2020
OLSEN'S HALLORA CASE STUDY
NARRATIVE REPORT

Prepared by Greg Hosking

Introduction

Niels and Marja Olsen with the help of their three sons Shane, Jamie and Shaun have been managing and operating the family farm in Hallora, Gippsland, Victoria since 1985. Previously, the property was used for dairy cattle with Niels making the switch to a herd of breeder cattle in 2008. Over the years Niels has worked a number of off-farm jobs, supplementing farm income. In 2012 Niels with the help of his family designed and patented a machine to improve soil health on his farm, the machine was named the SoilKee Renovator.

Niels and two of his sons Shaun and Shane.

Background

Niels grew up on a farm not far from his current property; for many years he lived the life of a typical dairy farmer, milking twice daily 365 days a year. Niels farmed the way he had learnt in his youth, the traditional West Gippsland way: growing pastures in the good seasons of the year to harvest and store later to be fed out during the other seasons. This method of farming was labour and time intensive.

In the 1990's Niels started and managed an earth moving business whilst keeping the farm running. The earth moving business proved to be quite successful and Niels made the decision to invest some of the profits back into the farm in the form of superphosphate fertiliser. In 1999 upon consultation from a local agronomist Niels purchased and applied a large quantity of super on his farm. The results were fantastic; pastures looked green and grew significantly more than they had the previous year. Niels decided to increase the dosage of super the following year expecting to achieve better pasture growth results. However, the complete opposite occurred; after applying the super the Olsen's paddocks turned brown and stopped growing whilst his neighbour's paddocks were green with fresh pasture growth.

This was the catalyst for the Olsen's to recognise these practices were harming the landscape and seemed unsustainable in the long term. Marja and Niels were horrified at the damage they had inflicted upon their soil. Their response was to seek out guidance and training, they started attending workshops and field days focused on improving soil health. Armed with the knowledge they had gained from the numerous workshops and field days they set about regenerating soil health on their farm.

The Landscape

The property is comprised of 124 hectares split into 28 paddocks, the water supply consisting of dams and an ephemeral creek running through the property. The property sits at an elevation of 135m above sea level with an average annual rainfall of 1000 mm. Prior to land clearing in the late 19th century for agricultural purposes the landscape would have consisted of what is now classified as a damp/ wet sclerophyll forest. Numerous species of eucalyptus and acacia trees would have been present in the landscape, only Messmate (*Eucalyptus obliqua)* is present today.

The property consists of low slopes and rolling hills with an acidic red ferrosol soil. The pasture species at the time of purchase were mostly rye grasses and clovers with no native grass species present. Signs of ecological health in the soil such as worms were rarely observed prior to 2002. The pH of the soil ranged from 3.7-4.5 across the farm. Prior to the use of the "SoilKee Renovator" landslips and washouts regularly occurred across the property. Since the implementation of the "SoilKee Renovator", no landslips or washouts have occurred on the property. The soil structure on the farm was improved by sowing deep rooted pasture species such as legumes, improving the structure of the soil which greatly reduced the risk of landslips and washouts.

Indicators of ecological health such as reptiles and frogs were not regularly observed on the farm prior to adoption of some regenerative management techniques, especially soil health, high soil carbon content, cover and hydration. In recent years frog numbers have increased significantly and they are now observed regularly. The dominant snake species on the property used to be the Eastern Brown (*Pseudonaja textilis)*, since the increase in frog numbers Eastern Brown snakes are rarely sighted on the property instead Tiger snakes *(Notechis scutatus)* have become common. Frogs are the preferred food of Tiger snakes. The increase in frog numbers on the property directly coincided with the ceasing of chemical inputs.

Birds such as Ibis's were commonly observed in the paddocks eating slugs and cockchafers, since adopting regenerative management techniques Ibis's are rarely if ever seen on the farm. During a short walk on the property in November 2019 a Soils For Life ecologist observed 22 different species of birds. These species included birds from most of the trophic levels including raptors suggesting that the health of the landscape is in excellent condition.

Production

From 1985 till 2008 Niels operated the property as a dairy farm with a herd size of around 150, in 2008 Olsens stopped dairying and started a breeder operation and selling steers for slaughter. Initially they kept the same herd of dairy cattle and used them as a breeder herd due to the cost of replacing their herd entirely. In 2018 they replaced the herd of dairy cattle with a herd of angus crosses. Niels and Marja have utilised rotational grazing on the property from 2003 onwards, prior to 2015 the total yearly grazing time per paddock was eight weeks. This has increased the grazing time since 2015 to 12 weeks of the year due to increases in pasture production gained from sowing multi-species utilising the SoilKee Renovator. Niels has altered his production system from an animal-first perspective to soil first. Olsen's focus is on improving the health of their soil through methods such as multi species cropping to encourage root growth and nitrogen and carbon intake from the air. Olsens consider fungal activity to be vitally important in improving soil health. They ensure that the soil is never deep ripped which can damage and stop fungal activity from occurring.

Prior to 2012 Niels had a concept in his mind which he thought could be the ideal method of farming for his property. However, he did not have the tools to trial the concept. His idea was that by utilising a machine which lightly disturbed the soil and planted crops concurrently, and twice a year, he could grow enough pasture biomass to feed his cattle year-round without having to cut and store fodder to be fed in the feed gaps of each season. In 2012 this idea came to fruition, Niels had built and designed a machine which he named the "SoilKee Renovator". The machine consisted of angular blades which "broke" the earth rather than "cutting" it at minimal depth. The machine is utilised after grazing with 15-20% of biomass left from the grazing mulched straight into the soil speeding up the process. Essentially Niels had designed a machine which converted his pasture biomass directly into mulch after grazing. This completely reduced the need for any fertiliser application on the property.

Since 2012 Niels has not had to supplementary feed his livestock. The method of multi species pasture and cropping combined with the accelerated mulching enabled by the SoilKee Renovator, has significantly improved the health of the soil and the amount of pasture biomass produced each year. Niels has been able to grow 20 tonnes of dry biomass per hectare per year on some of his best paddocks, the less fertile areas of the property achieve 15 tonnes per hectare per year. The pasture growing season is now 9 months of the year. Undesirable pasture species such as kikuyu grass (*Pennisetum clandestinum)* which used to be present across the property has been out-competed by desirable species planted sowed with the SoilKee machine.

Pasture at the Olsen's Farm late November 2019.

The Family

The Olsen Farm is an unusual farm in the sense that all three of Niels and Marja's adult sons still work on the farm and in the family business. A lot of the production of the SoilKee machine is done on farm by the eldest son Shane, who is interested in manufacturing and design improvement. The middle son Jamie manages the farm with his father Niels and does contracting work driving the SoilKee Renovator on other properties. The youngest son Shaun helps in all aspects of the farm and family business. Marja manages the administration side of the farm and the business whilst Niels oversees operations. The sons are happy that they get to keep working on the family farm, Niels and Marja are pleased that their sons continue to play an active role in their lives.

Soil Health and Soil Carbon Sequestration

Commencing in 2016 detailed soil tests were undertaken on Hallora to meet the reporting requirements of the Australian Government's Emissions Reduction Fund carbon abatement reporting requirements. Results for the 2017 reporting period showed Hallora measured 12.2 t/CO2e/ha and in 2018 this had increased to 13.7 tCO2e/ha. In early 2019 the Soilkee Farm became the first farm in the world (as far as we can ascertain) to be awarded carbon credits for sequestering carbon with their soil.

Increased carbon in the soil has correlated with increases in organic matter, water infiltration and holding capacity. Moisture and organic material were previously measured to reach a depth of 50cm in the soil, currently on some parts of the farm that depth has increased to 650cm. The pH of the soil has also improved from 3.7-4.5 prior to 2003 to currently measure at 5.5-7.9.

Nitrogen nodules on the roots of peas planted in the pasture are numerous and large in size and commonly observed. Worm castings are evident across the property and the soil structure has altered to feel spongey under foot. During autumn the fruit of fungi in the form of mushrooms and toadstools are visible across the paddocks indicating a healthy fungal biota existing beneath the soil.

Nitrogen nodules on the root system of a pea plant.

Conclusion

Over 34 years of management the Olsens have continued learning about their landscape and the importance of the soil underneath it. Niels and family have altered their management practices to focus on building soil health and resilience across the farm to ensure long term viability. The most significant innovation that Niels has implemented on the farm is the use of the SoilKee Renovator, which has improved the health of their soil in conjunction with growing significantly more pasture biomass across the property. Other innovations include monitoring soil, introducing multi-species pasture and switching from dairy to beef.

The improvements the Olsen family have made to the property are an outstanding example of land holders implementing and practicing innovative regenerative management techniques particularly focused on nurturing soil health. The Olsen's have achieved:

- Soil microbiology enhancements
- Soil hydration improvements
- Improvements in carrying capacity of land
- No low season feed inputs
- Air penetration of soils
- Biodiversity
- Family wellbeing
- Carbon sequestration in the soils
- Australian Carbon Credit Units which can be traded.

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OLSEN'S HALLORA CASE STUDY
SUMMARY ECOLOGICAL REPORT

Prepared by Greg Hosking

The Olsen Family Farm is a 124 hectare grazing property managed by Niels Olsen and family since 1985. The farm is located to the South of Drouin in West Gippsland Victoria.

The property is split into 28 paddocks, water supply on the farm consists of dams and an ephemeral creek running through the property. The property sits at an elevation of 135m above sea level and the average annual rainfall is 1000 mm.

The predominant soil type on the property consists of an acidic red ferrosol soil. Prior to major land clearing at the time of settlement the native vegetation on the property would have consisted of what is now classified as a damp/ wet forest. Numerous species of eucalyptus and acacia trees would have been present in the landscape, only Messmate (*Eucalyptus obliqua)* is present today.

The ecological values[1] of the property were assessed based on the known history of management of the property from 1985 when the land manager acquired it and his assessment of potential effects of changes in management initiated since then. The ecological values assessed include resilience to disturbance and soil nutrients, hydrology and biology. Because there is little empirical data, the assessment is necessarily based on observations and a subjective judgement of likely effects of management. The exception is soil carbon where in 2017 the Olsen Family Farm measured 12.2t/CO2e/ha and in 2018 this had increased to 13.7 tCO2e/haThis report shows that significant improvement of condition was observed across eight of the ten criterion since 1985. These assumptions are based on the theory that implementing rotational grazing, multispecies cropping and maintaining high ground cover levels should have positive outcomes on the majority of the ten criterion.

The trend for eight of the ten criterion is therefore similar – a decline in the early years of management followed by a small increase then a significant increase in later years as the manager refined and improved their management practices. An example is provided below. For further details and commentary, please see the Supplementary Ecological Report.

