



Gradual incorporation of biological principles paying dividends for mixed farming business

The Haggerty family has found the gradual transition into biologically based farming has improved cropping performance in a period of declining rainfall. Photo Helen Dister.

A co-winner of the 2010 A & K Hill Green Agriculture Innovation Award is Prospect Pastoral Company in Western Australia. Ian and Dianne Haggerty and their three sons have found increased biological activity in their soil is boosting crop and pasture productivity and is giving them a story to tell for direct marketing their lambs into Perth butcher shops. Cindy Benjamin investigates their gradual change in farming direction.

Investing in knowledge is the key to Ian and Dianne Haggerty winning the battle against long years of dry weather; optimising soil fertility and productivity on their Wyalkatchem property, WA. Along with their own property the Haggertys sharefarm and lease another four properties in the district, running sheep and growing cereals in rotation.

In 2000, Ian and Dianne could see that their conventional method of farming was demanding more and more inputs to achieve decent crops and they were really struggling to maximise crop pro-

duction in dry years. They started to implement biological farming ideas they had learned from people such as Dr Arden Anderson, Dr Elaine Ingham, Dr Dan Skow, Jerry Brunetti and Bruce Tanio at seminars across the country hoping this new system would enable them to grow better crops in dry seasons.

"The theory behind a biological system is that soil microbes can increase the nutrient and moisture holding capacity of the soil and reduce pest and disease problems," says Dianne. "We have seen this theory borne out in practice and are fully convinced of the benefits."

"In most seasons our profit per hectare is improving and we are growing harvestable crops on just 160 to 170 millimetres annual rainfall," she says. "What we have really achieved is the ability to establish crops in years where we would previously have had poor germination. Most of the rain we have received in the last few years has fallen in 3-5mm events followed by windy weather, reducing the effectiveness of the rain. Having an active soil biology, good ground cover and increased soil carbon means we are holding onto moisture that previously would have been lost to evaporation. Microbial activity is definitely the key to achieving nutrient balance. When the soil microbes are functioning well mineral problems just resolve themselves; simply supplying minerals is not enough," she says.

Soil samples taken across the Haggerty-run properties have shown a balancing-out of soil nutrients, with good nutrient availability. "Major nutrients like calcium are now highly available in many of our soils without the need to apply lime," says Ian.

The Haggertys generally have 50-60% of their land under crops and the remainder under pasture but their rotation is flexible enough to take advantage of whatever moisture is available in the season. Wheat, barley and oats are grown for grain and the Haggertys often feed the oats as green forage or bale the oaten hay. The sheep graze the cereal stubble over summer. The pasture phase is usually one or two years.

The Haggertys rely on the soil seed bank to generate the pasture having found that the delay in sown pasture establishment is too long in short growing seasons. "High plant biomass is more important than species selection at this point," explains Ian. "Better pasture species become more prevalent naturally as soil conditions improve."

Build biology during cropping

On some paddocks the Haggertys have trialled using biological support to grow wheat back-to-back for seven years with minimal disease and maintaining yields expected for the seasonal conditions.

"The pasture phase also boosts the biological activity in the soil. We take a whole of farm approach across all the farms and usually have about 50-60% of the total area under crop. The combination of cropping, pastures and livestock has made a big difference to our soils and our business," says Ian.

Contrary to the norm, the Haggertys prefer to build biological health in the cropping phase, rather than under pasture.

"For economic reasons crops have played a bigger part in our business over the last 10 years but we have been trying to boost activity in the pasture phase in preparation for the following cropping program. Both the crops and pastures grow big root systems and this has helped break up hard pans," he says.

In preparation for planting, livestock go onto the paddock first and then the crop is planted in one pass using a Flexi-Coil air seeder with knife points on 22-centimetre spacing. The seeder is fitted with a liquid cart that injects the liquid biological brew into the furrow.

