

Paddocks

10	544 cull ewes	544
12	334 merino ewes & 441 lambs	775
8	435 merino ewes & 569 lambs	1004
20	598 merino ewes & 609 lambs	1207
Feedlot	258 XB lambs	258
35	666 XB lambs	666
39	247 XB lambs	247
41	393 cull ewes	393
46	926 ewe hoggets	926
Holding	93 red tag wethers	93
Ram	29 merino rams & 18 White Suffolk rams	47

6160

Winter grazed

296ha

Creeks

20ha

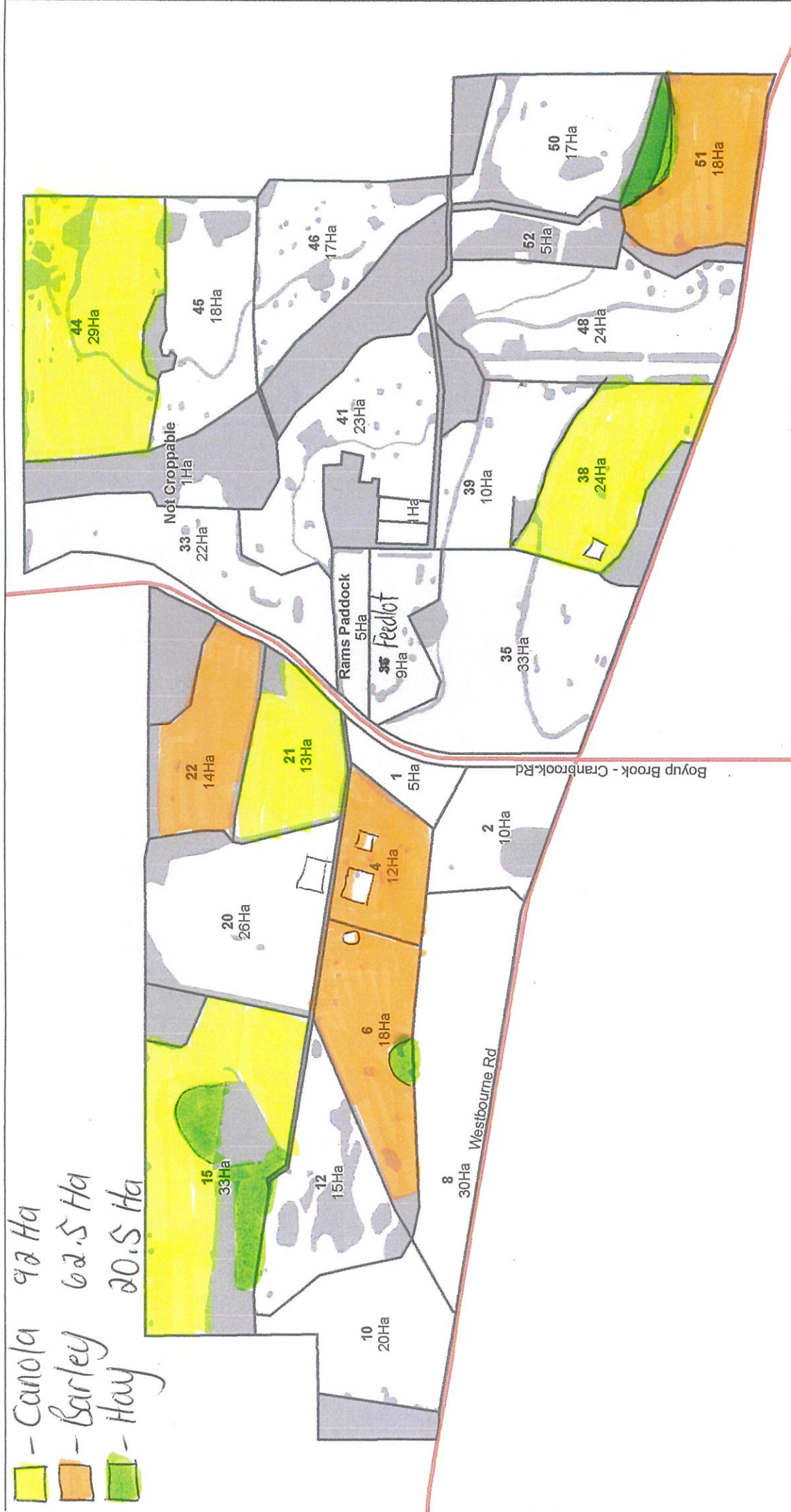
316ha

(12.8Ha Creek closed)