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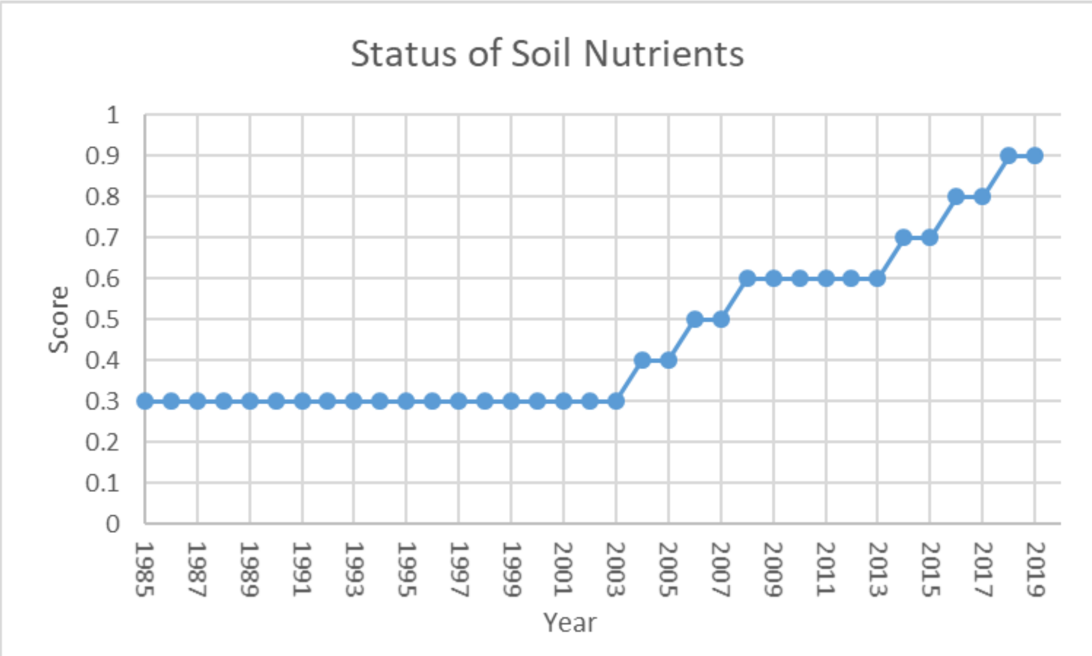
[1] The ecological values assessed were: Resilience of landscape to natural disturbances – flood, drought and frost; Status of soil nutrients - including soil carbon; Status of soil hydrology - soil surface water infiltration; Status of soil biology; Status of soil physical properties – as a medium for plant growth; Status of plant reproductive potential; Status of tree and shrub structural diversity and health; Status of grass and herb structure - ground cover; Status of tree and shrub species richness and functional traits; and Status of grass and herb species richness and functional traits.

The remaining two criterion follow their own individual trajectories and reflect the management strategies undertaken by the land owner. For further details and commentary, please see the Supplementary Ecological Report.



2020
OLSEN'S HALLORA CASE STUDY
DETAILED ECOLOGICAL REPORT

Prepared by Greg Hosking

Key findings

The Olsen family farm is a 124 hectare grazing property managed by Niels Olsen and his family since 1985. The farm is located to the South of Drouin in West Gippsland Victoria. This ecological assessment commences in 1985, this date reflects the time of ownership under Niels Olsen.

The property is split into 28 paddocks, water supply on the farm consists of dams and an ephemeral creek running through the property. The property sits at an elevation of 135m above sea level and the average annual rainfall is 1000 mm. Prior to land clearing occurring in the late 19th century for agricultural purposes the landscape would have consisted of what is now classified as a damp/ wet forest. Numerous species of eucalyptus and acacia trees would have been present in the landscape, only Messmate (*Eucalyptus obliqua)* is currently present today. The remaining woody vegetation on the farm consists of a few mature stands of Messmate in a couple of the paddocks.

From 1985 to 2008 the property was managed as a dairy farm, in 2008 Niels switched to a breeder operation. From 2008 rotational strip grazing was adopted on the property, and the land manager started to focus on building soil health. Between 2008 and 2012 Niels developed a concept management strategy which would grow enough pasture during the growing seasons to last through the two feed gaps each year saving the need to supplementary feed livestock. However, to be able to grow enough pasture to achieve this plan, Niels needed to develop a machine which was capable of mulching pasture into the soil and sowing multi species crops without damaging soil structure or fungal activity. In 2012 Niels in conjunction with his sons had designed and built a machine which was capable of achieving his goals. The machine was named the SoilKee Renovator.

The Olsen family farm was recommended to Soils For Life as a prospective case study by AgriProve's Matthew Warnken. Agriprove supported the Olsen family through the process involved in gaining Australian Carbon Credit Units (ACCU's) under the federal government's Emissions Reduction Fund. Furthermore, the CEO of Soils For Life at the time, had visited the Olsens with the Clean Energy Regulator and inspected the farm and received briefings from the Olsens including a demonstration of their machine and their soil sampling method.

This report demonstrates a close relationship between the land manager's goals/ideals and the ecological outcomes in each of four phases.

This assessment identified four phases of land management regimes including production regimes and biodiversity enhancements.

	Production regimes
Phase 1: 1985-2001	Conventional dairy farming, supplementary feed cattle during the two yearly "feed gaps", application of fertilisers and insecticides/herbicides occurred throughout this phase.
Phase 2: 2002-2007	Continued dairy farming and managing the pasture for twice yearly "feed gaps". Ceased application of superphosphate fertiliser due to noticeable damage to the landscape. Started to undertake soil remediation work through the application of lime on the pastures to address pH levels.
Phase 3: 2008-2011	Transitioned from dairy farming to a breeder operation. Introduced rotational grazing systems to protect and conserve soil health. Developed plans for the SoilKee Renovator which theoretically would enable enough fodder to be grown to avoid the need to supplementary feed cattle during the yearly "feed gaps".
Phase 4: 2012-2019	Construction of the SoilKee Renovator occurred and its use was trialled on the property. The land manager utilised the machine to achieve regenerative land management goals such as maintaining ground cover, promoting fungal and biological activity in the soil and providing nutritious mixed pastures for livestock year round.

An assessment over time of the responses of 10 ecological criteria shows that by phase 4, compared to the previous three phases, most ecological criteria have been assessed as nearly fully achieved or having achieved their reference state (i.e. a scores between 0.8 – 1.0). For example:

- Minimizing effects of extreme climatic events, which considers the whole property and its place in the broader catchment; this includes preparedness for drought (Criterion A);
- Managing pastures for production and to maintain ecological health of the property. Ecological changes include improving the reproductive potential of plant species (Criterion F) and maintaining high levels of ground cover across the property (Criterion H);
- Improving soil health and function. Ecological changes include soil nutrients and soil carbon (Criterion B), soil hydrology (Criterion C), soil biology (Criterion D) and soil physical properties i.e. soil as a medium for plant growth (Criterion E);

Transformation of the farm toward a regeneratively managed property has been achieved through deliberate planning and is based on a sound understanding of the links between land management regimes and ecological responses. Consistent implementation of management ideas has enabled the land manager to develop high-quality pastures which produce fodder for livestock throughout the year.

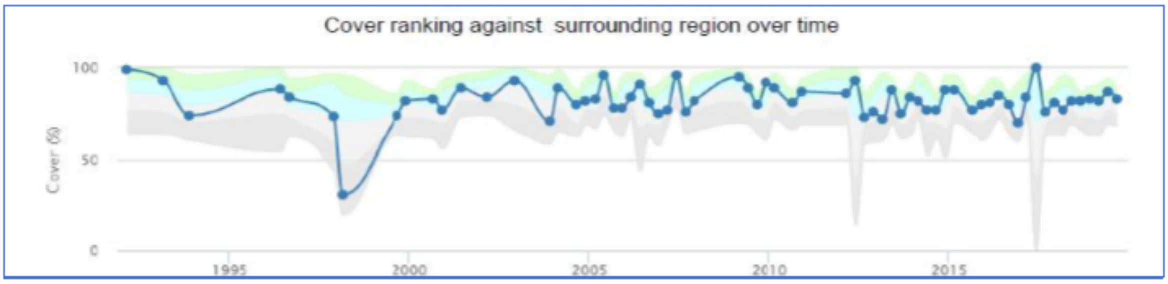
In addition, the management regimes have significantly improved the health of the soil, indicators such as soil organic matter, soil carbon, nitrogen and calcium have all increased within the soil profile. Soil pH levels have also improved across the property. Visible indicators of soil health such as worms and the absence of pest species in the soil such as "cockchafers" and other grubs have greatly improved under the regenerative management regimes currently implemented on the property. Bird life on the property has increased with different species of birds frequenting the property since the land manager adopted regenerative practices. Birds such as the Australian White Ibis (*Threskiornis moluccus)* and the Straw-necked Ibis (*Threskiornis spinicollis)* are no longer seen feeding in the pastures on the property, prior to 2012 they were regularly seen on the property. Ibis's are known to feed on grubs in the soil, their absence suggests that grubs are no longer present in high numbers on the property[1].

Independent scientific assessment

An independent assessment of the land manager's self-assessment across all 10 ecological response criteria supports information presented by the land manager.

This independent assessment examined one measure of ecological responses found inside and outside the Olsen's property boundary: 1) ground cover.

1) An assessment of ground cover information for the Olsen's property was derived from a standardised national ground cover dataset (Landsat satellite using a 30m resolution) between 1990-2019. This ground cover analysis supports the graphical ecological summaries provided by the land manager, showing an obvious transformation in ground cover at the Olsen's; in the late 1990s the property experienced an event of low levels of ground cover (20-50%) compared to neighbours whereas by 2000 the property had established consistently high levels of ground cover (70-100%) compared to neighbours. Since 2012 the ground cover on the property has gone through a series of small sharp declines and increases whilst consistently staying above 75% ground cover.



This independent ecological assessment highlights the importance of a local land manager understanding, and planning for, and implementing well-informed land management regimes that aim to achieve sustainable ecological outcomes. These results support the conclusion that the Olsen's property is an outstanding example of regenerative landscape management in an agricultural setting.

Assessing responses to land management regimes according to the ecological criteria

This Supplementary Report is underpinned by the Soils for Life *Conceptual Model* and *Assessment Framework* that documents the responses of 10 criteria corresponding to ecosystem function, composition and structure.

Prior to undertaking a field visit in November 2019, the landowner, Niels Olsen, was asked to document the production systems that have been developed and implemented including land management regimes associated with the following: soil and vegetation condition (pastures, shrubs and trees); weed and pests; surface and ground water and animal production. That production history

[1] https://www.abc.net.au/news/2017-10-23/csiro-seeks-straw-necked-ibis-sightings-during-aussie-bird-count/9071762

aimed to document land management phases which lead up to the current regenerative landscape management in this agricultural setting.

This included collation of all relevant available published and unpublished ecological data and information about the farm and how it was managed. It also included paddock-based photographs, fertiliser history, paddock-based management histories, as well as grazing charts, soil surveys and names of interested parties who had visited the farm over time (Attachment A). This 2019 assessment has incorporated information which was compiled in September 2012 as part of the Soils for Life (SFL) Case Study Project.

Assessment of Response Criteria

This ecological assessment commences in 1985 this year reflects the date that Niels Olsen purchased the property.

A. Resilience of landscape to natural disturbances - Drought Preparedness

Why track changes and trends in resilience to major natural disturbance/s?

