TAKING CONTROL OF THE DETAIL

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Mark Branson jokes that his farm is run by resistant ryegrass.

The weed certainly influences what he grows, how he manages his crops and pastures and even the length of the cropping phase in each paddock. But Mark's approach to farming leaves little doubt that he, not ryegrass, is "running the show" on the Branson property at Stockport about five kilometres west of Tarlee, in the Lower North.

Mark, his wife Nola, and his parents, crop about 80 per cent of the 1,000-hectare family property each year and run a self-replacing flock of 1,000 Hazeldean bloodline Merino ewes, with the aged ewes mated to Dorset rams to produce prime first-cross lambs.

While sheep and cropping is a traditional farming mix, Mark's phase farming system is not. He uses extended cropping phases and short pasture phases which play a key role in his ryegrass management regime while also providing feed for the sheep.

The medic-clover pastures also benefit following crops by fixing nitrogen and improving soil structure.

The development of herbicide resistance in weeds, particularly ryegrass, means effective integrated weed control is essential for continued viability of the farming enterprise.

Most of the annual ryegrass on the Branson property is resistant to Group A chemicals. One population, on a block at Giles Corner, about 10 kilometres north of the home property, is resistant to Group A and Group B herbicides. The wild oats on that block are resistant to Group A herbicides.

Hay making is a key element of many integrated weed management programs in the Mid and Lower North, but Mark finds hay too risky in his conditions; focusing instead on pasture management to reduce his ryegrass populations.

His standard pasture phase is three years, with the initial focus on establishing a good, productive stand of legume.

At end of the cropping phase he sows 20 to 25 kg/ha of mixed medic and clover species to ensure a dense stand of legume that will maximise grazing productivity, nitrogen fixing and competition with weeds.

The pasture is treated much like a crop, receiving a top-dressing of phosphorus fertiliser each year to maximise nodulation and pasture growth. "Legume pastures love phosphorus and in an intensive system like this we need the pastures to perform."

In the second year the pasture is grazed heavily or slashed to minimise grass seed set.

In the third year – the year before the paddock is returned to cropping - he uses a combination of measures to ensure there is no grass seed set to increase the weed seed bank. The first is a grass-selective herbicide applied soon after germination. He then spray tops with glyphosate at about flowering, after which the stand is grazed off.

The first crop after pasture is usually canola, to capitalise on the nitrogen fixed by the legume and the low weed population.

His standard practice has been to work up paddocks coming out of pasture but two years ago he got good results in some trial strips he direct-drilled into un-worked pasture ground and this year he direct-drilled all the paddocks being returned to cropping after pasture with "beautiful" results.

Which was just as well, because the dry summer and autumn coupled with the late break meant there was no opportunity to work up ahead of sowing anyway.

Soils on the Branson property are a mixture of red-brown earth – which are too hard to work when they are dry - and dark brown cracking clays.

Mark uses gypsum, lime and poultry litter from a nearby broiler farm to improve his soils.

He started using gypsum in 1994 as a source of sulphur when he added canola to his rotation and today still top-dresses his canola paddocks with 800 to 900 kg/ha of gypsum ahead of sowing.

He top-dresses each paddock with gypsum when it is returned from pasture to cropping, lifting the rate to 5 t/ha where the soil is sodic and replacing the gypsum with 5 t/ha of lime where soil pH is less than 5.5.

After 10 years his soils are easier to work, less prone to waterlogging in wet seasons, and grain yields are up.

The poultry litter is used where it will provide the greatest benefit, usually on patches of under-performing soil observed in faba bean or pea crops after harvest.

Mark's father achieved "amazing" results from spreading poultry manure on "dead", poorly performing areas about 20 years ago when the family diversified into laying hens for a period. When the opportunity arose to obtain litter from a nearby broiler enterprise he decided to adopt the same approach.

The litter provides organic matter and some extra P and N which is released slowly as the organic matter breaks down, he said.

