Eyre Peninsula Grain & Graze 2 project outcomes

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INFORMATION

The Eyre Peninsula Grain & Graze 2 project officially commenced on 31 March 2010. The aim of the project was to develop and promote the adoption of production practices in mixed farming systems on Eyre Peninsula that improve whole farm profitability and sustainability and increase the efficient use of water and nutrients. The work was to focus specifically on the management of groundcover and biomass by integrating cropping and livestock within conservation farming systems.

The Grains Research & Development Corporation (GRDC) and the Australian Government's Caring for Our Country program provided funding of $808,118, which provided a full time research officer (Jessica Crettenden) and half time project coordinator (Naomi Scholz), project management for the University of Adelaide, funds to partially support a Steering Committee and contracting of consultants to deliver specific works such as Sheep Groups and Profitability & Risk workshops. Cash and in-kind support was provided by SARDI for research support (Roy Latta), technical support, overheads and operating; EPNRM provided cash for extension support via the Regional Landcare Facilitator (Linden Masters) and the University of Adelaide provided administration support and project supervision (Glenn McDonald).

The EP Grain & Graze 2 project has enjoyed strong collaboration with a number of organisations including the Eyre Peninsula Agricultural Research Foundation (EPARF), Lower Eyre Agricultural Development Association (LEADA), Eyre Peninsula Natural Resources Management Board (EPNRM), Ag Ex Alliance (AEA), Low Rainfall Collaboration Group (LRCG), Rural Solutions SA (RSSA) and the CRC for Future Farm Industries (CRC FFI). There were also interactions and collaborations with a large range of projects, including the Eyre Peninsula Farming Systems 3 project and SheepConnect SA.

Outcomes from research

Enrich Perennial Forage Shrub Trial – a program to identify novel native forage species.

Fifteen species of either *Atriplex, Rhagodia, Eremophila* and *Medicago* forage shrubs were established at Minnipa and Piednippie in 2009 to measure their persistence, productivity and palatability to support the establishment of both shrubs and herbaceous perennials for grazing and/or carbon sequestration and soil remediation on low production, constrained soils. Sites were monitored and measured in spring and autumn of 2010, 2011 and 2012. Both sites were grazed for the first time in autumn 2011 and again in 2012; subsequently their recovery was monitored to decide which lines progress to further establishment and evaluation studies. Supported by the national CRC for Future Farm Industries Enrich program it has shown that it is best to have mixed species stands rather than single species. A mix of *A. nummularia, R. preissii, A. semibaccata, E. tomentosa* and *A. amnicola* has been the most productive, calculated by plant establishment, biomass, persistence and palatability. As a progression, three direct seeding trials to investigate low risk/ low cost perennial establishment methodology were established from 2011-2013 with the most productive perennial forage shrubs selected from the results of two of the trial sites. Production and persistence will be monitored on these sites and grazing in their second year of growth will allow further assessments of grazing preference.

The Enrich sites provided excellent information to assist with shrub selection and management, however establishing shrubs from seed appears one of the major hurdles in the further adoption of forage shrubs and more research is required. These sites were used as a 'trial and error' opportunity to understand what the major hurdles for shrub establishment on the EP are. An important conclusion from the demonstration sites was that more work needs to be done on more workable direct seeding practices before promoting it as a cost and production efficient option to growers, especially on time of sowing, site preparation and design and weed management.

Annual and Perennial Species Evaluation Trials

Establishment of a trial to evaluate the potential of alternative herbaceous perennials (Sulla, Tedera and Cullen) compared to lucerne commenced in 2009 with 4 sites sown encompassing low to high EP rainfall zones and alkaline to acidic soil types. After 4 years of evaluation, it has been established that lucerne is well adapted to the better, deeper cropping soils on EP. However it lacks persistence on the shallow soils as opposed to Tedera, which is well adapted in neutral to acid soil types and Cullen to more alkaline soil types. Sulla was highly productive on the neutral to alkaline soil types and is well adapted to a 2-3 year break in an intensive cropping system, not necessarily as a longer term crop replacement on retired cropping land.