Rylington Park

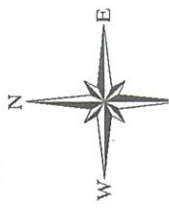


- Canola 92 Ha
- Barley 62.5 Ha
- Hay 20.5 Ha



Processed December 2018 **Total Area:** 596 Ha

Farm Last Updated: 4/12/2018 **Arable:** 455 Ha



ECU and Rylington Park Institute for Agricultural Training and Research Report**to 30 September 2023****Research Update ECU – Rylington Park Institute for Agricultural Training and Research**

Professor Cobie Rudd Deputy Vice-Chancellor (Regional Futures) & Vice-President, ECU has supported a four (4) Month Secondment (September to December 2023) to provide liaison and partnership development for Professor Kerry Brown to activate and support the ongoing relationship between ECU and Rylington Park Institute for Agricultural Training and Research.

ECU Announcement:

Professor Cobie Rudd, Deputy Vice-Chancellor (Regional Futures) & Vice-President, ECU is excited to announce that Professor Kerry Brown is seconded to the role of ECU liaison to the Rylington Park Institute for Agricultural Training and Research managed by the Boyup Brook Shire until the end of December 2023. The spirit of the MOU between ECU South West and the Rylington Park Institute for Agricultural Training and Research is to work in partnership with each other. By way of background, ECU established a 20-year MOU with Rylington Park Institute for Agricultural Training and Research in 2021. The Institute is based at Rylington Park Farm which is a 650-hectare working farm used for agricultural training and research for the betterment of the local community and the broader agricultural sector.

Professor Kerry Brown's role is to activate and support the partnership and promote collaboration across the University with Rylington Park for regional development-related research. This will include exploring new or novel approaches to sustainable agricultural systems, marketing, and supply chain completion.

Please contact Kerry for further information (k.brown@ecu.edu.au; w: 6304 2157 m: 0407731939)

Engagement activities to date***Rylington Park Field Day 14 September 2023***

Organised ECU's contribution to Rylington Park Field Day and attended Field Day 14 September 2023. ECU stall at the Field Day was supported by Kristy Gillian and Kerry Brown. A formal presentation by Dr David Cook, ECU outlined research projects in sensors and sensor capability and updated about drone sheep count and soil biomass projects.

The WA Agricultural Research Collaboration (WAARC)

1. A meeting with Dr Kelly Pearce, Director WAARC and Ben Bidulph DPIRD at ECU Joondalup was organised to discuss WAARC and introduce new WAARC Director Dr Pearce on Tuesday 5 September 2023. WAARC governance processes are still being developed so there is some uncertainty around projects and how these will be managed and supported. Director Dr Pearce has only recently been appointed as the inaugural Director, so there will be a settling in period to develop new processes and protocols. The WAARC operates on a co-contribution model of providing at 2:1 \$ funding for projects (for every \$1 provided by WAARC to projects there is a need to raise \$2 from external sources) along with a requirement for in-kind contribution valued at 1:1 of the WAARC dollar contribution. Kerry Brown attended this meeting.
2. The WAARC Climate Resilience Theme had an initial call for projects – Expression of Interest from research collaborations relating to Climate Resilience under headings of:
 - Resilient Farming Systems
 - Robust Landscapes
 - Reducing Emissions
 - Optimising Offsets
 - Carbon Industries

One ECU research EOI was invited through the second stage. The project collaboration comprising ECU and University of Western Australia supported a research project through to second round of

submissions. ECU project members are Dr Dave Blake and Professor Elizabeth Watkin from School of Science. The research focus on Soil Carbon gas emissions.