"These 'dead' patches produce little crop or pasture so there is little organic matter returned to the soil from plant roots or residues. Adding poultry litter breaks the cycle by injecting organic matter and some nutrients."

GPS and precision agriculture

Mark has been using global positioning system (GPS) technology for several years and has recently installed an RTK (real-time kinematic) ground base station on the property.

Coupled with an auto-steer unit, the base station, which provides a fixed reference point for correction of GPS satellite signals, allows him to sow or spray with an accuracy of plus or minus two centimetres.

For the first few years he purchased access to a corrected satellite signal but the base station provides a higher level of accuracy and minimises the potential for variation of the guidance signal.

Mark, a member of the Southern Precision Agriculture Association (SPAA) committee, has been yield mapping since 1997. He is co-operating in a GRDC-funded precision agriculture (PA) project so he is aware of all the available mapping and technology options and can reference his observations and results against the research findings.

He has settled on four sets of data as being the most relevant to his enterprise: EM38, yield, NDVI aerial biomass imaging that registers crop and pasture density, and elevation (topography) which is measured using the GPS.

He considers electro-magnetic (EM38) mapping, which identifies variation in soil type and conditions, as the most important of these four layers of information.

He plans to complete EM38 mapping of the family property this season, but suggests anyone embarking on precision agriculture consider starting with EM38 mapping because soil conditions are basic to so many farming decisions.

“EM38 is a very good way of mapping soil type and quantifying salinity and sodicity levels. I am using the EM38 map to identify areas in most need of gypsum or lime and to target areas that need other soil improvement inputs or different management approaches.”

But, he cautions, the basics still apply. The EM38 maps need to be to be ground proofed with soil tests in each paddock to key the different EM readings to particular soil types and characteristics.

The big positives are that EM38 maps the whole paddock and that the ground proofing needs to be done only once.

Mark is using variable rate technology in only six paddocks this season because they are the only ones in which the EM38 mapping has been ground proofed.

He became interested in PA when he saw what was happening in the US and Europe. He attended a yield mapping field day in 1996 and fitted out the new header he bought in 1997 with an Omnistar GPS unit and Microtrack hardware. He is now using his RTK signal and Case AFS hardware.

Initially he used a consultant to produce his yield maps because the computer he was using for his paddock records wasn’t powerful enough, but that changed when he upgraded and he now does his own map generation and analysis.

His current auto-steer unit is a KEE Trimble ZYNX, an integrated system that comes in a single unit rather than as separate plug-in modules, ensuring it is robust and there are minimal compatibility problems.

Mark has GPS-linked variable rate equipment on his sowing rig so he can adjust sowing rates and urea inputs according to soil type, sub-soil conditions and other factors including weed populations, but not on his fertiliser spreader.

“There needs to be a scientific base for making that sort of change and I haven’t seen any scientific justification for variable rates of phosphorus, although that is being explored in a long-term trial set up by SPAA.”

His latest step in the PA matrix is controlled traffic (CT), which he used for the first time last year.

This season, with the ground base station in place, he is using CT across the property and has set up permanent wheel tracks in most of his paddocks.

He is controlling weeds in the wheel tracks by shallow-sowing them without fertiliser and expects less weeds pressure as the surface of the track becomes harder over the years and the seed bank runs down.

His urea boom, spray boom and tractor all have the same axle width, so he can spray or apply urea at any time without crushing any of the crop.

The urea and spray booms each cover 29.4 metres in a pass and the seeding rig 9.8 metres.

The switch from the satellite GPS grid he used last season to the more accurate ground station meant realigning the wheel tracks, which left him in no doubt about the compaction caused by traffic.

“Because of the realignment we had to plough out last year’s wheel tracks, and even after just one year they were much harder to work up than the areas the tractor hadn’t travelled.”

He has also switched to sowing up and back, something he first tried in some paddocks three years ago.