The slow rate and lack of commercial development of the Tedera and Cullen species respectively has meant that there has been little opportunity to promote the species as alternative pastures on their specific niches. As a result of this project, Sulla has been included in crop rotation studies as a phase pasture and is being assessed as an alternative break crop, with weed control and animal production benefits, to annual pastures.

Grazing Crops

Several trials were established from 2010 to 2013 to evaluate of a range of dual purpose crops (cereals and broad-leaf) measuring early biomass production for grazing, biomass production at anthesis for hay making, and subsequent grain yield from both grazed and un-grazed plots. Four paddocks were sown to barley in 2011, which were split for plus and minus grazing prior growth stage 31. There was delayed crop development and reduced lodging as a result of grazing, which also provided a feed source to fill the winter feed gap. There were also significant yield losses in response to late, untimely, continued grazing.

A canola grazing trial established near Cummins on lower EP in the same year measured a 60% yield loss in response to untimely and continued grazing. In a barley grazing trial at Wangary in 2011 the grower made the decision to utilise the paddock as a winter feed resource as opposed to an opportunistic grazing resource with grain production as the primary aim. The decision was supported by a delayed sowing date which reduced the early biomass production and the weed infestation which limited the yield in the un-grazed section to 2 t/ha. Grazing until ear emergence reduced yield to an estimated 0.7 t/ha.

In 2012 the same 4 paddocks used for the 2011 trial were sown to canola and medic, which aimed to demonstrate the impact of grazing a grain crop at the optimal stage of growth (6-8 leaf stage for canola) and compare grazed versus un-grazed systems. Due to seasonal conditions, poor early vigour and poor overall growth in the canola, the paddocks were not grazed. Biomass was still measured throughout the year and harvest yields were recorded to report on the decision making process of the trial. This decision making process was documented in the EP Farming Systems Summary 2012, in the article *"Grain and Graze – who, what, when, where, why, how?"* p 126.

In 2013, a broad acre demonstration site was established at Lock with barley, which was sown with the intent to graze for sheep feed with the opportunity to remove stock and cut for hay or harvest grain if the season allowed. Technical advice was provided to the farmer, exclusion cages were placed in the paddock and biomass measurements and feed tests were taken to assist in the decision making process. Results showed 1085 kg/ha higher dry matter in the exclusion area at harvest and 285 kg/ha more yield than measurements taken from the grazed area in the paddock. This showed that grazing has not impacted drastically on grain yields or biomass when compared to the substantial feed utilisation throughout the grazing period.

The in-season decision was to leave the northern side for hay or harvest with the southern side grazed down too far for either end use. Conversely, the opportunity to utilise the northern area as a standing feed source to finish lambs on over the summer period was decided to be the best value for the residual crop with 927 kg/ha of barley grain and roughly 5.8 t/ha of dry matter remaining in this area of the paddock.

Although using the cereal as a forage crop has somewhat affected a higher yield result, the feed value over this time needs to be considered as a beneficial outcome as well as additional advantages of livestock delaying grass growth and the on-set of weed seed set, offering the opportunity to spray-top later in the season. Furthermore, this end use will provide a valuable and substantial feed source for livestock over the summer and will also prevent other stubbles from being over-grazed, thus benefits of this practice need to be understood from a whole mixed farming system perspective (EP Farming Systems Summary 2013, *Flexibility in grazing cereals*: *the yin-yang effect*, Crettenden).