Resilience to major disturbance/s includes the following factors depending on the agro-climatic region (wildfire, drought, cyclone, dust storm, flood). A major natural disaster or natural disturbance event can occur at any time. Some disturbances give a warning, such as a wind storm or electrical storm preceding a wildfire or a flood. Once a disaster happens, the time to prepare is gone. Lack of preparation can have enormous consequences on farm life including social, ecological, economic and production.

Assumptions and definitions

Drought is the most frequent natural disturbance affecting the property. Drought preparedness is an aggregate score across all paddocks. Appropriate drought management dictates dynamic monitoring of stock numbers and available pasture to avoid groundcover loss and expensive fodder purchases.

Results and Interpretation

Phase 1 extended from 1985-2001 and was associated with conventional farming. Pastures and soil under this management regime were not actively regenerated, synthetic fertiliser use occurred regularly and urea was also applied to the paddocks. During periods of below average rainfall, ground cover was relatively low.

Phase 2 extended from 2002-2007; the land manager continued with conventional farming. However, within this Phase the land manager became aware of the damage synthetic fertiliser application was causing to the soil on the property and ceased applying yearly doses of Superphosphate. The ability of the property to cope with drought periods was initially impacted upon due to heavy synthetic fertiliser application. Improvements were seen after the landholder ceased applying synthetic fertilisers and started mineral based fertiliser applications. The land holder also ceased applying urea in 2003.

In Phase 3 extending from 2008-2011; the land manager made marginal improvements to the properties ability to cope with drought events. The improvements were a result of changing the enterprise from a dairy farm to a cattle breeding operation whilst introducing rotational grazing. Within this Phase the land manager was exploring options around designing and building the SoilKee Renovator and the management of the property continued as required. The land holder ceased mineral based fertiliser application in 2008.

Phase 4 extended from 2012-2019; within this Phase the land manager observed significant improvements in pasture growth due to improvements made in areas such as soil organic carbon, soil moisture availability and biological and fungal activity within the soil. These improvements resulted in the property significantly improving its ability to cope with drought events. The improvements seen across the property coincided with the implementation of the SoilKee Renovator machine into the farm management strategy. Since 2012 the land manager has utilised the SoilKee Renovator on the property typically twice yearly and in certain circumstances three times a year. The SoilKee Renovator was used on the property to mulch existing pasture biomass into soil whilst sowing multi species crops. The species sown included; chickory, maize, pea, tillage raddish, lucerne, clover, barley, oat and ryegrass. In 2019 the property produced up to 20 tonnes of dry weight biomass per hectare per year.

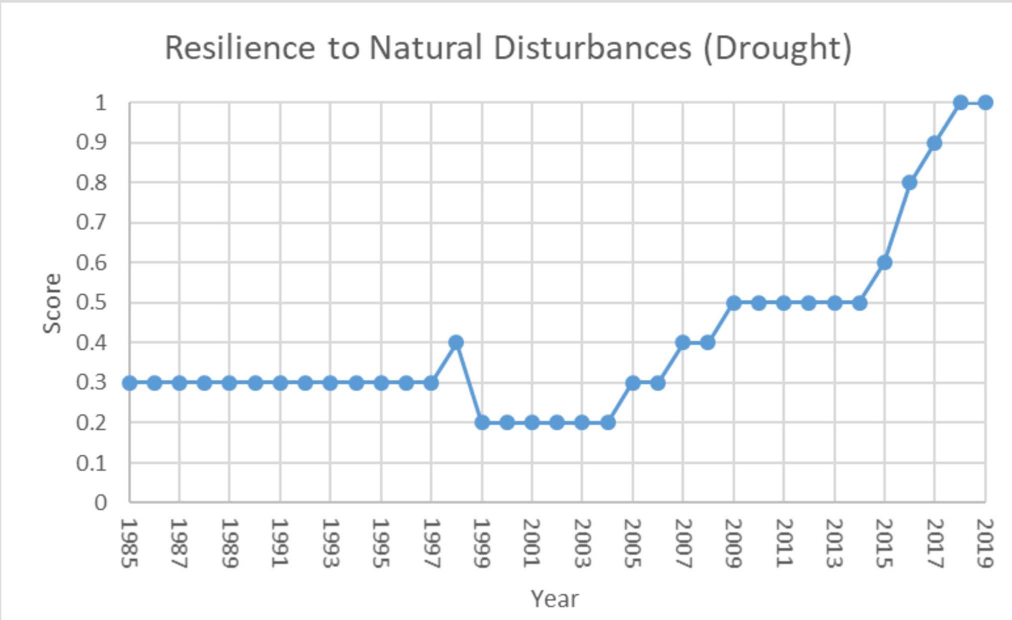


Figure 1. Land holder's graphical assessment of drought resilience change over time.

B. Status of soil nutrients – including soil carbon

Why track changes and trends in soil nutrients – including soil carbon?

Soil organic matter (SOM) is the basis of soil fertility. As a general rule-of-thumb, for every tonne of carbon in SOM about 100 kilograms (kg) of nitrogen, 15kg of phosphorus and 15kg of sulphur become available to plants as the organic matter is broken down. Thus, SOM releases nutrients for plant growth, promotes the structure, biological and physical health of soil, and is a buffer against harmful substances.

Assumptions and definitions

This is an aggregate score of the soil nutrients of all paddocks found on the property. This includes SOM, soil carbon, and a range of plant nutrients.

Soil organic carbon accounts for less than 5% on average of the mass of upper soil layers and diminishes with depth. According to the CSIRO, in good soils, soil organic carbon can be greater than 10%, while in poorer or heavily exploited soils, levels are likely to be less than 1%. Under conventional grazing in the intensive land use zone, heavy applications of inorganic fertilisers (inputs) are commonly used to drive higher production outputs. Regenerative landscape management regimes may be described as low input, but high quality/lower quantity output systems.

Results and Interpretation

Commencing in 2016 detailed soil tests were undertaken on the Olsen Family Farm to meet the reporting requirements of the Australian Government's Emissions Reduction Fund carbon abatement reporting requirements. Details of the soil survey method[2] are available from the ERF for the Grounds Keeping Abatement Project[3]. Data presented in the table and graph below apply to the whole property.

Results for the 2017 ERF reporting period showed the Olsen Family Farm measured 12.2 t/CO2e/ha and in 2018 this had increased to 13.7 tCO2e/ha. Details of the carbon credit units are also shown in the graph below.

Table 1. Carbon abatement and carbon credit data for the Olsen Family Farm. Data were derived from publicly available data sourced from the Australian Government's Emissions Reduction Fund for the Grounds Keeping Abatement Project.

Year	2017 (First Round - 12 months after baselining)	2018 (Second Round - 24 months after baselining)
Area	100.2	100.2
Carbon increase as tC	332.2	375.2
Carbon increase as tCO2	1,218	1,376
Abatement per hectare tCO2 / ha	12.2	13.7
Year-over-year percentage increase over one metre soil profile	1.9%	2.1%
Carbon Credit Calculations		
First Round Discount	50%	-
Net emissions (over historic farm emissions baseline)	18	7
Net abatement	591	1,369
Discounts for 25 year permanence and risk of reversal	443	1,026
Add back first round discounts		472
Australian Carbon Credit Units (ACCUs)	443	1,498
ACCUs per hectare	4.4	15.0

(Note that the first round (2017) is 37 more than first issuance due to updated calculations. Also some amounts do not sum because of rounding. And finally it is the relative percentage increases that are reported here, not absolute percentage points.)

[2] Carbon Credits (Carbon Farming Initiative) (Sequestering Carbon in Soils in Grazing Systems) Methodology Determination 2014

[3] 2020 AgriProve Unpublished, Internal Calculations. ACCU issuance available from http://www.cleanenergyregulator.gov.au/ERF/Pages/Emissions%20Reduction%20Fund%20project%20and%20contract%20registers/Project%20register/ERF-Project-Detailed-View.aspx?ListId=%7B7F242924-BF02-45EE-A289-1ABCC954E9CE%7D&ItemID=684

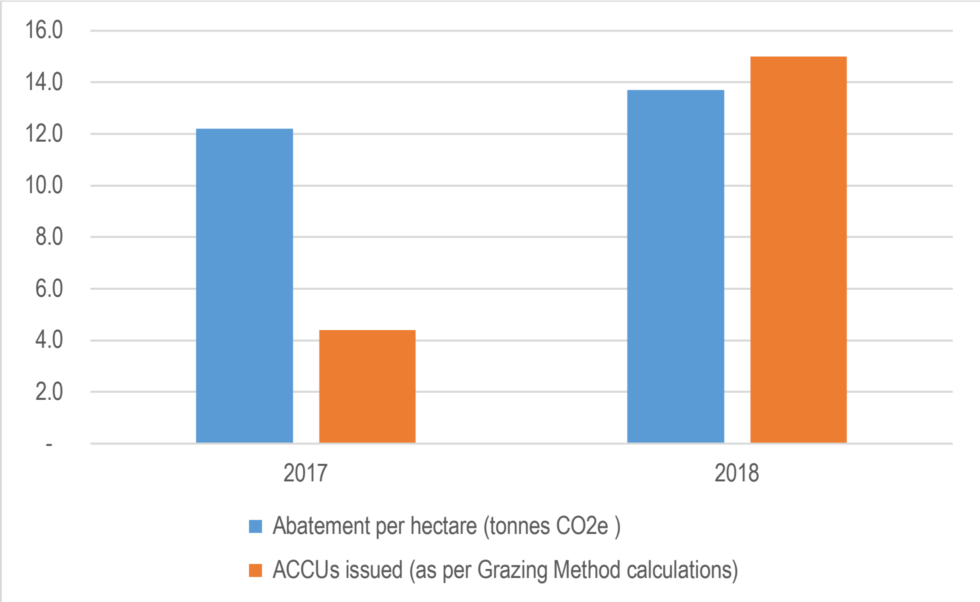


Figure 2. Carbon abatement per hectare and Australian Carbon Credit Units for The Olsen Family Farm.

Phase 1 extended from 1985-2001; within this Phase the property was managed for production. Synthetic fertiliser and urea application occurred throughout the Phase and protecting and improving the health of the soil was not a priority of the land manager.

Phase 2 extended from 2002-2007; within this Phase the land manager ceased applying synthetic fertiliser and urea on the property and started applying lime and mineral based fertilisers onto his pastures. Lime was applied across the property to improve soil pH levels.

Phase 3 extended from 2008-2011; within this Phase the land manager continued applying lime onto his pastures and started a rotational grazing management system. The land manager ceased applying mineral based fertilisers in 2008.

Phase 4 as seen above in Criterion A.

Phase 1 extended from 1985-2001; within this Phase the property was managed for production. Synthetic fertiliser and urea application occurred throughout the Phase and protecting and improving the health of the soil was not a priority of the land manager.

Phase 2 extended from 2002-2007; within this Phase the land manager ceased applying synthetic fertiliser and urea on the property and started applying lime and mineral based fertilisers onto his pastures. Lime was applied across the property to improve soil pH levels.

Phase 3 extended from 2008-2011; within this Phase the land manager continued applying lime onto his pastures and started a rotational grazing management system. The land manager ceased applying mineral based fertilisers in 2008.

