

Intensive mixed farming: getting the best from cropping and stock

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Mixed farming still has an important role in Australian agriculture. The question is how to make the most of it and how livestock best fits with intensive cropping.

Canowindra farmer Stuart McDonald has no doubt about the benefits of mixed farming but has moved away from an extended ley farming system to continuous cropping on much of his property.

However, livestock continue to have important profit-generating and risk reduction roles in his business and Stuart believes they can also help improve soil biology and health.

He took the decision to change his farming system and move away from his extended ley (phase) farming system, which is standard practise in the Canowindra district in central western NSW, after he began benchmarking.

“Our benchmarking data showed that the phase farming system we were using – five to 10 years of lucerne and clover followed by five to 10 years of grain crops – was costing us money so we decided to change what we were doing,” he said.

At about the same time he received a Nuffield Scholarship to research how best to manage continuous grain cropping and livestock side-by-side in a high-rainfall environment.

“I wanted to see how farmers around the world were running continuous cropping systems and how livestock fitted with those systems to reduce risk, increase returns and improve the resource base,” he said.

The findings from Stuart’s Nuffield studies suggest that running livestock in conjunction with continuous cropping has the potential to extend pasture productivity, reduce over-grazing, decrease financial risk and enhance whole-farm profitability.

His local experience suggests sowing annual crops specifically for grazing can enhance soil conditions and nutrient uptake by subsequent crops.

In research undertaken in the initial phase of his scholarship Stuart found that since 1995 the proportion of cropped land on Australian farms has increased while



ON-FARM GRAIN STORAGE ENABLES STUART MCDONALD TO HOLD GRAIN FOR SALE TO LOCAL MARKETS OR TO FEED TO HIS LIVESTOCK.

livestock numbers have decreased, with cropping and grazing enterprises increasingly segregated. He also found a lot of research into how to optimise performance of extended pasture ley mixed farming systems in his region and trials demonstrating the benefits of livestock to both sides of these systems but little work on continuous cropping in his region.

However, he believes a combination of continuous cropping and good livestock management has the potential to extend pasture productivity, reduce overgrazing, lower financial risk and enhance whole farm profitability.

“I believe there is more value potential from this approach than a simple winter cropping program can provide in terms of dollars per hectare and stability across seasons,” he said.

“Continuous cropping, which is not commonly practiced in our environment

where high rainfall and good soils lend themselves equally to producing crops or high-quality pastures, will benefit a pasture system when animals can be removed from those pastures once effective grazing has been achieved.

“We have to balance business and financial risk whilst managing differing land classes on the same farm.”

Stuart is the fourth generation of his family to run Belmont, a 1,363ha sheep, cattle and cropping business north of Canowindra. Soil types on the family property range from red brown earth through sandy loam to clay loam and average rainfall is about 600mm a year.

He crops 1,050 hectares, sowing mainly wheat and canola plus lupins, chickpeas and oats, and runs a self-replacing 1,000-ewe Merino flock and a herd of 50 stud Illawarra dairy cows.

“We have good infrastructure and are well located for mixed farming. We have a

CROPPING SYSTEM

reliable water bore that supplies our stock water needs and are close to some large users of grain. We have about 1600t of self-emptying on-farm grain storage and one of our neighbours recently had a lime quarry opened up."

Stuart is trialling new varieties of wheat and canola and exploring the potential of chickpeas and lupins with the aim of maximising returns from his cropping program.

"We grow four different varieties of wheat – Wedgetail (trailing Kittyhawk this year) Kiora, Beckom, and Condo – and this year have planted TT 559 and CL970 canola plus HatTrick chickpeas, Mandelup lupins and Planet barley," he said. "We have also sown Greenland forage brassica and Ascend ryegrass for grazing.

"Wedgetail and Kittyhawk are dual-purpose wheats that can be sown from mid-March onwards. Kiora is ideally sown at the end of April, Beckom in the first two weeks of May and Condo from the second week of May onwards.

"Early wheat follows canola in the rotation, with wheat-on-wheat country seeded to a later variety in the second year. The area of each variety is influenced by the moisture available at seeding time. This season there was a good level of soil moisture at seeding so we have sown more Kiora and Beckom. Last year we had a dry start so we increased the area of Condo.

"Wheat and canola, which are reliably high-returning crops for us, are our main crops but they grow over only seven months of the year, with moisture harvesting the aim for the other four to



A DRIVER'S-SEAT VIEW OF STUART'S DISC SEEDING RIG HE EXPECTS TO MAKE IT EASIER FOR HIM TO SOW ACCURATELY THROUGH THE HIGH RESIDUE LOADS HE AIMS TO RETAIN TO PROTECT AND FEED THE SOIL.

five months. However, I see this as an inefficient use of our high-value land because we get rain in winter and summer and I want to capture and generate income from every drop of rain that falls on our property.

"We are now aiming to manage residue and plantings so there is no time when the soil is bare and susceptible to degradation, which is also causing us to re-assess our machinery. Our approach has been to accept machinery limitations but I believe this is around the wrong way because it has meant compromising soil conditions. We need to identify how best to protect our soil resource and choose machinery that can help us achieve that."

