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CASE STUDY - *John Willmott, Eneabba*

Dealing with Droughts

By Sarah Knight Mingenew-Irwin Group

Name: John Willmott (manager)

Farm Names: Big Valley Proprietors; Big Valley, Gum Park, Springvale, Coopers and Gould

Farm Location: South West Eneabba – 300 km north of Perth & 150 km south of Geraldton

Farm System: Sub tropical perennial grasses, cattle, sheep and crop

Soil Types: Variation of soil types, but typically grey sand over a gravel and clay subsoil

Rainfall: Historical average of 600 mm annually

Drought Rainfall: Gum Park 2006, 189 mm and only a fraction more in 2007.

Lowering Drought Risk with perennials

John Willmott is drought proofing all five of his farms in the Eneabba district of Western Australia. His efforts so far were well tested during the dry years of 2006 and 2007.

The poor unproductive soils of Big Valley Proprietors have been sown to sub tropical perennial grasses. Certain species have been sown in order to increase feed production for an increasing cattle herd.

John sows Gatton panic, Signal grass and Rhodes grass as his mix. With careful management these perennial grasses help save paddocks from blowing away and increase the feed supply on the farms.

A wagon wheel grazing management system is being set up but this was not in operation in 2006 or 2007. This system of rotational grazing assists to increase productivity, drought proofing as well as animal handling skills.

Dealing with different Soil Types

All five farms are located on the northern sand plain of the agricultural region of Western Australia. This region has typically deep relatively infertile sands ranging from gutless white ‘Bassendean’ sands to more sought after yellow or ‘Spearwood” sands.

John Willmott examines one of his paddocks

Gum Park has the greatest variety of soil types ranging from heavy clay; sand over clay to gravel, clay and sand. Big Valley has more highly productive gravel sands, which are cropped to wheat, barley or oats, however the farm has less productive patches of white sands.

Springvale, Coopers and Gould have more uniform soil types, consisting mostly of sand over clay, although one farm has a patch of salt and another has areas of deep, white sand.

With such a variety of soil types John Willmott wanted a way to increase their productivity as well as reducing drought risk so he could increase cattle numbers and become a predominantly and thriving grazing enterprise.

The reason behind Big Valley’s perennials

John had an issue with what to do with the unproductive cropping area and poor grazing country on the Big Valley farm. John’s found an answer via the Grain and Graze project. John was inspired to plant sub tropical perennial grasses after attending a Mingenew-Irwin Group hosted, Grain and Graze field day in 2006. The field day discussed filling the autumn feed gap, increasing productivity of non-croppable soils and improved seeding technology.

One of the field site hosts, Grant Bain, transported his perennials seeding equipment on site which allowed farmers to view modifications that had been made to sow perennials. This particularly sparked the attention of those with a keen interest in modifying idle equipment to suit the needs of a new generation of farmers.

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Perennials thriving despite the drought

Most importantly, Grant's equipment had resulted in an excellent establishment level of perennials. This combined with the production possibilities, resulted in John further researching Grant's machine as well as a number of other innovative farmer's machines within the region that have modified their combines to achieve establishment success.

With John's own 24 foot Shearer combine sitting idle in the shed, he set about make some modifications to enable him to sow his perennials more effectively.

A considerable amount of work went into modifying John's gear, but it wasn't until it was put to the test out in the paddock that the final adjustments were made to make the bar work best for John's conditions.

Sowing perennials

John sows perennials at the beginning of August with 1 kg/ha each of Gatton panic, Signal grass and Finecut Rhodes grass. At this time it enables him to make use of the winter soil moisture and hopefully spring rains. Also the soil temperature is starting to rise which is essential for the germination of sub tropical perennial grasses.

There are a number of controllable factors that determine successful germination.

Good weed control is essential. Weeds will compete with germinating perennial grasses and they will win. At least 1 knockdown for weeds is essential, maybe 2 depending on the season and the level of weed burden. However it is good to keep some ground cover. The paddock does not need to be bare as initially thought. Good ground cover will assist to avoid the risk of wind erosion, lessen evaporation and keep the soil surface temperature lower.

Rabbits can have a big influence on germination. If in a rabbit prone area it is advisable to implement a pest management plan to control rabbits.

Insects can also affect germination. Insects have the capacity to desimate germinating on emergence. If an insecticide is not used at seeding it is advisable to closely monitor the paddock to make sure that insects do not build up to threat levels and impact on the germination.

Sowing perennials in the drought

Despite a drop in rainfall over recent years, John continued to sow sub tropical perennial grasses. In 2006, 340 ha were sown to a mix of 1 kg/ha each of Gatton panic, Signal grass and Finecut Rhodes grass. In 2007 an additional 350 ha were sown using the same species mix.

The two years of drought in 2006 and 2007 did not deter John's enthusiasm for establishing perennials as a primary food source, particularly in late summer and autumn, as stock feed was perilously low. John suspected perennials to be the key tool to improving his on-farm feed supply throughout the year. So despite the trying conditions, he knew that perennials needed to be put to the test.