Within Phase 4 the property was measured in accordance with the Emission Reduction Fund to generate 11.2t/C02e/ha/yr. Following this the Olsen's were the first farm managers in Australia to be awarded carbon credits for sequestering carbon in their soil. The increase in carbon in the soil has correlated with increases in organic matter and water infiltration and holding capacity. Moisture and organic material were previously measured to reach a depth of 50cm in the soil, currently on some parts of the farm that depth has increased to 650cm. The pH of the soil has also improved from 3.7-4.5 prior to 2003 to currently measure at 5.5-7.9.

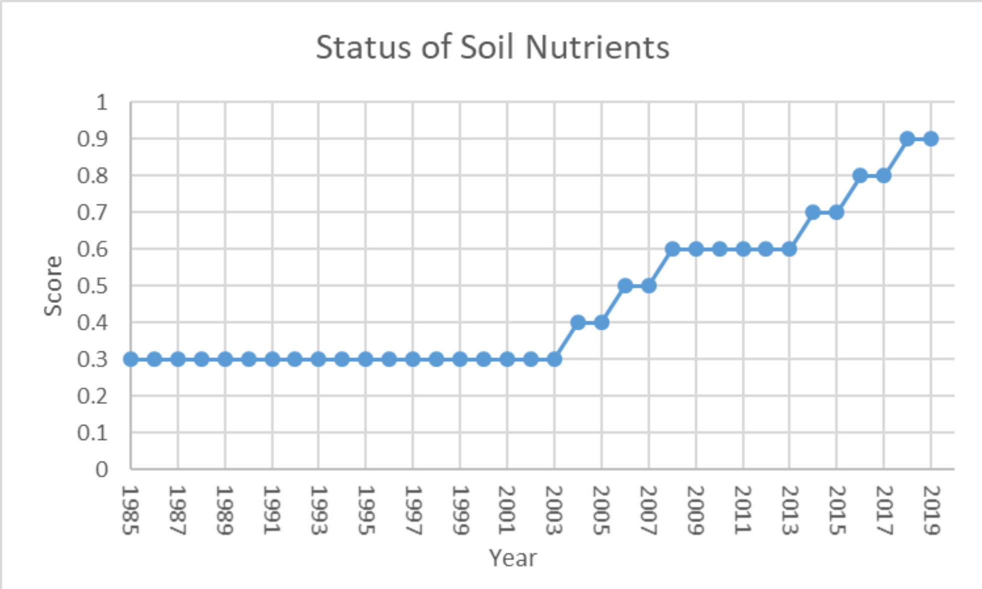


Figure 3. Land holder's graphical assessment of soil nutrients change over time.

C. Status of soil hydrology

Why track changes and trends in soil surface water infiltration?

Soil physical properties have a direct relationship to soil moisture. Soil texture and structure greatly influence water infiltration, permeability and water-holding capacity. Of the water entering a soil profile, some will be stored within the root zone for plant use, some will evaporate, and some will drain away. In agro-ecological settings, by increasing water infiltration, permeability and water-holding capacity this will usually act as a stimulus to ecological function.

Assumptions and definitions

This is an aggregate score of the soil surface water infiltration and water holding capacity across all paddocks found on the farm.

Plant available water is the difference between field capacity (the maximum amount of water the soil can hold) and the wilting point (where the plant can no longer extract water from the soil) measured over 100 cm or maximum rooting depth.

Results and Interpretation

Phase 1 as seen above in Criterion B.

Phase 2 as seen above in Criterion B.

Phase 3 as seen above in Criterion B.

Phase 4 as seen above in Criterion B.

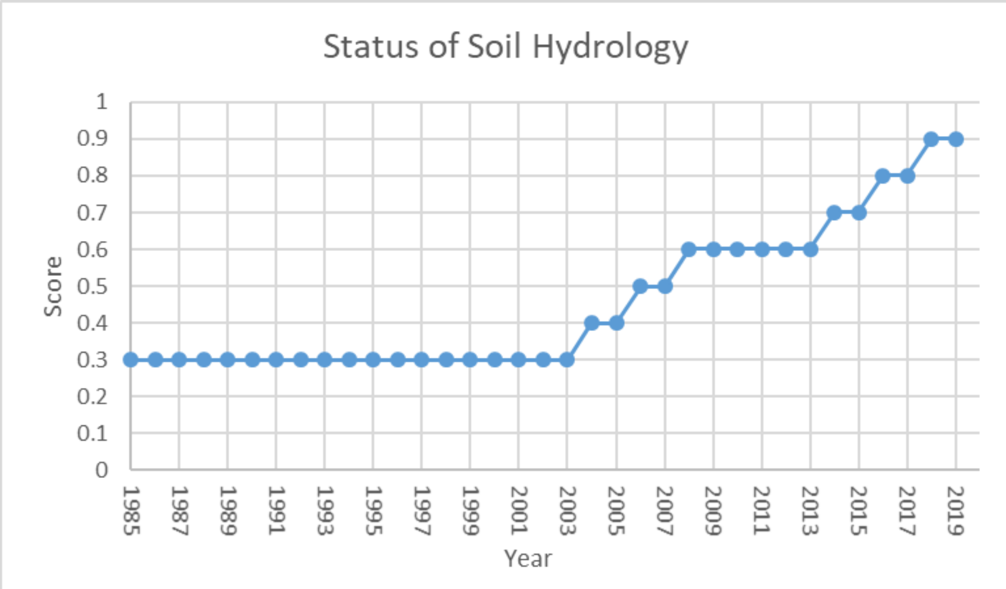


Figure 4. Land holder's graphical assessment of soil hydrology change over time.

D. Status of soil biology

Why track changes and trends in soil biological activity?

Soil biology affects plant (and animal) production by modifying the soil physical, chemical and biological environment within which plants grow and persist. The ratio of fungi to bacteria is important for land managers to understand - too many bacteria can indicate an unhealthy and unproductive soil. Soil fungi contribute to:

- natural processes (litter transformation, micro-food web participation and soil engineering);
- the decomposition of organic material resulting from compost applications and disturbance from cattle grazing; and
- enhancing nutrient distribution for plant health and productivity.

In healthy soils, invertebrates including arthropods and worms, also form a vital part of the soil food web.

Assumptions and definitions

This is an aggregate score of the soil surface condition properties of all paddocks found on the farm.

Decomposition of plant and animal residues is a dynamic process involving trophic levels. While some of the residues are being broken down for the first time by the litter transformers (detritivores), other residues have already been sequestered by soil microflora, which are in turn consumed by microfauna predators.

Results and Interpretation

Phase 1 as above.

Within Phase 2 soil biological activity increased marginally due to the application of lime and the ceasing of synthetic fertilisers.

Within Phase 3 no change in soil biological activity was observed. This was due to the land manager continuing with relatively the same management strategies as the previous Phase.

Within Phase 4 soil biological activity significantly increased due to the land manager commencing use of the SoilKee Renovator machine on his pastures. The SoilKee Renovator machine increased the mulch processing capabilities of the pastures which provided sustenance for soil biology in the form of worms and fungi.

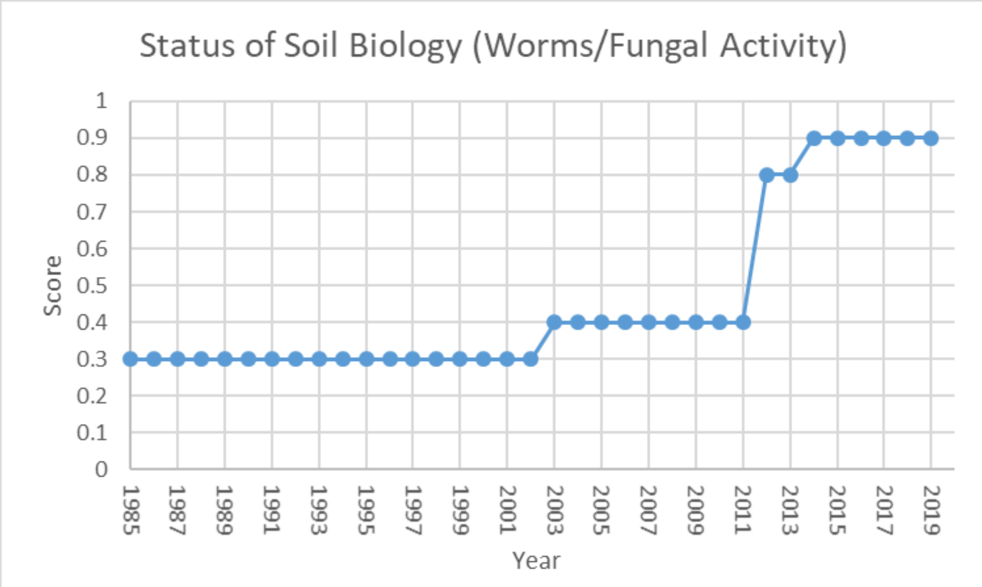


Figure 5. Land holder's graphical assessment of soil biology change over time.

E. Status of soil physical properties – As a medium for plant growth

Why track changes and trends in soil physical properties?

Declining soil surface condition involves the depletion of nutrients, soil organic matter and of key elements of the soil biology from the soils. Soil degradation is the result of high levels of bare ground, water erosion, wind erosion, chemical and physical deterioration. It is often associated with unsuitable land management regimes. Over time loss of soil physical properties will have consequences on production, economic, other ecological criteria as well as social outcomes.

Assumptions and definitions

This is an aggregate score of the soil physical properties of all paddocks found in the farm. This includes effective rooting depth of the soil profile and bulk density of the soil through changes to soil structure or soil removal.

The rooting depth of plants was observed by the landholder over time when the soil was ploughed or dug with a shovel. Under more intensive management, involving continuous grazing, grass tussocks were observed to be low in height and relatively shallow rooted.

Indicators of landscape function over time include: soil surface rain-splash protection, cryptogam cover, soil surface erosion type and severity, washed/deposited materials, physical features on the soil surface to retain resources during surface flows, and ground cover complexity which influences permeability.

Results and Interpretation

Phase 1 as seen above in Criterion D

Phase 2 as seen above in Criterion D

Phase 3 as seen above in Criterion D

Phase 4 as seen above in Criterion D

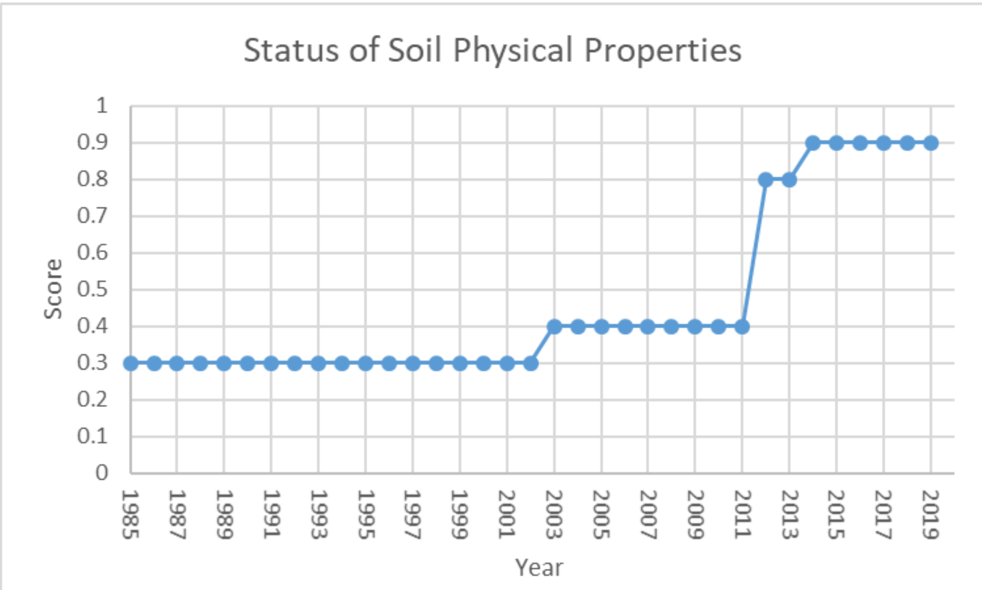


Figure 6. Land holder's graphical assessment of soil physical properties change over time.