Impact of Livestock on Soil Health

A trial was established on Minnipa Agricultural Centre in 2008 to test whether soil fertility and health could be improved under a higher input system compared to a lower input and more traditional system. Interposed on the input level comparison was the impact of livestock in a pasture-crop rotation to address the perceptions (often negative) associated with animals and soil health. The 6 year wheat, wheat, pasture (annual medic), wheat, pasture (annual medic), wheat rotation was split for plus and minus grazing in both the high and low input systems to establish the impact of grazing between the 2 treatments. Plant production along with soil nutrition has been monitored over the period of the trial. There had been no measured change in soil organic carbon content in response to high and low input systems with or without grazing until 2013 when a higher trend in the 0-20 cm profile was estimated in the 2 grazing treatments (0.15-0.2%), compared to the un-grazed treatments. The study measured increased pasture biomass in 2010 and higher wheat yields in 2011 response to both increased inputs, and grazing. The 2012 pasture phase of the rotation increased pasture biomass production in response to higher plant numbers from the 2010 annual medic establishment, high input treatments. There was increased plant available nitrogen at the 2013 seeding from the 2012 grazing treatments but no increased plant available N in response to higher 2012 biomass production. Grain yield, protein content and screening % following grazing the high input treatment in 2012 was higher than the high input un-grazed treatment, which was higher than the grazed low input treatment which was higher than the low input un-grazed treatment. Grazing has benefited both production and soil health outcomes.

Economically the high crop and pasture input treatments have produced an extra 1 t/ha of wheat from 4 crops in 6 years, irrespective of being grazed or un-grazed. The value of the extra grazing is reliant on the stocking rate and available growing season pasture area, i.e. there is no benefit unless there is a feed deficit under the current stocking rate requiring hand-feeding in the winter/spring period when annual medic is productive. The cost/ha has been an extra 120 kg of DAP ($80), 80 kg of seed wheat ($20) plus the pasture establishment ($40), giving a 6 year increased gross margin of approximately $110/ha plus any increased livestock returns (assuming a wheat price of $250/t).

Other related research is reported elsewhere in the document: Crop sequencing; Extending best practice wool innovations on Eyre Peninsula; Demonstration and extension of flock management strategies to improve lamb weaning percentages in low rainfall mixed farming regions.

Delivery to growers

The Eyre Peninsula Grain & Graze 2 project has had access to the extension networks established by the Eyre Peninsula Farming Systems projects; key messages, research results and new information has been provided to growers throughout the region and over the life of the project.

Each year, growers from 14 agricultural bureaus and groups on upper EP attended harvest report meetings, where research results were presented from the previous season, and grower issues and questions recorded to inform further research, development and extension. A field day showcasing trials and presenting information was held annually at Minnipa Agricultural Centre (MAC Field Day), EPARF hosted an annual targeted workshop (EPARF day) and a Women's Field Day was held every 2 years. Individual group 'Sticky beak days' were held in spring, where growers visited local properties and discussed trials or issues. Growers had access to the EPARF website www.minnipaagriculturalcentre.com.au and an e-newsletter was distributed each month. A Winter Newsletter was produced annually, detailing trials on EP and a couple of feature articles. All research results were published in the Eyre Peninsula Farming Systems Summary, which was available free to all farmers and consultants on EP and interested parties both inter and intrastate. 1200 hard copies were distributed annually and it was posted on the EPARF and SARDI websites. An email distribution list of 345 farmers was established specifically for EP Grain & Graze 2. This list was used to provide mixed farming information and notify people of coming events. The Eyre Peninsula component of the national Grain & Graze 2 website has been maintained, with publications, events and photos uploaded.

In March 2011, 4 Sheep Forums titled 'More Profit, Less Hassle' were held for growers on Eyre Peninsula. From these events, interest was gauged for the formation of 'Sheep Groups', or mixed Farmer Forums, with 4 groups being established at Cummins, Buckleboo, Poochera and Penong. Since then, 2 more groups have formed around the Kimba and Lock districts. The Sheep Groups are coordinated and facilitated by Mary Crawford, Land Management Consultant with Rural Solutions SA. Members of the Sheep Groups are mixed farmers, and each group determines their own agenda for the coming year.

Funding for the operation of the Sheep Groups was provided by EP Grain & Graze 2, SheepConnect SA and the Eyre Peninsula Natural Resources Management Board. This was a very important collaboration as the pooled funds provided flexibility (Sheep Group members were able to determine their own agendas), a greater number of serviced groups and greater ability to attract professional support.

Sheep groups generally met 3 times a year, with the first meeting being a planning session with invited guest speakers, the second was usually a benchmarking session undertaken with Daniel Schuppan, Livestock Consultant with Landmark where growers compared their livestock production to each other and saw changes in their own business over time, and the third was a technical session, usually held in the field visiting grower's properties.