To John's pleasant surprise, the perennial grasses in both 2006 and 2007 germinated well and have since provided his livestock with an abundance of feed in comparison to their annual counterparts. John concluded that if the perennials could survive those two drought years in the soil types where they were planted, they would survive anywhere! Although he also advises that they are not indestructible, as during the two drought years the perennials had to be carefully managed to ensure their long-term survival.

Drought tolerant species

Over the two drought years, John observed that Gatton panic was the most drought tolerant of the species of which he had sown. "It was more productive and persistent than the other species" he said, "two qualities that are key to the perennials existence at Big Valley Proprietors".

John noted that Signal grass was not too bad on the survival and quality front, but was clearly not as tolerant or as productive as Gatton. Rhodes grass was the least tolerant species, showing that it did not cope well with moisture stress. It managed to battle on by retreating

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Cattle rotation enabling better management of John's perennials

back to its core, but this provided very little food. While it looked almost dead, John was surprised at how quickly it refreshed after some rain eventually came.

The three species that John uses are also sown by other farmers in the Northern Agricultural Region. Others have also advised that Gatton panic, once it reaches its second year, is the most productive of the grasses and has been found to be the most drought tolerant.

Rhodes grass is quickest of the grasses to establish. As a spreading grass it covers a significant area in a short period of time. During its first year it is the most productive of the sub tropical perennial grasses. In the second year Gatton panic generally appears to provide more feed than Gatton panic. Rhodes grass is very good where quick cover is essential in areas prone to wind erosion.

Signal grass is not nearly as productive as Gatton panic and Rhodes grass. A reason for using it in a mix is that it will emerge when sown deeper than the other two. Wind erosion during establishment can cause furrows to fill resulting in seed having to emerge from a greater depth. Many species prefer to be sown at 5-10 mm, if additional soil is pushed on top there is a chance they will not emerge. Research suggests that Signal grass will emerge from as far down as 50 mm.

Grazing in the drought years

On the Big Valley Proprieters properties, generally only cows with calves at foot grazed the perennial grasses. Cattle are considered softer on the grasses than sheep. During establishment, John was careful to ensure that his grasses were not overgrazed as he had not yet set up a rotational grazing system at that stage.

The perennials paddocks were grazed for about two weeks at a time. In the two weeks the perennials would be eaten right back. John explained that they were grazed hard, but not overgrazed so that they would recover well when the paddock was spelled.

Through the work of Tim Wiley of the Department of Agriculture and Food WA and experienced local growers, it has become well recognised that grasses can be better managed with the implementation of a cell grazing or rotational grazing system.

Rotational grazing allows better management of the perennial grasses that respond well to short bursts of intense grazing. Providing there are enough cells and stocking numbers are correct, there is generally sufficient recovery time for grasses to reshoot, create more biomass and better establish their root systems.

This system also prevents grasses from becoming rank, which results from set-stocking. Set-stocking promotes the continual selection of choice grasses, as livestock select young, fresh shoots. Less preferred grasses are un-grazed resulting in a higher percentage in the sword of tougher and unpalatable plants. Rotational higher intensity grazing on the other-hand forces livestock to graze everything on offer, as they are less selective as the alternative is to go hungry.

Rotational grazing also usually ensures improved livestock welfare, as farmers are more attentive and observant of their herds through more regular visits and handling. Set stocking promotes a set-and-forget management mentality meaning that grasses and livestock are often left unmonitored for weeks or months on end.

Annuals vs Perennials in the drought and non wetting soils

Over the drought years John found that the volunteer annual paddocks did not perform nearly as well as the perennials or cropped paddocks. In fact the annual paddocks did very poorly.

As John explained further, "the soil in particular on Gum Park, could be wet in the top few mm of the profile, and then followed by a very dry layer for the next 10 cm and then wet again below this". It is quite likely that it wasn't just the drought that caused the lack of germination and production of the annual paddocks over these two years, but also the significant non wetting layer.

The perennials were able to survive better in this soil as they had their roots below the non wetting level. Crops were also assisted as the sowing action resulted in part removal of the non-wetting layer, giving them more chance of getting their roots into moisture.

Other drought practices

While perennial grasses have had a major impact on

overall farm productivity, it was the sowing of cover crops in 2006 that helped save the farm's topsoil and livestock production system.

When the season was turning dire and the prospect of pasture germination was unlikely, John sowed wheat, oats and lupins into 1,620 ha across all farms, just to provide cover. In a bid to minimise input costs, none of these paddocks were fertilised, yet it was the action to sow these paddocks at the critical cut-off date that saved the farms from disaster.

Continuing the drought proofing process

Since the drought years John has continued to sow sub tropical perennial grasses. All but one paddock on Gum Park is now under sub tropical perennial grasses. John has set up some of his paddocks as a wagon wheel rotational system which is working very well. This will enable him to increase biomass production and make better use of it.

The wagon wheel cell grazing system permits ease of cattle movement. Under the rotational grazing system John has been able to increase biomass production and also better utilise the feed on offer as a result of it. John Willmott plans to continue setting up this system to ensure that the the properties can continue to withstand future tough times.

This case study is written by Sarah Knight (Mingenew-Irwin Group) as part of the Perennial Pasture Companions Project supported by Caring for our Country.

An example of the non-wetting layer of soil evident on some areas of John's properties