F. Status of plant reproductive potential – Reproductive potential of pastures

Why track changes and trends in reproductive potential of pastures?

An understanding of successful reproduction, germination, establishment and development of plants is important in managing agri-ecological ecosystems. This understanding of successful plant reproduction is vital in the manipulation of planned production outcomes - e.g. grazing regimes can prevent seed-setting by undesirable or invasive plants and for increasing the longevity of perennial pastures before they need to be resown.

Assumptions and definitions

Reproductive potential is the relative capacity of a species to reproduce itself under optimum conditions, including trees, shrubs and grasses. In the context of grazing land management regimes this is an aggregate score assigned across all pastures found on the farm.

Where continuous grazing is the preferred grazing management regime or where total grazing regimes limit or prevent reproductive success of a species mix in pastures, this can lead to bare ground and to the dominance of some species which may have low feed value for grazing animals.

With the implementation of rotational grazing and the advent and use of the SoilKee Renovator pastures on the property were better able to set seed, germinate and grow. The use of multi-species cropping techniques insured a diverse pasture species composition across the property.

Results and Interpretation

Within Phase 1 management actions which the land holder conducted negatively impacted upon the reproductive potential of pasture species across the property. The management action responsible for the decline was applying large amounts of superphosphate fertiliser in consecutive years.

The reproductive potential of pasture species improved marginally during Phase 2 due to the land holder ceasing the application of superphosphate fertiliser and commencing mineral based fertiliser and lime application.

The land holder did not commence any further pasture remediation work within Phase 3.

Within Phase 4 the land holder started using the SoilKee Renovator. The multi-species crops planted regularly by the land holder during this phase were allowed to grow to maturity and set seed before being grazed by livestock. The management actions and ideals of the land holder during this phase enabled the reproductive potential of pasture species to significantly increase.

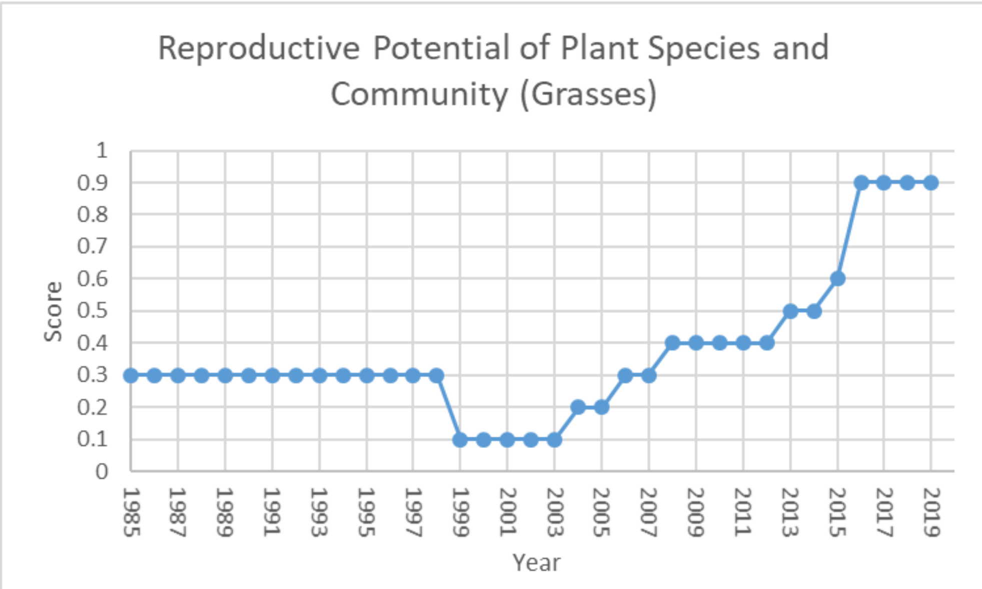


Figure 7. Land holder's graphical assessment of reproductive potential of grasses change over time.

G. Status of tree and shrub structural diversity and health

Why track changes and trends in extent of tree cover?

Tree cover in agricultural landscapes provides important ecosystem benefits including mitigation of soil erosion, shelter for pastures, improved animal welfare; enabling added revenue from stacked enterprises; habitat and breeding sites for pollinators and predatory insects, birds and animals; improved salinity management; improved interception of rainfall and improved aquifer recharge management.

Results and Interpretation

In 1996 the land holder cleared trees on the property to open up more land for pasture growth. The majority of trees on the property had already been cleared before the current land holder purchased the property in 1985. In 2005 during the Millennial Drought some of the trees remaining on the property perished. The land holder has not undertaken any revegetation work on the property.

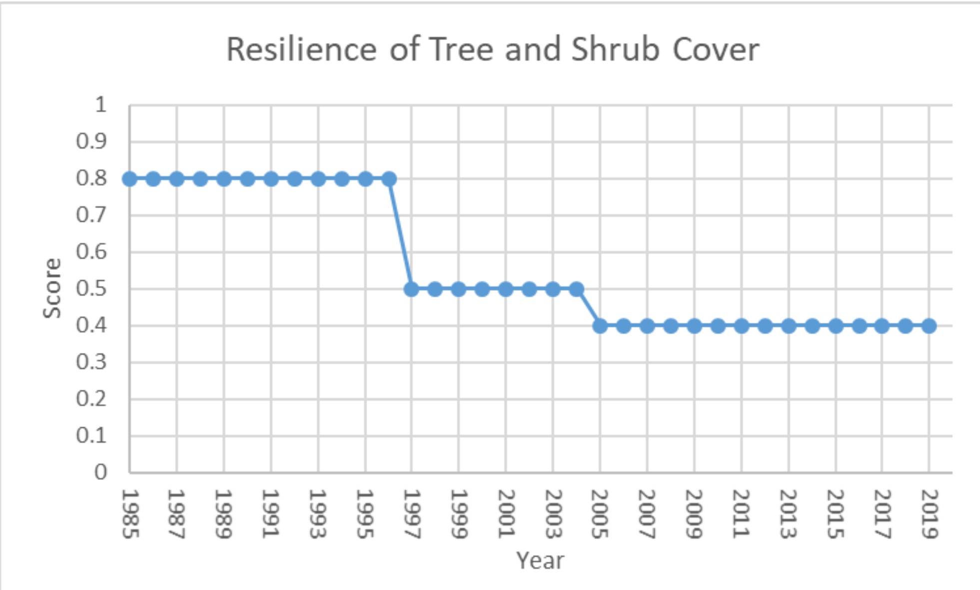


Figure 8. Land holder's graphical assessment of tree and shrub cover change over time.

H. Status of grass and herb structure - Ground cover

Why track changes and trends in ground cover?

The quality of ground cover in summer provides essential protection to keep the soil cool against direct, searing summer heat by reducing evaporation, protecting bare soil against raindrop splash and wind erosion. Good summer pastures also slow overland flows during the storm season and assist with infiltration of intense rainfall events, thus mitigating water erosion and replenishing soil moisture.

Winter grazing is an important management consideration in landscapes that are managed for livestock production. Conservative grazing land management is both ecologically and economically sensible.

Definitions and Assumptions

This is an aggregate score across all pasture production paddocks on the farm.

The commonly espoused grazing land management regime in the district is that of continuous or set stocking throughout the year with two growing seasons and two feed gaps between the growing seasons. Typically land holders cut and harvest pasture during the growing seasons to later feed out to livestock during the feed gap seasons.

In contrast to continuous or set stocking, holistic grazing of pastures involves short duration grazing followed by a relatively longer duration of pasture resting. This method of grazing in conjunction with the use of the SoilKee Renovator has enabled the land holder to grow sufficient feed to bridge the biannual feed gaps. The land holder leaves the feed to continue growing in the paddocks year round and has removed the need to harvest feed and then refeed it to livestock. This has reduced the amount of time spent managing the livestock and lowered overhead costs of the business.

Results and Interpretation

Throughout the four phases ground cover on the property has varied. Within phase 1 the land holder increased stocking density in 1990 and applied large quantities of synthetic fertilisers, these actions had negative impacts on the ground cover layer. Actions the land manager undertook in phases 1,2 and 3 which improved the ground cover layer were applying lime and mineral based fertilisers, rotational grazing and multi-species cropping through the use of the SoilKee Renovator machine.

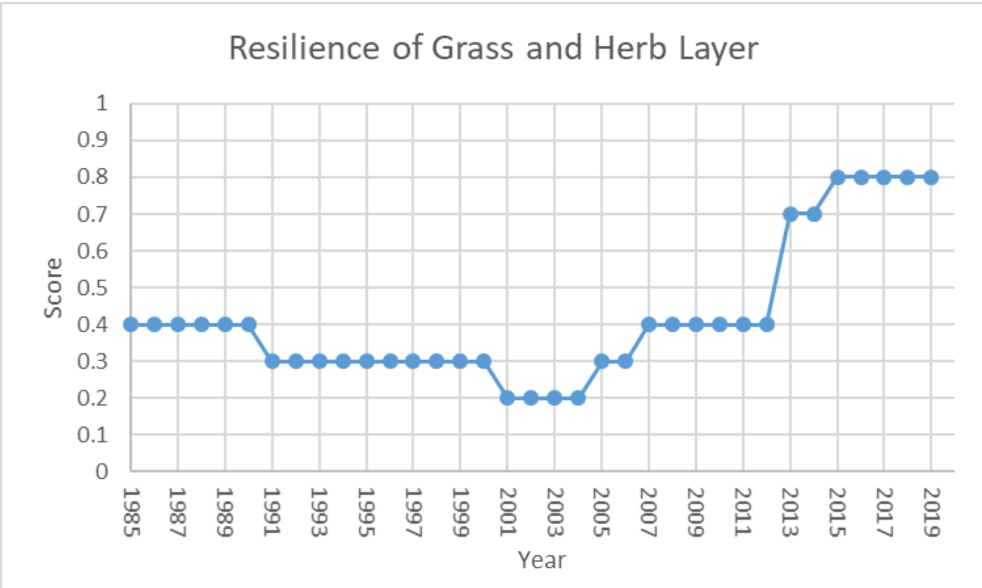


Figure 9. Land holder's graphical assessment of ground cover change over time.