"It is important to transition from one system to another. Introducing a biological component to the system can vastly improve the performance of mineral fertilisers. Then you can play with rates and make gentle changes that don't shock the soil, or the bank account. We can't afford to have a crop failure so when we are making the transition from conventional to biological we support the crop with any of the tools available to us."

The Haggertys have reached a point on their own farm where they did not use any mineral fertilisers last year and won't again this year. Likewise, a leased farm at Dowerin that they have been farming for two years grew a good oaten hay crop last year with no mineral

Prospect Pastoral business profile

Business structure: Family company; operated by Ian, Dianne and their 18-year-old son James

Location: Wyalkatchem, wheatbelt north-west of Trayning, WA, on the Wallambin salt lake system

Property: Prospect, 1420ha, 325mm annual average rainfall; sharefarm or lease an additional 4440ha

Crops grown: Wheat, barley, oats (grain, hay, green fodder)

Grazing: Merino wool and direct-marketed lamb

Crop response to management: Grain quality improving with less screenings and less damage to grain by frost

Soil response to management: Friable depth doubled or trebled in places

Fertiliser: Biological mix includes compost extract, worm liquid, humates and other microbial foods and trace elements

Total soil carbon: eg up by over 35% on wodgil soil type

fertilisers and will also be sown to cereals this season without any mineral fertilisers.

Winter weeds can be a problem and the Haggertys work with them within the crop season, mainly to reduce or prevent seed set.

"To do this we do use herbicides to control weeds that threaten to compromise crop yield. But we find that over time the use of biological agents alters the types of weeds and herbicides offer more effective control of tough-to-kill weeds. We reduced our reliance on herbicides and now we find that lower rates of chemical are effective. When we start developing a new property we marry the conventional and biological systems together then just keeping moving further toward the fully biological system over time."

The Haggertys use no insecticides and there are some herbicides that are 'no-go'. "We look for alternatives that give similar results to some of the 'harder' chemicals," says Ian. "Sometimes we decide to not grow a particular crop if it would mean using certain chemicals."

Biological inputs

The biological mix includes worm liquid from NutriSoil in Wodonga, Vic, compost extract from Ylad in Young, NSW, humates and a variety of other microbial foods and trace elements.

"In the past we have made our own compost tea but now we use extracts and are careful about the compost we purchase," says Dianne. "We use quite low rates (5-15 litres/hectare) but it must be good quality. We look into how the compost is made and we also check the biological activity under a microscope on the farm, mainly to assess the diversity of microbes present."

The quality of worm liquid is also critical as there is a vast range in the concentration and nutrient spectrum in products on the market. The Haggertys believe this is one area where paying for good quality is essential. Tissue testing is used to monitor the health of crops, particularly on new farms. The Haggertys test the weakest country and use foliar fertilisers to ensure that every crop is as successful as possible. Maintaining production through the season is critical. Prospect Pastoral has some wodgil soil – brown, acidic, non-wetting loam with high aluminium levels – that the Haggertys have seen respond well to their biological farming methods.

In April 2003, the total carbon was 0.98% (0-10 centimetres depth), samples taken in March 2010 showed total carbon levels of 1.32% (0-20cm depth), representing a 35% increase as a minimum considering the dilution effect of the increased sample depth. For comparison, a better quality red clay-loam soil also on Prospect had

a total carbon reading of 1.28% (0-20cm) in March this year.

Dianne says the deep white low fertility sands on the Dowerin property have also been surprising where soil tests indicated low nitrate and potassium levels but tissue tests have revealed acceptable levels of both nutrients (and others) with 60kg/ha of sulphate of ammonia applied as the nitrogen source on continuous wheat rotation.

Grazing management

Prospect Pastoral runs about 2000 ewes, across the 5860ha of stubble and pasture. Lambs produced on Prospect are now 10th generation in a biological system. The Haggertys have found the flock has developed a microbial balance and have not required drenching for intestinal parasites for 10 years.

