persistently high weed pressure – particularly glyphosate-resistant annual ryegrass (ARG) and fleabane.

The Wagga Wagga trial site is the central hub of a network of seven research trials, and its aim is to compare the productivity and resilience of four different farming systems:

1. Traditional mixed farming system – Wolfe (grains focus)
2. High intensity mixed farming system – Kirkegaard (livestock focus)
3. Ley farming system – O’Hare (two years annual pasture, two years crop)
4. Continuous cropping

What we have observed from one year of research at Wagga in 2025 is that the three mixed farming systems – Traditional, High intensity and Ley – demonstrated contrasting production pathways that generated similar overall gross margins, albeit through different combinations of livestock and cropping contributions. In contrast, the continuous cropping system produced lower gross margins due to the high cost of production and low yields for faba beans and canola.

Seasonal conditions and key drivers

The site received 494 mm annual rainfall, with only 22 mm falling in March–April, significantly delaying sowing for main-season crops until late May and early June. Establishment of autumn-sown dual-purpose crops and pastures was restricted, resulting in greater reliance on strategic grazing rotations, confinement feeding, and tactical herbicide choices to suppress weeds.

Crop performance

Dry sowing constraints influenced establishment and yield across all four of the systems:

Canola (dual-purpose and main-season)

- Dual-purpose canola sown in March 2025 had poor early establishment, eliminating the main grazing window and reducing biomass value. Crops taken through to harvest yielded 0.7–0.8 t/ha, producing negative gross margins. Grazing and forage (hay) production proved a better use of these crops.
- Main-season canola, sown 21 May 2025, averaged 2.7 t/ha, lower than a nearby benchmark trial (3.5 t/ha).

Wheat

- Ironbark wheat averaged 5.5–5.9 t/ha, slightly below the nearby benchmark (6.6 t/ha).



- Despite high plant densities (200–255 plants/m²), grazing was avoided due to pasture availability and to prioritise grain yield.

Barley

- Barley yields ranged from 6.0–7.4 t/ha, with the continuous cropping system outperforming the three mixed-farming systems, and there were higher screenings in the mixed-farming systems. The only difference in management was that barley establishment was preceded by grazing of wheat stubbles in the mixed-farming systems, but it is not clear if this was the reason for the yield difference.

Faba beans

- Yields averaged 1.9–2.1 t/ha, substantially below the nearby benchmark trial (3.3 t/ha), which affected the cropping gross margins.

Pasture performance and grazing systems

Pasture performance varied dramatically depending on the timing of rainfall and establishment success:

- Lucerne provided some Autumn feed in the mixed-farming systems and consistent feed supply through the Spring, supporting 60–77 grazing days per plot and contributing significantly to lamb growth.
- No grazing value was observed from hard-seeded legumes in Autumn, but high lamb production was recorded from these pastures through Spring.
- A vetch mix (including oats + clovers) provided substantial spring grazing (up to 2464 DSE grazing days/ha), extending the feedbase for the weaners in the high intensity mixed farming system (Kirkegaard).

Sheep production

Lambing occurred under severe feed constraints in 2025, requiring 86 days of supplementary feeding in the traditional (Wolfe) and high intensity (Kirkegaard) mixed farming systems and 41 days in the Ley mixed farming system. Despite this, lamb survival and growth performance remained acceptable for a dry / moderate drought year:

- Mean weaning weight for the lambs was 30 kg, with no significant difference across systems and 1.2 lambs weaned per ewe
- Mean sale weights:
 - Ley: 54.1 kg per head
 - Traditional (Wolfe): 52.4 kg per head
 - High intensity (Kirkegaard): 49.8 kg per head, however the highest production per area grazed

Ewe liveweights were lowest at lamb marking but recovered quickly once returned to rotational grazing of pastures.