I. Status of tree and shrub species richness and functional traits

Why track changes and trends in the status of tree and shrub species richness?

Functional richness refers to the number of species inhabiting a place and what is/are their roles in that place. Functional diversity reveals how evenly the species are distributed in an area. A decrease in functional richness and evenness decreases an ecosystem's productivity and stability. How an ecosystem is managed in an agricultural setting will determine its productivity and stability.

Grazing land management regimes typically result in a reduction in the numbers of species of trees and shrub species as the landscape is modified for pasture production. Grazing animals can inhibit the regeneration of trees and shrub species.

Definitions and Assumptions

This is an aggregate score across all paddocks.

Results and Interpretation

Prior to the current land holder purchasing the property in 1985 significant tree clearing had already been undertaken. The number of species of trees and shrubs on the property has not altered during the four Phases of the current land management regime.

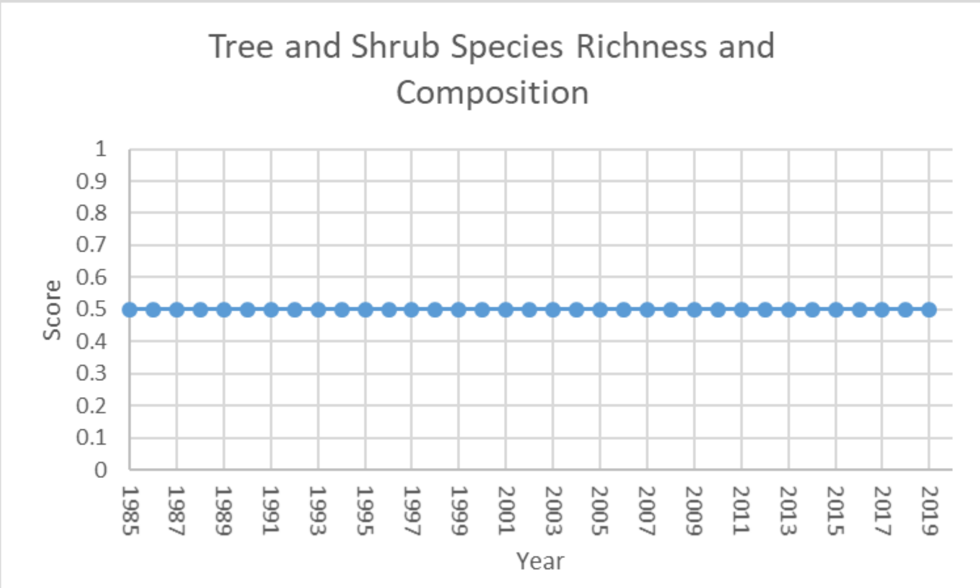


Figure 10. Land holder's graphical assessment of tree and shrub species richness and composition change over time.

J. Status of grass and herb species richness and functional traits

Why track changes and trends in grass species diversity?

Functional richness refers to the number of species inhabiting a place and what is/are their roles in that place and functional diversity reveals how evenly the species are distributed in an area. A decrease in functional richness and evenness decreases an ecosystem's productivity and stability. How an ecosystem is managed in a production setting will determine its productivity and stability.

In many grazing land management regimes, the variety of pasture plants (annuals and perennials) can improve production, protect natural resources (soil and water) and build the capacity of farming systems to adapt to future production and environmental challenges. The intensity of the grazing management system will determine the health and vitality of pastures and their longevity.

The selection of which perennial pasture species, on which to base a grazing production system, should be based on considerations of climate, soil conditions and performance of pasture species under different management regimes.

Assumptions and definitions

This is an aggregate score across all pasture species found on the farm.

Results and Interpretation

Ground cover species composition has changed over time on the property due to the management actions undertaken by the land holder. Actions such as applying lime and mineral based fertilisers corrected the pH levels of the soil which resulted in a marginal increase in pasture species. A significant increase in pasture species occurred when the land manager started a management plan of multi species cropping utilising the SoilKee Renovator Machine. Undesirable pasture species such as Kikuyu grass (*Pennisetum clandestinum)* has since been outcompeted and is no longer a problem on the property.

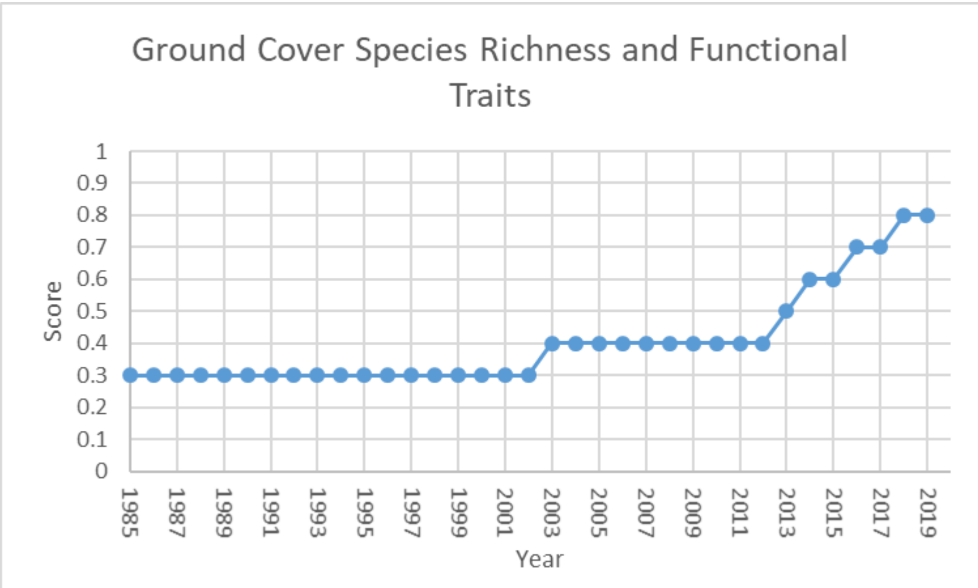


Figure 11. Land holder's graphical assessment of ground cover species richness and functional traits change over time.

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Attachment A

Production systems

Information below describing land management regimes or production systems was compiled from a field visit and interview with Niels Olsen and his family, conducted November 2019.

The following chronology was established as a partnership with the land manager for each of the phases 1-4:

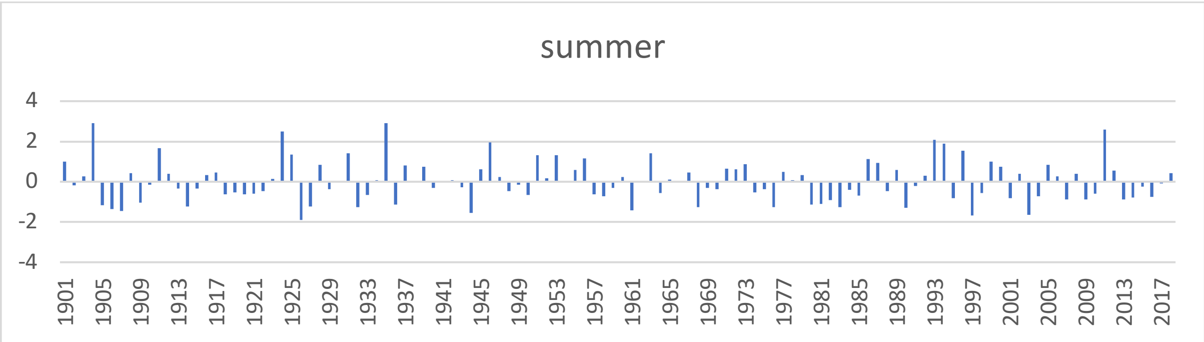
Date	*Action*
1985	Purchased farm / Established dairy farming
1990	Increased stocking density.
1996	Cleared trees from property
1999-2000	Superphosphate fertiliser application onto property, soil pH approximately 3.7-4.2 Earth moving business began

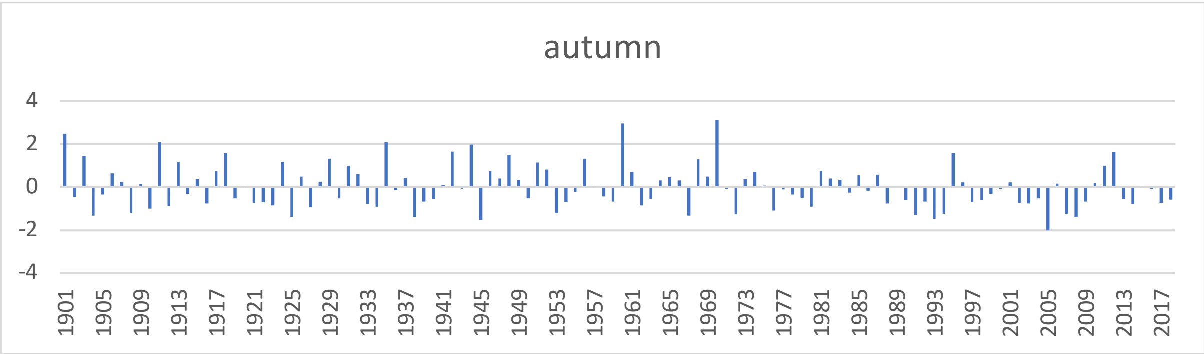
2003-2007	Stopped urea fertiliser application completely. Application of 6 tonne of lime per acre to increase mineral properties of soil. pH increases to between 5-6. Began mineral fertiliser business, stopped earth moving. Self-education (Courses in soil chemistry, nutrition. Ian Mills, listening to regen ag success stories). Trees died on the property during the Millennial Drought.
2008-2012	Stopped dairying in 2008, changed to beef enterprise, (sold herd, purchased breeders). Stopped application of mineral fertiliser on paddocks. Commenced Rotational Grazing
2012-2018	SoilKee Renovator was created and patented. Commenced use of SoilKee Renovator on the farm, more attention paid to soil composition and nutrient requirements for healthy soils. Began to see surplus pasture, no longer needed to supplementary feed. Input costs began to decrease. Kikuyu Grass outcompeted on the property from 2014. Selling of SoilKee machinery/seeds and contracting work relating to SoilKee renovators (Mostly Shaun and Jaime) begins. Changed grazing patterns: Longer grazing (12 weeks per yr instead of 8 weeks/yr) Increase in yield to 20 tonnes/DM/Ha/year from 12 tonnes/DM/Ha/Yr

2019	Focus of business has changed from beef to manufacturing and expansion of Soilkee renovator machinery and 'vision'. Current soil pH ~ 7 Improved soil properties, carbon content and microbial biomass
Future Plans	28 paddocks current, plan to split 4 more into 8.
	Increase stocking rate of beef herd slightly to better manage pasture. Refining which seed sp. Benefits property / business most.