“It’s dead easy, particularly with auto-steer. The equipment drives itself.

“Our system also has an auto cut-off/cut-on facility that ensures there are no gaps and no over-laps at the end of a run.

“It’s very simple to use once everything is set up.”

Mark believes an investment in auto-steer equipment will pay for itself in five years through increased efficiency and ease of operation. And while he still has reservations about aspects of PA his figures indicate increased returns in the order of $40 to $50/ha where he is currently using PA; considerably more than he expected.

Since 1996, when a fire wiped out most of the existing fences, paddocks on the Branson property have been fenced according to soil type and land class, one of the factors that influence crop selection and management.

In some paddocks, steep slopes of red soil prone to water erosion mean he can’t grow grain legumes because they don’t provide enough summer cover to protect against water erosion in the event of a summer storm. This narrows the rotations and limits management options.

Ryegrass populations, which vary with soil type and the stage of the rotation, also have a major influence on cropping decisions.

Ryegrass management

Increased sowing rate is one of the tools in Mark’s integrated suite of mechanisms to control resistant ryegrass.

His standard cereal sowing rate is 100 kg/ha but he increases that to 180 kg/ha where there is a high density of herbicide-resistant ryegrass with the aim of out-competing the weed.

Last year the 180 kg/ha rate significantly reduced the ryegrass population without any loss of wheat yield or quality.

“We got the same yield and quality from 180 kg/ha as from 100 kg/ha but the higher rate reduced ryegrass seed set so much that his season you can pick out the trial strips as having less ryegrass.

“There is a clear grass control benefit from using the higher rate.

“I am seeing at least as much benefit from controlling ryegrass through increased seeding rate as I could expect from varying fertiliser rates.

“The next challenge is to work out how to accurately map all the ryegrass patches on the property ahead of sowing.”

He aims to continuous crop until ryegrass becomes a problem.

His rule of thumb rotation is: pasture, canola, malting barley, beans, durum, bread wheat, peas and bread wheat.

At that point he makes a decision. If there is too much ryegrass he will put the paddock back to pasture.

If the ryegrass population is still under control he will continue the cropping rotation for another three years with barley, peas and Clearfield canola before the paddock is returned to pasture.

Mark grows Clearfield canola because it allows in-crop use of OnDuty® - a Group B herbicide – and a glyphosate knock-down spray as the crop is windrowed to kill any green weeds growing under it.

When the windrows are picked up and the grain harvested the residue is laid back in the same windrow – so there is no spread of seed – and burnt off over summer to kill any seeds in or under it.

The end result is ryegrass control at least as good as that achieved from a well-managed hay crop.

He uses the same technique in bean crops.

Mark sows all his crops with 100 kg/ha of DAP, 1.25 kg/ha of zinc and 50 kg/ha of urea, using double chutes to lay the urea about 10 centimetres under the seed and place the DAP with the seed.

He is exploring the potential of late-season application of nitrogen and last year applied nitrogen at the first node stage, when he had a healthy plant without excess tillering and was better able to predict how the season was shaping.

A trial he conducted on his property last season showed a 5 pc yield increase from late application of urea.

He believes there may be benefits from a third application of urea at about flowering on durum, depending on the season.

When it comes to cereal yields, Mark thinks, and talks, in terms of yield potential, rather than tonnages.

His wheat crops are averaging more than 80 per cent of their water-limited yield potential; 80 per cent of the theoretical maximum achievable with the water available in a given season.

Most of his recent barley crops have been approaching 80 per cent of the yield potential but last year's malting barley averaged 5.6 t/ha; 85 per cent of the theoretical maximum yield.

Last year Mark's peas averaged about 2.5 t/ha, his faba beans averaged 3.5 t/ha and canola yields were around 2 t/ha.

Property records suggest cereal yields 20 years ago were nearer 65 or 70 per cent of the potential, even though only about 60 per cent of the property was cropped annually, not the 80 per cent now being sown each year.

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