The Sheep Groups explored a range of topics to improve production, profitability and sustainability. Items included animal health and nutrition, soil cover and health, feed availability, new sheep handling technology and innovations, grazing management, Australian Standard Breeding Values, grazing cereals and so on.

A total of 94,968 growers, researchers, consultants and agribusiness and NRM representatives attended or received Grain & Graze related events and publications. 1476 of those people actively participated in events such as workshops, Sheep Group discussions and training sessions e.g. measuring ground cover and determining feed availability.

Profitability & Risk

A dedicated forum with banks, accountants and whole farm consultants on EP demonstrating the '@risk' approach used in Southern Victoria was held in 2012. The aim of the forum was to raise awareness of the availability of a new tool '@risk' to examine production and financial risks of farming businesses to bankers, accountants and consultants on Eyre Peninsula. None of the participants had encountered '@risk' prior to this session, so awareness increased 100% amongst participants. Participants were interested in this type of risk analysis for their clients, but needed more exposure to the program to determine whether they would like to learn to use the tool.

To date, 6 groups of young farmers have participated in 'Introduction to Farm Finance and Risk Management' workshops, presented by Andy Bates (Ag Consultant) and either Brian Wibberley (Accountant) or Phil Stephens (Accountant). The aim was to introduce a group of younger farmers to the basic principles of financial management, with a longer term view to improved risk assessment and management. The workshops were aimed at whole farm business management, and participants were introduced to business structures, tax, measuring equity, cost of production, types of farm finance, common farm business financial tools, cash flow budgets and how to use them, identifying & managing farm business risks, interpreting financial statements and key business measures.

A series of 3 day Profitability & Risk workshops were run in 2009 at Cummins, Kimba, Wudinna, Streaky Bay and Tumby Bay, following the success of the workshops delivered as part of EP Grain & Graze 1, by Mike Krause and Brenton Lynch. Further Plan 2 Profit workshops are being held across Eyre Peninsula in 2014, under the Agrifood Skills Eyre Peninsula project.

Adoption/Change in practice

A KASA (knowledge, awareness, skills and attitude) exit survey was undertaken in March 2013 as part of the EP Farming Systems 3 project in conjunction with the Low Rainfall Collaboration project. 38 growers responded to the survey. A very small component of the growers that responded to the KASA survey were Sheep Group participants, but many had attended events that presented outcomes from Grain & Graze 2. 97% of respondents had heard of the EP Grain & Graze 2 project. The survey investigated changes in practices or attitudes over the previous 5 years.

According to the survey, the percentage of income from pasture/sheep remained the same at around 17%, the area for pasture/sheep declined to 33% of the total farm area (increase in cropping area). The three major changes people had made recently were purchasing land, upgrading equipment and increasing their livestock numbers. Lambing percentages fluctuated with the seasons, with the average being 99%.

To improve their livestock water use efficiency, 19 growers improved their pastures, 16 used containment areas, 15 dry seeded feed crops, 13 sowed cereals for grazing only, 13 had improved their grazing management and 10 had changed their stock management (e.g. timing of lambing) and 9 sowed dual purpose cereals. Other ways growers stated they had improved their livestock water use efficiency were by including the use of perennial shrubs, legumes and native grasses, fencing to smaller paddocks to improve feed utilisation, managing the feedbase better or supplementary feeding.

In March 2013, 29 Sheep Group participants responded to a written questionnaire. They found the most useful components of being part of a Sheep Group were benchmarking their enterprise against others in the district; talking to other farmers in the district and presentations from a range of different speakers. 58% of respondents had made changes to their sheep enterprise/s since they became involved in a sheep group. Those that had not made changes were generally members of the more recently formed groups.

Some of the changes people had made included changed shearing time, increased stocking rates, use of electric fencing, general planning and nutrition, planting feed early (e.g. barley for grazing), changed lambing time, fenced paddocks to better utilise feed and protect sandhills, improved weaner growth rates with higher protein supplements, improved fencing and watering systems, feed budgeting and condition scoring ewes. Being involved in a sheep group helped 83% make decisions about their sheep enterprise, and all of the respondents thought that Sheep Groups should continue in the future.