Gross margins (2025 preliminary results)

Gross margins were calculated using spot commodity prices, NSW DPIRD sheep gross margin frameworks, and system-specific input costs (fertiliser, herbicides, supplementary feed, hay making, pasture establishment). Key preliminary findings include:

- No significant difference in gross margin between the three mixed farming systems (Traditional (Wolfe), High intensity (Kirkegaard) and Ley) (see Figure A1)
- Livestock contributed a higher proportion of gross margin in the High intensity and Ley systems due to higher farm stocking rates and strong lamb sale values
- The Ley mixed farming system benefited from substantial hay returns, particularly pasture hay, which had high market value in spring 2025
- Cropping had a comparatively lower contribution to farm gross margins across all systems due to:
 - High weed management costs
 - Low faba bean and canola yields
- Negative returns from dual-purpose canola taken to grain
- The Continuous cropping system generated the lowest cropping returns due to reliance on canola and faba beans (50% of area), both of which performed poorly in 2025

An estimated improvement of \$110/farm ha in the High intensity system would have been achievable had a spring (short-season) canola cultivar been used instead of a winter (main-season) type.

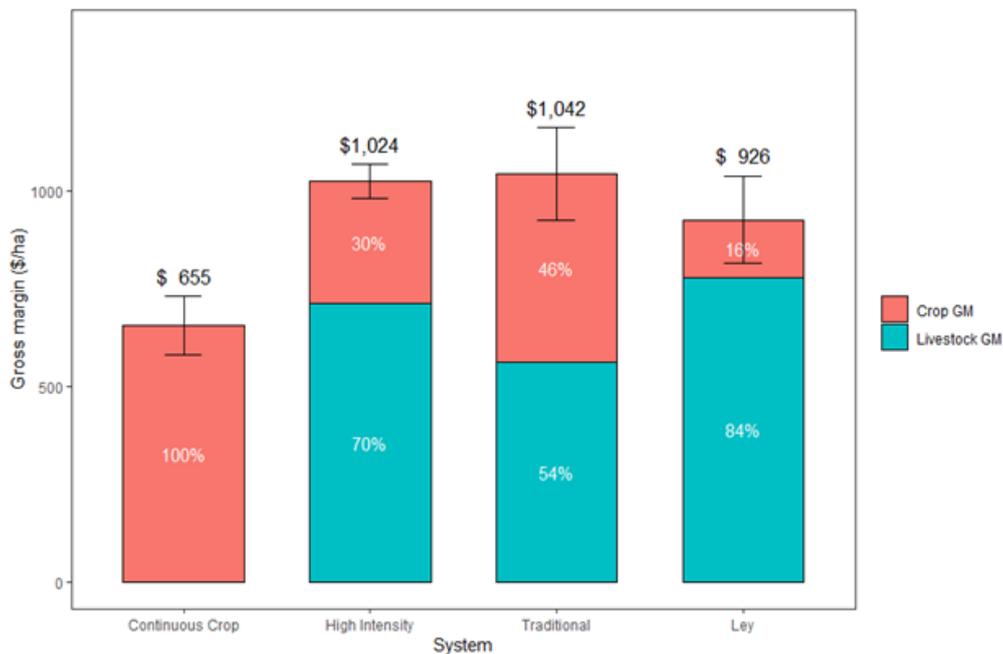


Figure A1. Preliminary Gross Margins for Farming Systems being compared in the Long Term Field Trials at Wagga Wagga, NSW, in 2025.

Conclusions

2025 was, in practical terms, the first full year of data capture for the project at the Wagga Wagga trial site, following the set up of the rotations and various systems in 2024. In 2025, the research data captured seasonal learning with system risk profiles and long-term performance information expected to emerge over time as the project progresses.

The key observations from the year are that, in a year that was characterised by low rainfall and a late autumn break, mixed-farming systems outperformed continuous cropping in the systems experiment due to diversification, with livestock and hay making a significant contribution to these systems.

Not all components of the systems performed well, with winter canola sown into marginal conditions in March being a poor-performing and risky option, and low yields for canola and faba beans also affected cropping returns. In addition, the key legacy effects from the preceding crops and management are not yet evident in the systems and may take several years to become obvious.

Key learnings:

- Crop yields were broadly comparable across systems, indicating that gross margin differences were driven more by income diversification than by inherent differences in crop productivity.
- Enterprise mix was the primary driver of gross margin differences, with mixed systems deriving 54-84% of total gross margin from livestock, buffering whole-farm profitability in a dry (decile 2–3) season, noting also that livestock prices were relatively strong in 2025.
- The mixed farming systems increased tactical flexibility, allowing poorly established winter crops to be grazed or cut for hay while assisting with weed management.
- Hay production and sale was a surprising and strong contributor to returns in the Ley farming system, supported by high forage prices in Spring 2025.

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