Working through that issue has resulted in a decision to buy a disc seeder. In recent years Stuart sown his crops with a 12m Flexi-Coil minimum-till seeder fitted with knife points and press wheels but is now using a Morris Razzr disc seeder he expects will make it easier to sow into the high residue loads he aims to retain to ensure he captures and retains all the rain that falls on the property and encourage his soil biology and fauna.

"Ideally soil organic matter levels will increase and this will provide fertility and water holding capacity benefits.

"Retaining more residue is central to feeding the changes we are making and disc seeders enable seeding through the high residue loads that protect and feed the soil."

Retaining more residue has so far not improved the performance of his winter crops and in many instances has caused management problems, but he is optimistic that improving soil health will boost the performance of his farming system, although it is not yet clear how best to achieve that in Australian conditions.

"There appears to be great interest in optimising the biological population and capacity of soil, which I feel has been the forgotten leg of the three legs of our soil characteristics; physical structure, chemical and biological.

"The five principles of zero till – year-round living root systems, diversity of plant species, full armouring of the soil and livestock integration – are simple

MIXED COVER CROPS

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ideas that can be applied to give tangible benefits to a cropping system.

“These practises are being successfully applied in a wide range of different climatic environments in the US, France and the UK. The principles don’t change and in theory can be successfully transferred anywhere, but they don’t seem to be directly transferrable to our environment. Applying them here in Australia will require adaption and trialling to see what practises fit our environment and soils and what is possible.”

Stuart has been trialling multi-species summer covers and is now looking at companion-planting cash crops.

“We have a farming systems trial currently underway in our cover crop paddocks looking at how summer covers and multi species mixes affect productivity.

“We are two years into trialling how summer multi-species covers might fit into our cropping system and this winter are trialling multi-species grain crops in those paddocks.”

He is relying on careful management of an extended rotation to maintain profitability during the transition to his higher-retention, disc-seeding system and exploring other methods to improve his overall farm management and profitability including enterprise-based benchmarking and using agronomy, sheep breeding and nutrition consultants.

“Creating wealth in agriculture is no different to any other business. We are trying to get a clear picture of the profit drivers in the business, set goals and make better decisions.

“We want to utilise a range of selling options to spread marketing risk. With a more diverse range of crop types, wider seeding windows and harvest timing, harvested product either walks out of the paddock as fattened livestock or is carted out as grain.”

Stuart’s Nuffield Scholarship enabled him to address knowledge gaps around continuous cropping and livestock integration in high rainfall areas and develop approaches he is now applying on his property to grow a more profitable and sustainable business, he said.

“The program appealed to my enjoyment of farming. We had built a toolkit of solutions to our challenges using our experience and the experience of others locally from discussions at field days and farm visits. Being able to then visit farms



GROWING CROPS WITH DIFFERENT GROWING-SEASON LENGTHS AND STAGGERING SEEDING SPREADS FROST AND HEAT RISK AND INCREASES THE LIKELIHOOD OF ACHIEVING GOOD RESULTS LIKE THIS.

overseas and see how producers there approached their local issues was a chance to broaden my perspective and recalibrate how I approached farming.”

During his overseas study tour he was able to observe the power of grazing used as a tool to improve land, an approach that sees animal productivity as a natural outcome of good grazing management, rather than the primary objective.

His study findings suggest over-utilising pasture can have short-term benefits but negative long-term consequences, with a broader selection of available feed and good management reducing the need to graze pastures beyond the optimum.

This would require running the whole system conservatively with a focus on long-term improvement but would still provide a significant boost in production relative to segregated enterprises, he said, because as the production system increases in intensity, so does the requirement for timely management decisions.

“Focusing on continuous grain cropping, with the integration of livestock, will only work if in the short term it increases revenue per hectare or at a minimum maintains current levels of profitability and improves the resource base.

“All improvements we carry out on our land come at a price and it is easier to reconcile something physical like dragging a deep ripper through a paddock than to identify and quantify incremental yearly improvement in your soil from management or other changes.”

He says soil conditions and improvements can be measured by monitoring soil structure using Visual Evaluation of Soil Structure (VSS) methodology, tracking water infiltration rates, using a biological respiration test similar to the American Haney test and carrying out periodic worm inventories.

Economically, all farmers work on margins for profitability and change to an untried system can threaten this, he said, but on-farm trialling and a conservative approach to adoption of new methods can help decrease risk in this area.

“We can’t change how our rainfall falls and with what intensity, but it is within our control to have our properties ready at all times to best receive whatever gets thrown at us. This does not supersede my profit imperative; it merely shapes how I go about it.

“I think a whole-system approach to changing what we see as achievable with cropping is needed but this is a longer-term process than a lot of research currently receives funding for.

“Overseas I was often told that the five principles of zero till need to be applied for five years before there will be any major change, but in Australia a three-year research program can be seen as long-term trial. It is also difficult to apply scientific rigour to natural systems and the adaptive, flexible way farmers work because of their dynamic nature, inherent complexity and the number of variables at play, with factors like grazing especially hard to include.”