

Healthy Subsoils

Produce More Red Meat

The MLA funded Producer Demonstration Site (PDS) project called “Healthy subsoils produce more red meat” held a second workshop on May 31st in Mansfield, North East Victoria. Attendees included members of the Goulburn Grasslands Society (GSSA) branch as well as the Alexandra & Mansfield and Yarra Valley Best Wool Best Lamb (BWBL) farmer groups as well as a number of interested producers who travelled from different parts of the state to attend.

This project is a collaborative effort between the GSSA and BWBL groups, Agridome Consultancy, LaTrobe University, Melbourne Polytechnic, Charles Sturt University and several other private companies including TerranovaAg, Agriprove, Incitec Pivot, CSBP and Soilkee.

Coordinated by Dr Matt Mahoney of Agridome Consultancy Pty Ltd this project will demonstrate proven techniques used in the cropping sector and apply to the high rainfall pasture grazing systems of this North Central to North Eastern region of Victoria.

The subsoil under high rainfall pasture is the focus of the project and a hugely important part of our farming systems. But they are often overlooked. From 10-80% of plant nutrition and water is derived from the subsoil. Over 4million Ha of farmland in Victoria alone are estimated to be affected by some type of subsoil constraint. However, the subsoil is generally given little attention in usual soil testing practices on most grazing enterprises.

This recent workshop followed on from a seminar that was held earlier in 2022 at Yarck, whereby the project was introduced to the wider producer audience and the initial soil testing results from producer properties, located in the region from Coldstream to Merrijig were presented. The focus of the second workshop in Mansfield was on the methodology to address the constraints identified by the initial soil testing of the core producer properties involved in the project.

On every site soil was sampled and analysed for both physical and chemical constraints and subsoil constraints thought to be limiting to pasture production were identified. This highlights the extent of the issue this project aims to address. Soil acidity and Aluminium toxicity were found to be the most common across nearly every site. This was followed closely by nutrient deficiencies of the major nutrients, Phosphorus, Potassium and Sulphur whereby nutrient concentrations decreased with depth. Physical constraints such as dense mottled clay layers evident of waterlogging were also identified. Soil salinity was not identified as an issue however one site was slightly sodic.

The range of the constraints found at the producer sites means that there will be no one-treatment-fixes-all approach that can be used to ameliorate all of the sites. Rather a prescription approach is required to be developed to address the individual constraints at each of the sites.

At this most recent workshop attendees heard from presenters who are experts in their respective fields. The presenters provided insights to the amelioration of the subsoil constraints thought to be impacting the core producer sites in this project.

Gary Clark and Peter Sale from LaTrobe University presented on the impressive results from subsoil manuring. This is the deep placement at 300-400mm depth of 15t/Ha of organic nutrient rich amendment into the subsoil. Gary showed how this had a long lasting effect on crop response far beyond that of deep ripping alone and the soil structure had improved hugely with soil aggregation vastly improved and visually apparent at depth from the subsoil manuring treatment areas. Gary also explained this amelioration technique enabled plant roots to penetrate deeper into the clay subsoil, previously too impenetrable for root growth, and allowed the crop plant to access a larger volume of soil to extract soil water. It was this extra soil water that would explain the dramatic increases in yields that were recorded every year after the treatment and still significantly above the control four years later. The extra soil water in the subsoil was described by Peter "as taping into extra rainfall, and each extra millimetre of subsoil water could produce 30-60kg of extra grain/Ha. However this required a good reliable rainfall to ensure there was plenty of soil water available in the subsoil for crop growth, which could sometimes be a problem in the relatively low rainfall cropping regions". Peter went on to highlight to the attendees the fact that in our high rainfall pasture systems receiving >700mm rainfall annually, that subsoil moisture will be much more reliable every year. However Peter also explained that the species sown and subsequent grazing management would need to change in order for this to occur. If done correctly, would have the potential to dramatically improve pasture production and season length especially in drier years, which would be extremely valuable to producers.

One of the highlights for the day was delivered by Jason Condon from Charles Sturt University, Wagga Wagga. Jason presented the results he had recorded from experiments ameliorating acidic soils with lime and explained how we have been aiming far too low for our optimum soil pH target when calculating lime rate recommendations. Jason also discussed the error in only looking at 10cm increments when we soil test could be misleading. Jason recommends soil testing in 5cm increments instead and that a target pH of 5.5 in calcium chloride should also be adopted. The results that Jason presented showed that incorporation of the lime was also very important for the lime to work effectively. Jason also showed that when lime was not working correctly, that legume crops did not perform at their potential as they were not able to form fully functioning nitrogen fixing nodules.

Tarrenova Ag have designed equipment to place organic amendments in a band at depth in the soil. This organic amendment was usually poultry litter but could be composted green waste. Simon Falkiner presented the equipment they use to deliver the material to depth and some of the results they have been achieving when the right amendment was applied at depth, again showing how a prescription approach was required to amend different subsoils depending on the soil chemical and physical characteristics.

Another approach was presented on the Soilkee machine developed by Neils Olsen. With many years of successful soil regeberation, Neils presented the results he was achieving using the unique Soilkee machine in combination with rigorous rooting annual cover crop species. Neils claimed the results were largely due to the tillage of only 15% of the soil to 7cm depth, incorporating plant material and driving microbial growth which fed the plant roots and ameliorated the soil from the top down. This soilkee method was also able to make the less available nutrients available for root uptake and plant growth and subsequently increase soil carbon to levels previously thought to be impossible.



To round out the day, Mark Ritchie, one of the projects core producers gave a presentation on his journey being involved with a small group of producers supplying a large Supermarket business with carbon footprint assessed beef for the supermarkets carbon neutral beef range. Mark presented his properties carbon foot print for his beef production side of his business, and showed how a large proportion of the emissions came from methane production from his beef herd. While the carbon footprint assessment was focussed on the greenhouse gas emissions, it was discussed that these emissions would need to be offset with carbon capture somewhere and could be done by increasing soil carbon using the methods demonstrated in this MLA PDS project.

The prescription approach to subsoil constraint amelioration will enable the most cost effective amelioration method to be employed at each demonstration site. This will be compared to a 'usual practice' area along side to act as a control. The prescription approach will consider the limiting factors of the subsoil affecting pasture growth and may be a combination of amelioration methods for example combinations of lime application and different incorporation methods and blending with the organic material amendment.

Another workshop is planned for the project and is expected to be held either late this year or early 2023.

If you would like more information on this project, please contact Dr Matt Mahoney from Agridome Consultancy e:matt.agridome@gmail.com m:0438 209 707.