3. Opening of Round 2 for WAARC Climate Resilience Theme has been announced with a closing date of 31 October 2023.
 - a) Dr David Blake, Dr Leisa Armstrong and Dr David Cook School of Science, Assoc Prof Ferry Jie School of Business and Law to support grant submissions to the WAARC in areas Ag Tech, carbon and soils and, supply chain innovations.
 - b) In discussions with Greening Australia, Murdoch University and AWI for a Project based on Rylington Park for the Resilience Theme. Greening Australia has supported approximately 10 test sites at different farms across Australia on Shade, Shelter, Fodder projects over several years and would like to a) use these cases at the test sites to determine best practice in shelter belts/shade shelter fodder models b) use the best practice findings from these projects to develop a best practice model to trial at Rylington Park Farm.

EVOKE Ag Conference February 2024

An Application is currently being developed to support a field trip for delegates to visit Rylington Park Farm as part of the EVOKE Ag International Conference to be held in Perth in February 2024. Flavio Macau and Kerry Brown (ECU), Helen Connell and Erlanda Deas are members of the group to support this initiative.

Current ECU Research Projects

LoRaWAN (a LoRa Wide Area Network at Rylington Park) Hybrid

A sensor network has been deployed on the property and brings together important data and scientific measurements, activities by people and animals, and a range of conditions. The LoRa system connects research projects and people together at all points of the farm. It supplies data that drives research across disciplines ranging from Business, Computer Science, Engineering, Supply Chain Logistics, Environmental Science, Law, Education, Horticulture, Agriculture, Tourism, Cyber Security, and the Natural Sciences.

A LoRa Network has been established across the farm. It runs in the range of 915Mhz to 930Mhz and is a free network operating in that bandwidth. It consists of a LoRa Mast with coverage that reaches across all of the farm area and pastures. There is a test node located at the North-Easterly high point of the farm, which transmits regular data in the form of Weather Station measurement. This includes Temperature, Humidity, Wind Speed, Wind Direction, Barometric Pressure, and LoRa Signal Strength. The data is collected at the farm centre and a Dashboard has been established for visualisation.

This is an ongoing project run by Dr David Cook and Dr Leisa Armstrong (SSCI) and assisted by Adjunct Professor Dean Diepeveen (from DPIRD) as well as Mr Blake Batten, Masters student Mr Minh Pham. This project forms the network backbone that is established at Rylington Park - and facilitates several other sensor-driven projects that use electronic data collection sources.

Tracking Sheep Using LoRaWAN

This is a project that builds upon the above project by using a process called geolateration to use three (or more) LoRa gateways to establish the exact tracking and location of livestock. This project uses LoRa to measure the acquisition of a signal using the inclusion of timer chips to determine livestock location. The research has application for the organisation and tracking of people, livestock, and farm machinery and vehicles.

This is an ongoing project run by Dr David Cook and Dr Leisa Armstrong (SSCI) and assisted by Adjunct Professor Dean Diepeveen (from DPIRD)

*There is an AO sized Research Poster and Stand now at Rylington Farm to help visualise this research project.

Virtual Fences (Livestock and Cropping management and tracking without the use of physical fencing)

This is a sensor-driven project that uses a range of Sensors to identify the movement and tracking of livestock across the farm. It assists with the movement of sheep, tracking of vehicles, and assessment of threats from predators, especially foxes. It uses Lidar sensors to project the shape and size of livestock and objects as they emerge.

This is an ongoing project run by Dr David Cook, (School of Science) Dr Leisa Armstrong (School of Science) and Assisted by Professor Dean Diepeveen (from DPIRD), Mr Blake Batten and Masters Student Mr Minh Pham.

*There is an AO sized Research Poster and Stand now at Rylington Farm to help visualise this research project.

Synthetic Plant Knowledge using L-Systems for Grain Optimisation

This is a software development project using Genetic Algorithms and a Novel approach using L-Systems to identify and develop AI generated Synthetic Wheat Heads. The use of these genetic algorithms provides the mechanisms for identifying crop disease, pests and pasture obstacles. It dovetails into a Drone Research project that uses these same algorithms and uses drone-generated mapping in conjunction with ground truthing sensors to create an accurate "precision-agriculture" approach to crop management.