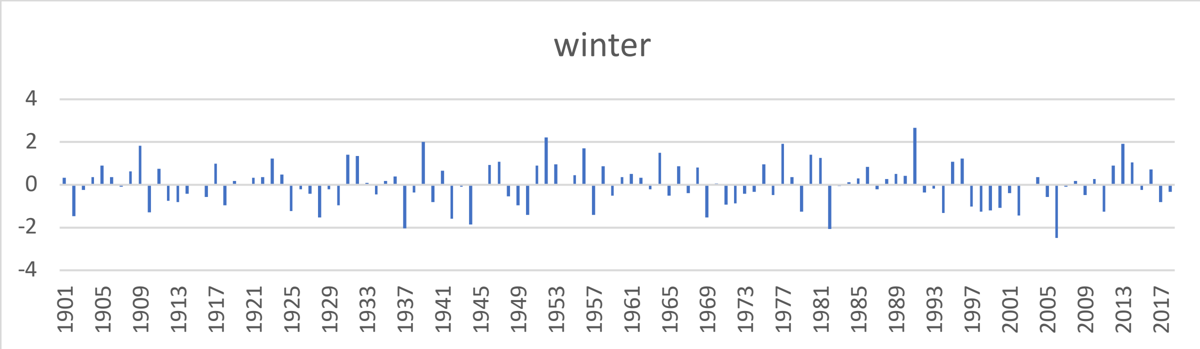
Attachment B

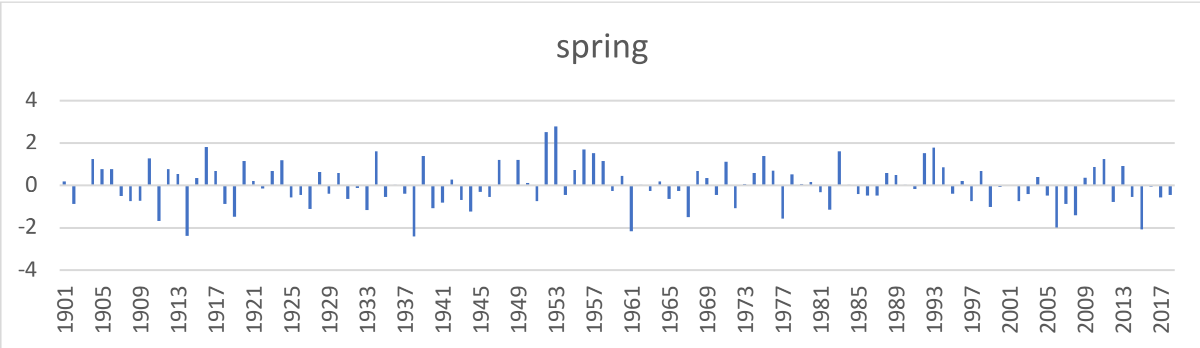
Patterns of seasonal rainfall derive from modelled monthly rainfall data for the Olsen Family Farm[4] showing variants around the mean.





[4] Source: Bureau of Meteorology modelled 5-kilometre resolution rainfall data. Seasons are defined as the standard 3 monthly intervals e.g. summer comprising December, January and February





Acknowledgements

Richard Thackway and Matthew Warnken of Agriprove reviewed the document and provided information regarding the Emissions Reduction Fund and the allocation of carbon credits.

Richard Thackway provided the seasonal rainfall record from modelled monthly rainfall data for The Olsen Family Farm (Attachment B).

Phil Tickle of Cibolabs provided the spatial analysis of regional ground cover.

2020
OLSEN'S HALLORA CASE STUDY
ECONOMICS REPORT

Prepared by RSM

Introduction

Niels and Marja Olsen have managed a beef cattle farming enterprise in Hallora Victoria for the past 35 years. The farm is a 124-hectare grazing property with primary income derived from the breeding of beef cattle. The Olsens initially operated a dairy on their Hallora farm until the late 2000s – when they transitioned across to beef cattle.

The Olsens' beef cattle enterprise consists of approximately 150 head that are rotationally grazed across 28 paddocks. Hallora is also home to the manufacture and assembly of Olsens' invention – the SoilKee Renovator.

Since the early 2010s, the Olsens' have strived to repair the damage done to their soil by poor management techniques of the past. This led to greater understanding of soil chemistry (and later the invention of the SoilKee Renovator).

With their new found knowledge, the Olsens' have been able to dramatically increase the organic matter of their soil – in particular carbon – allowing for greater water retention and productivity. The Olsens' capitalised on this by working with Agriprove and were subsequently awarded the first soil Australian Carbon Credit Units (ACCU) – a tradable financial commodity.

The Olsens' property has undergone significant changes over the past ten years – both in management techniques and operations. As such, it is difficult to illustrate the changes in profitability and productivity. This Economic Report is taking a 'lessons learned' approach and we hope to illustrate the principle behind the changes implemented and the potential benefits and effects on; productivity, profitability and economic viability.

<u>Report Data Sources:</u>

Farm Data & Information – Niels & Marja Olsen

Industry & Technical Insights:

- Agriprove & Matthew Warnken
- SoilKee
- West Gippsland Catchment Management Authority

Government Regulations & Legislation:

- Clean Energy Regulator
- Australian Legislation; www.Legislation.gov.au
  - Income Tax Assessment Act 1997
  - Goods and Services Tax Act 1999
  - Carbon Credits (Carbon Farming Initiative) Act 2011
- Australian Taxation Office
- Austlii legal database

A significant focus of this report is the benefits of Australian Carbon Credit Units and how they provide a small but significant source of additional revenue for a farming enterprise. However, carbon credits are an emerging and evolving market. The Olsens strongly recommend that farmers 'do their homework' as carbon credits can be technically and legally complex. There are restrictions and compliance obligations that must be met, so it is crucial that farmers are aware of the associated risks to themselves and their enterprises. It is recommended that farmers seek advice, from a reputable source, before taking steps to obtain carbon credits.

It is also important to note that the Olsens have a bespoke business model – that is, the Olsens receive income from a number of interrelated but separate sources. In particular, these sources are Beef cattle production, sale of Australian Carbon Credit Units and sale of the SoilKee Renovator (and other SoilKee machinery).

Given the business model, potential from the beef cattle enterprise has not yet been realised. Emphasis has been placed on developing the Soilkee Renovator, with significant investment into research and development. As such, the beef cattle operation is yet to fully realise the increased productivity of their soils – although there are plans to increase stocking rates in the near future to take advantage of the improved pasture productivity and use livestock to maintain soil quality.

For the average farmer, with a single income source (that is, agricultural production), the increase in soil and pasture productivity that the Olsens have achieved (refer below) results in a significant improvement in production levels. Due to the timing of this case study, the evidence of increased beef cattle production and financial profitability is yet to be seen in regards to the beef cattle enterprise.

Production

The sale of ACCUs can provide a revenue source that supplements on-farm income, however obtaining ACCUs can be costly, time consuming and difficult. As such a primary benefit from implementing regenerative farming practices are concerned with enhancing natural capital and the resultant ecosystem services leading to improved soil moisture profile and a diverse range of macro and micro invertebrates, such that outcomes include improved soil and pasture quality and increased productivity.

The Olsens noted that their efforts into increasing soil carbon was, primarily, to improve the quality of their soil and pastures and to increase production levels of their land – the ACCUs are an 'added bonus'. The benefits to soil quality and productivity, as a result from the transition to regenerative farming practices, include the following:

Water Retention

Due to the increase in soil organic carbon (SOC), water retention in the soil has improved significantly. SOC holds up to seven times its own weight in water. With every percentage increase in SOC levels in the Olsens' soil, the amount of water that can be held also increases.

This allows the Olsens to take further advantage from rainfall events – particularly in seasons with minimal rainfall or periods of drought. The increase in SOC and hence water retention allows pasture to bounce back much faster from a singular rainfall event. Other farming enterprises may take extra time to get pasture growth from initial rainfall events as limited ground cover and low organic carbon content impacts pasture growth rates.

Dry Matter Increase

The increase levels of SOC and water in the Olsens' soil results in strong pasture growth rates. This facilitates nutrient availability within the soil thus allowing soil microbes to benefit – leading to increased pasture growth and dry matter.

On their Hallora farm, the Olsens have measured an average Tonnes of Dry Matter per Hectare (DM/Ha) of 16-17 DM/Ha – with the best paddocks measuring up to 20.3 DM/Ha and the worst paddocks measuring 12 DM/Ha. The Olsens noted typical results for the West Gippsland area was 6-7 DM/Ha for grazing operations and 10-11 DM/Ha for dairies.

The Olsens' level of pasture growth and dry matter is significantly higher than the average for the area. This leads to greater levels of feed for livestock and higher productivity for the enterprise.

Due to this high pasture growth, the Olsens have gone from two months of feed ahead to six months of feed ahead. To take advantage of this (and maintain levels of soil carbon), they plan to increase stock numbers – while still maintaining ample feed reserves. Conversely, a number of other farmers in the area have been forced to destock due to drought conditions.

Expenses and Labour

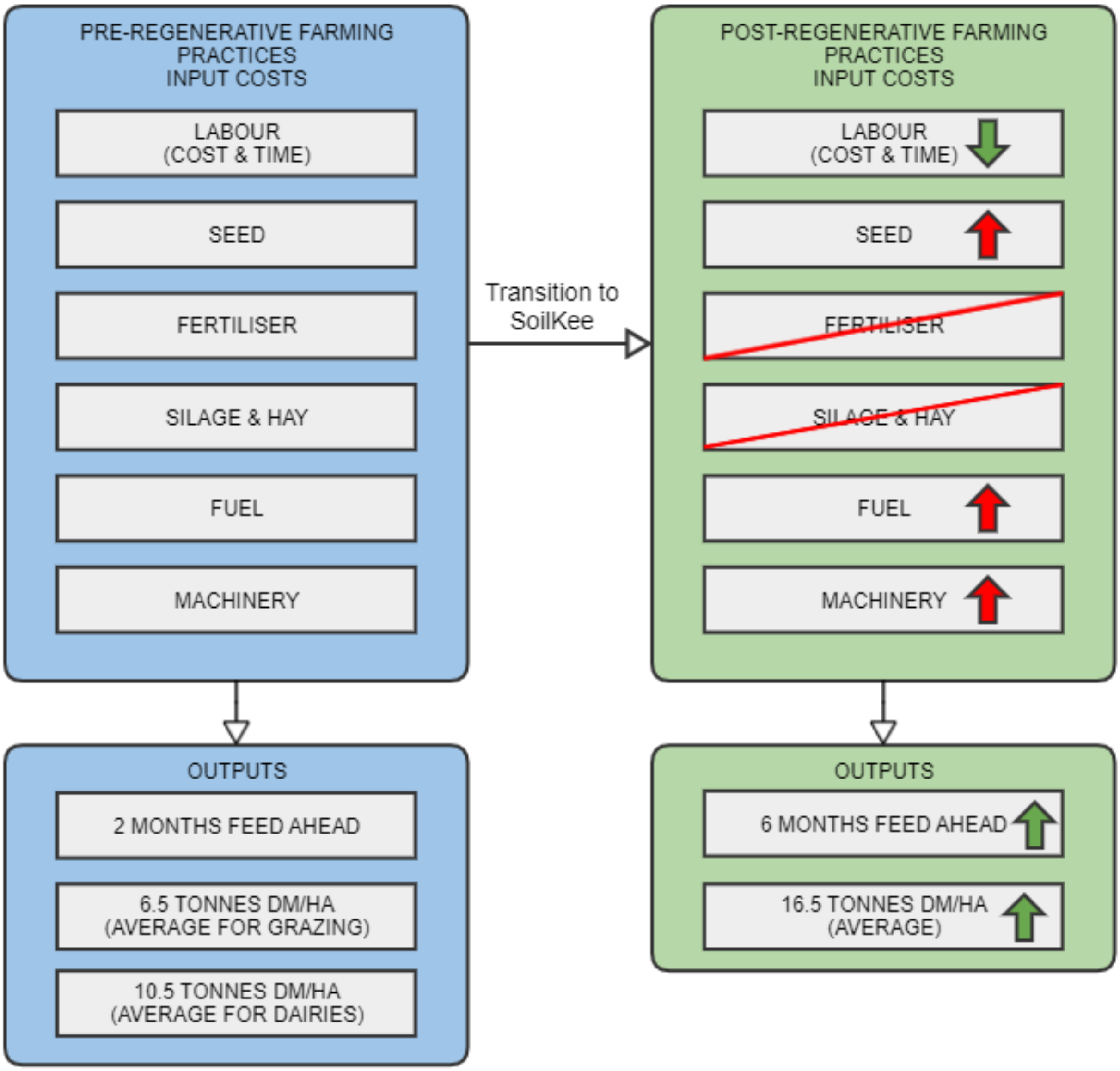
After using the SoilKee Renovator, the Olsens have been able to significantly reduce expenses and labour time on their farm. In particular, fertiliser expenses have been reduced 100% as no fertiliser is used on the property anymore.