A further Sheep Group evaluation was carried out in September 2013. Sheep Group members were invited to provide feedback about how they think being involved in a Sheep Group has helped them improve their mixed farming business. Several local businesses provided prizes for the best responses, to encourage participation. Some of the comments included:

- "Several decisions were made after our benchmarking meeting and one of them was to mate our ewes to type rather than age. The second decision was to try lambing a bit later…with far less mortality (and) as a result we should see a huge lift in our production with more wether lambs to sell and more young ewes to shear and breed from."
- "The sheep group meetings allow us as members to see in the plainest of terms, where our own operations sit compared to our surrounding neighbours. We receive a quantitative figure, and no mistake can be made as to how we are performing. It is a safe, confidential environment, which facilitates discussion that delves quite deep into some producers systems, a depth which wouldn't be reached in general discussion over a beer at the local. The group meetings highlight the top producers, who we can then delve into what they may be doing differently to gain this edge."

- "Planting early feed has saved us time, through shortened hand feeding. It has saved us money, because we need to hand feed less. We are now losing less condition from the sheep as a result of this and consequently growing more wool from healthier ewes and lambs, resulting in favourable financial outcomes. The costs are mainly fuel and labour, and these don't compare to the gains we receive as a result of doing it, not to mention the peace of mind we get from having the sheep on decent feed."
- "Before we started benchmarking two years ago I had no idea how the sheep enterprise on our mixed farm was performing. After two years of data I now know that there is plenty of room for improvement and I now have a clear plan to make the enterprise profitable into the future. The two key areas I identified for improvement were to improve wool cut and to try and run more sheep through better grazing management."
- "Through the sheep group and EPNRM I applied for funding to make a central water point and a dividing fence to make four 100 hectare paddocks to be able to rotational graze and help prevent erosion on sand hills. This project has allowed me to run more sheep in a more environmentally friendly manner and has been so successful it has inspired me to re-fence and add more troughs to other areas of my farm to be able to graze sheep in individual paddocks which I am in the process of doing now."

Benchmarking undertaken by the Sheep Group members has been seen as very beneficial. Many producers in the groups commented that it was good to improve their understanding of their sheep enterprise and get a handle on what their sheep enterprise is returning on a $ per DSE and $ per winter grazed hectare ($/WG ha) basis.

The variation observed between producers within the same rainfall environment provides some opportunities for producers to be more productive and profitable. Producers can control the areas where the largest variations occurred including sheep losses and marking percentages. There were some small variations in sheep sale price, wool price and kg of wool/DSE. The big influence on gross margin per ha was the stocking rate, which influenced the number of lambs per ha and the wool production per ha. Therefore pastures, grazing management, animal health and genetics are the keys to optimising income from the sheep enterprise.

Risk management is also important and this will be determined by the management capabilities and the amount of risk that a producer is willing to take. The higher the stocking rate, the higher the risk and more management required. Some producers have low stocking rates as it makes it easier to get through the "poor season". Many producers have an idea in their minds of what they will do in the "poor season" but there is no written strategy to implement 'back door' or exit strategies.

Some producers have started to implement changes to their enterprise after the first year of benchmarking their sheep enterprise. These changes have resulted in an improvement in their second year figures. The changes included improving pastures, monitoring ewe condition score and focusing on genetic improvement. The local information from the group allowed these producers to focus on targets that are being achieved in their own district and give them confidence to implement the change as they have the support of the local group members and advisors.

Following the success of the Eyre Peninsula Grain & Graze 2 project, GRDC have chosen to invest in a third program (Grain & Graze 3), of which EP will be a part. Other groups involved are East SA managed by Ag Excellence Alliance, BCG, Southern Farming Systems and Mallee Sustainable Farming. EP Grain & Graze 3 will focus on grazing cereals, pastures in the crop rotation and improving farm business decision making skills.

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