This project is Lead by Masters by Research Student Chris Napier, with supervisors Dr David Cook, Dr Leisa Armstrong (SSCI) and Professor Dean Diepeveen (from DPIRD)

*There is an AO sized Research Poster and Stand now at Rylington Farm to help visualise this research project,

*Masters Student Chris Napier has a number of 3D Printed Wheat Heads that are an excellent demonstration tool that assists farmers and others to understand the visualisation process.

Drone Practices and Applications for Sheep Farming

This is a master's by research project that examines the need for Codes of Conduct and Codes of Practice in the area of multiple uses for drones. The research examines existing practices by means of a qualitative and quantitative sequential process that involves interviews with local farmers of sheep and livestock who use drones and other UAVs on private farming properties. The research examines current practices, existing codes of conduct, and seeks to establish a best practice model that allows for the specialist use of drones in multiple numbers on farming and agricultural environments.

This project is led by Masters by Research Student Hrishikesh Neetye, with supervisors Dr David Cook and Dr Leisa Armstrong (SSCI) and Professor Dean Diepeveen (from DPIRD)

*There is an AO sized Research Poster and Stand now at Rylington Farm to help visualise this research project.

Resilience Factors with Technology and Older Farmers

This is a Human Computer Interaction (HCI) project that uses a qualitative approach using a snowballed process of round tables. Boyup Brook is used as a central starting point - but is moving through several other agricultural places using the WA Growers Group Alliance. It will establish the technology rejection and the technology resilience areas that inform the farming community, with many people engaging with farming practices using under-developed connection with technology and precision systems.

This project uses funding from JTSI and has several Research Assistants.

Determining the effects of climate change in cereal crops in southwestern Australia and the role of soil health

This study will investigate the impacts of temperature and moisture differences on two wheat varieties, grown under trial conditions at Rylington Park Farm. UAV technology will be used to measure changes in plant productivity and health grown under different temperature and moisture conditions as well as, soil gas flux (CO₂ and CH₄), soil carbon sequestration and fractionation and soil microbial diversity. The project will be led by Dr Anna Hopkins and Dr David Blake (SSCI)

Co-funded UAV

External funding allowed the purchase of a new UAV with \$10k each provided by the Shire of Boyup Brook and the Department of Biodiversity, Conservation and Attractions (Kings Park). Internal funding to the value of \$13k was provided by the School of Science.

Dr David Blake (SSCI) undertook a sheep count at Rylington Park Farm and is working on Artificial Intelligence applications to automate the drone sheep count. Dr Blake is also conducting research that involves calculating pasture biomass production at the sub-paddock scale and comparing this to farm management practices and soil health.

Next steps

Identify priority research topics in collaboration with ECU researchers and Rylington Park Committee

Identify appropriate funding sources

Develop grant proposals

The research partnership allows RPAR and the local community to benefit from research findings and ECU researchers to undertake real world applied research.

Research workshop – 25 November 2021

A collaborative stakeholder workshop was held in November 2021, in which 11 ECU researchers from across the University met with a 20-person delegation of Shire stakeholders consisting of Shire President, CEO and Councillors, the farm managers and committee members. The purpose of the workshop was for ECU researchers and research theme leads to familiarise themselves with Rylington Park Farm, and to hear from the Shire stakeholders about the challenges and opportunities the property presented, and to gather feedback on their areas of research priority. An extensive list of research categories and potential research topics was collated as a result of this workshop – see attachment below.



Rylington Park -
Workshop summary c

Prof Cobie Rudd has requested an audit of research relating to Agricultural research and will apply this expertise to grant funding rounds. As a part of this audit, the Rylington Park Committee will be invited to update and add to the results of the Research Workshop held at RP on 25 November 2021 – see note above. This reworking of the research topics and areas will be undertaken at a convenient time in the coming weeks 12 October – 20 October 2023.

The WA Agricultural Collaboration provides a key opportunity to develop significant research projects in Agriculture. The climate resilience program is developing research projects that will include some exciting projects for Rylington Park Farm that have been discussed previously and may now be coming to fruition. However, there are other sources of Research funding, and these are also being explored for funding for agricultural research projects.

Professor Kerry Brown

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