Labour time (and labour hire expenses) have also been reduced on the farm – as less time is spent on harvesting feed for hay and silage. However, due to the requirements of the SoilKee process, there has been increased expenses on fuel and seeding. The Olsens noted that the savings made on fertiliser and labour significantly outweigh the increased seeding and fuel expenses as a result of the use of SoilKee.

For the average farmer, it is assumed that – in order to implement the same or similar regenerative practices to the Olsens – that there would be a capital outlay to acquire the required machinery.

Figure 1 illustrates the change in input costs and outputs, before and after the Olsens transition to regenerative farming practices. While some expenses have increased, they have as a whole declined after transitioning to regenerative farming practices. Similarly, time spent labouring has also reduced overall – as the increase in labour time for seeding is outweighed by the time no longer spent for hay and silage.

Figure 1 Input Costs & Outputs change from transition to regenerative farming practices



What are Australian Carbon Credit Units?

Australian Carbon Credit Units are tradeable financial instruments issued by the Clean Energy Regulator of Australia. One ACCU is equal to one tonne of carbon dioxide equivalent (tCO2-e) that has been stored or avoided. That is, one tCO2-e has been removed from the atmosphere and stored in the form of organic materials in the soil.

Soil Carbon Credits

Commonly, increasing storage of carbon is done so by planting trees – but this method can limit the availability of land for grazing and/or cropping for farming enterprises. However, a method much more suited to farmers is by increasing the carbon storage of their soils. This, in turn, will increase the quality and productivity of their soil. There are multiple benefits as the farmer is potentially entitled to ACCUs to later sell and they also benefit from the improvement in ecosystem services on their land.

Creation of ACCUs

There are a number of steps that must be completed in order to create ACCUs. The application process begins with creating a carbon reduction project – by way of increasing soil carbon, reducing emissions from livestock, reforestation and so on. There are other types of projects set out by the Clean Energy Regulator that may be applicable to Australian farmers.

Once an eligible project has been created, the applicant will need to apply to become a participant of the Emissions Reduction Fund (ERF – Government fund to facilitate buy-back of ACCUs).

In order to create ACCUs, the applicant will need to successfully increase carbon levels through their project. To determine this, regular testing and reporting, in accordance with guidelines from the Paris Agreement must be undertaken. To ensure accurate testing and reporting, regular audits must be carried out by an auditor registered under the *National Greenhouse and Energy Reporting Regulations 2008.*

The creation of ACCUs is a very complex technical and legal process[1]. Applicants must understand the risks and obligations associated with this process which can last up to 25 years. The Clean Energy Regulator recommends engaging carbon service providers to assist with understanding and participating in this process. In the case of the Olsens, they engaged Agriporve as a carbon service provider to assist in the creation of their ACCUs.

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[1] For more information, please refer to the following:

- The Clean Energy Regulator; http://www.cleanenergyregulator.gov.au/
- *Carbon Credits (Carbon Farming Initiative) Act 2011*; https://www.legislation.gov.au

Tax Treatment of ACCUs

The *Income Tax Assessment Act 1997* provides a uniform tax treatment of the acquisition and sale of ACCUs – that is, regardless of individual circumstances, the taxation of ACCUs is generally the same.

In general, the gross proceeds from sale of the ACCUs is included as assessable income and the gross expenditure incurred in the acquisition of the ACCUs is allowed as a deduction in an entity's tax return. There are a number of limitations on what can be deducted, but the costs incurred in preparing or lodging applications for ACCUs are generally deductible. The *Goods and Services Tax Act 1999* has been amended so that the sale of ACCUs are GST-free supplies.

Please note; The information provided in this report does not constitute professional advice. Applying the taxation legislation in regard to ACCUs can be complex. You should obtain professional advice about the tax treatment of ACCUs for your own situation[2].

Revenue from ACCUs

ACCUs can be sold in a financial market – Usually, ACCUs are sold back to the Australian Government through the ERF. According to the Clean Energy Regulator, the current price for ACCUs is $15.37 per unit.

As discussed previously in this report, the Olsens have used the SoilKee Renovator to significantly increase the level of organic carbon in their soil. By doing so they have, created over 2,000 ACCUs in 24 months. The Olsens have the option to sell these ACCUs, providing an additional revenue source on the farm. This additional revenue can be used to subsidise other activities in the enterprise.

[2] For more information, please refer to the following:
- *Income Tax Assessment Act 1997;* https://www.legislation.gov.au
- *A New Tax System (Goods and Services Tax) Act 1999;* https://www.legislation.gov.au
- Australian Taxation Office; https://www.ato.gov.au/

2020
OLSEN'S HALLORA CASE STUDY
SOCIAL REPORT

Prepared by Aoife McHugh

Niels and Marja Olsen, along with their three sons Shane, Jamie and Shaun are a reflection of the triumph made possible when shared passion meets innovation and hard work. The Olsen's story is rooted in the origins of dairy farming after purchasing their property in 1985. Over three decades Neils and Marja have successfully navigated farm enterprise changes, established profitable side businesses and raised three diligent sons. The changes made on farm originated from a desire to improve soil health and create a high-quality product that reflects the care and commitment they have to their land and to the principles of regenerative agriculture. Amongst the suite of practices implemented on their 305-acre farm, the most impressive relate to the pursuit of self-directed education and the development of the Soilkee Renovator System. It is clear that this success story is underpinned by strong family foundations: The Olsen's are a team. They are warm and good humoured with each other, and each member contributes ideas and opinions to all major decisions made on the farm.

After leaving school Niels completed a farming apprenticeship and shortly thereafter acquired the Hallora property which was run in a conventional style between the year of purchase to the early 2000s. During this time Niels farmed the way most Australians have for generations, through the application of inputs onto the land in order to achieve pasture growth. Whilst this method produced successful results in the short term, overall productivity fell short of ideal. Change toward regenerative farming practices commenced when superphosphate fertiliser application continued to increase in price, and lowered productivity was reflected through input costs pressures. The Olsen's began to question how they could change their current farming practices to reduce their burden. Parallel to this and as equally important, Niels and Marja realised an interest in the relationship between human health, food and the soil from which it grows. Self-directed education saw them enrol into soil chemistry courses and research into the importance of biodiversity and ecosystem health, all of which facilitated a mindset shift away from conventional farming practice. Marja completed research into human gut-health and Niels applied that knowledge so that it could be extrapolated to the farm. Their enthusiasm grew still as they discovered how soil fertility fostered resilient landscapes and improved the quality (and quantity) of realised pasture on other farms in low rainfall areas.

Propagating success: SoilKee Renovator System

Whilst learning about the importance of soil health was the catalyst for change, it is the SoilKee Renovator that streamlined the Olsens' farming methods and accelerated a boost in soil health. In 2012 a machine that Niels had conceptualised for many years became a reality. The SoilKee Renovator is cleverly designed, its angled blades lightly disturb the soil surface whilst the incorporated seed bin simultaneously distributes a mixture of multi-species seed crops. It is utilised after cattle have grazed pasture and mulches the remaining biomass straight into the soil as a compost. The decision to change farming practices was accepted by all members of the Olsen family and all express extreme satisfaction with the results they have seen on their property. Most notably, the family is happy with the return of many native species of animals onto their property and have attributed this to multi-species pastures and the redundancy of synthetic fertiliser. There is evidence of higher overall productivity, better control of pests and diseases, enhanced ecological services and greater economic profitability.

Pasture production has increased from 12 tDM/Ha (tonnes of dry matter per hectare) to between 15 and 20 tonnes, the need for supplementary feeding is a farming practice of the past, much like the need for fertiliser application. Soil health is reflected through increased organic matter, presence of macro and microorganisms and documented carbon capture and storage. These many on-farm successes have been acknowledged by the scientific community through ongoing studies and collaboration. The Olsen's were the first farming family to be awarded Carbon Credits, something which in itself is no small feat. Despite ongoing success, the Olsen's remain grounded, even joking that they now label themselves as "hobby farmers". They express that more time is spent on manufacturing their SoilKee machines and completing contract work than what is spent on farming their own paddocks. However, it is to their credit that they have achieved such a low maintenance farm; and when cost of production is just AUD $38/ tDM/Ha, the hobby farm label tends to lose any associated negative connotation.

The creation and subsequent success of the SoilKee Renovator System provided Shane, Jamie and Shaun with an opportunity to work on their family farm that may not otherwise have been present. In fact, the machines have kept everyone extremely busy and as the SoilKee methodology gains traction the family are presented with new challenges relating to expansion and supply. Whilst Niels represents the face of SoilKee and he oversees the day-to-day operation of the farm, each member of the family progressed into a role that complements their strengths and interests. Marja maintains the administrative and business-related aspects of their enterprise, Shane spends his energy on manufacturing SoilKee machines, Jamie and Shaun divide their time between farm and contracting work and the electronic aspects of the SoilKee machines.

Into the future: Expected challenges and goals

Looking toward the future, Niels sees room for improvement both on farm and with the expansion of the SoilKee Renovator business. He plans to refine the type and amount of grass and crop species he uses as ground cover in his paddocks and will increase his head of cattle to reduce the excess amount of biomass mulching currently required. The family has also discussed plans to further divide paddocks so as to enhance rotational grazing management practices. Beyond the benefits to their own business the Olsen's acknowledge that the soil health they have achieved will supply their community with a quality beef product free from agrichemicals. Niels believes that change begins with the farmer and a resilient farming model underpinned by the SoilKee machine, advances the principles and concepts the wider agricultural industry can benefit from when implemented logically and in a timely manner. Niels emphasises that the SoilKee Renovator System is not just a piece of machinery; he has captured a system of practice that brings about improvement in natural soil cycles. Time constraints have prevented the Olsen's from educating farmers on the benefits of their system as well as they would have liked but they believe this work is imperative to ensuring continued success.