"In our Merino stud we focus on breeding animals with minimal artificial support," says Dianne. "The flock needs no drenching, mulesing or grain supplements. We breed for hardy, large-framed, early-maturing sheep with plain bodies, excellent carcase for turning off at four and a half months of age, good combing wools and bare breech tendencies, particularly in ewes."

Lambs are direct marketed to customers in Perth and Fremantle, WA, through several butcher shops. Based on international research, the Haggertys believe their pasture-fed Merino lambs give consumers more omega-3 fatty acids and conjugated linoleic acid (CLA) than grain-fed lamb.

"Customers place their orders with us and we arrange for the butchers to prepare the sides of lamb to order. The meat we produce

is also more nutrient-dense than lot-fed animals due to the diverse pasture and mineral diet on offer to the lambs," says Dianne.

Nutrient density refers to the concentration and range of minerals present in the plant. Broad spectrum biological fertilisers such as seaweed, fish and correctly-made worm liquid can address minor trace elements imbalances and stimulate the soil biology to enable the uptake of minerals. Animals grazing on nutrient-dense pastures are assumed to produce nutrient-dense meat.

The Haggertys see themselves as being in the business of food production rather than commodity supply and take this responsibility seriously.

"We want to produce nutritious food and believe that our farming systems achieve this. It would be good if farmers were rewarded for the nutrient density of the food they produce," Ian says.

The Prospect Merino Pasture Fed Lamb brand is available to customers as fully-prepared sides of lamb from 20-22kg carcasses.

"The minimum order is a side of lamb but customers sometimes share a side," says Dianne. "The butchers prepare all the meat to the customers' requirements. We can also supply hogget and have a strong mince market using meat from hogget."

Lease farms

Leasing is quite common in Western Australia and has been an important part of the growth of Prospect Pastoral Company since 2002. The lease farms are all within about 80km of the Haggerty home farm. The spread of farms can cause logistical difficulties but has the advantage of a better chance of getting rain 'somewhere' across the farms.

"You can't afford to be too rigid in the way you apply the 'system'," explains Ian. "It is important to assess the conditions on each farm and to work out the best way to handle each farm in each season. Soil type, condition and moisture are the main factors that determine the rotation."

On a sharefarm in the Dowerin area the Haggertys have implemented their biological system with confidence and have seen non-wetting sandy soil vastly improved in just two years under a continuous wheat program.

"One of the biggest differences in management is reducing the use of granular fertiliser and introducing liquid biological fertilisers. This farm receives better rainfall than our home farm and the biological system just works really well."

"Each lease agreement has different arrangements for the use of chemical fertiliser. This has given us an opportunity to see the difference between different farming systems. Our home farm is the driest of all the land we farm now, yet we can measure the difference between biological and conventional farming on tractor fuel consumption due to better soil tilth under the biological system. At seeding last year we noticed both fuel consumption and wheel slip were halved when working the longer term biological farms compared to the newer properties.

"The fact is that no one has all the answers. Scientists and farmers need to share knowledge, ideas and observations. The natural world is such a complex 'organism' and the aim of farming has to be to produce agricultural products in the least disturbing way possible. To do this, everyone involved must be prepared to think outside the square," Dianne says.

Find out more:

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Prospect pasture and saltbush-fed pure Merino lambs are direct marketed to customers in Perth and Fremantle.

Key management changes

The Haggertys believe that the money they have invested in gaining knowledge over the last 15 years has been very well spent. They started by making small changes and using their observations to modify their farming practices. The changes they have implemented include:

- Free-choice mineral supplements for sheep initially. These are no longer required due to changes in the nutrient inputs and increased microbial activity in the pasture's soil.
- No drenching, mulesing in stud and top commercial flocks (breeding for clean breech), grain supplements or antibiotics.
- No pesticide, minimising herbicide requirement.
- Replacing mineral fertiliser with biological nutrients and agents.
- Maintaining ground cover, growing bulk during pasture phase.
- Direct marketing of pasture-fed lamb.