INNOVATION PROFILE

BUSINESS SNAPSHOT

OWNERS
Greg and Alicia Patten

PROPERTY NAME
Canegrass Station

PROPERTY LOCATION
65km north of Morgan, SA

SIZE OF PROPERTY
52,600 hectares

BRIEF ENTERPRISE DESCRIPTION
A vertically integrated saltbush meat business, running a self-replacing flock

NUMBER OF PEOPLE WORKING IN THE BUSINESS
4 people (2 full time equivalents)

AVERAGE ANNUAL RAINFALL
225mm

WHY THIS IS A PASTORAL ZONE INNOVATION
Water storage is essential for pastoral properties in hot, low rainfall environments. The Superdam increases the amount of rainfall caught and stored, reduces evaporation and the cost of dam cleaning.

Conserving Water with a Superdam

Greg and Alicia Patten run Canegrass Station in the north eastern pastoral zone of SA. They took over the property 10 years ago and have since made many improvements to the infrastructure and environment.

The property is set in Black Oak country and has clay sand soils. There are currently 23 dams on Canegrass Station which supply water to troughs and tanks in five main paddocks.

This innovation profile explains the Superdam system that Greg and Alicia have designed and constructed on Canegrass Station, to supply water to their flock.

Figure 1: The Superdam at 78% capacity.

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WHAT WAS THE MOTIVATION TO CHANGE?

At Canegrass Station, it is common to lose 10 mm of water per day through evaporation, or 3.6 metres per year. The existing dams on the property are large and shallow, and are restricted in depth due to the shallow clay layer in the soil. The water in these shallow dams can heat up quickly and have a high evaporation rate. This makes them inefficient at storing large volumes of water.

The existing dams at Canegrass contain small silt traps and are full when the running water gets to ground level, as the filling process works on gravity. Most of these dams store a maximum of 4 to 6 megalitres of water and have 1,800 litres of water per square metre of surface area.

Eventually the surface water run-off fills the dams with silt and they must be emptied, dried and cleaned out to remove the buildup of sediment. This process can take over 12 months and means that part of the property is without localised water during this period. These dams also need cleaning out every 12 years or so, which is a very costly and repeatable exercise for pastoral producers.

With this in mind, Greg and Alicia came up with the idea to construct a Superdam. The aim of the new dam design was to capture and store more rainfall, reduce water evaporation, and minimise the need for dam cleaning. The stored water is then used to supply water troughs and maintain their flock.

HOW DOES THE INNOVATION WORK?

Canegrass Station features vast areas of flat clay pans, and other low lying areas where grasses or trees are sparse. These areas are known as catchment areas and accumulate large volumes of water during rainfall events.

Greg and Alicia have designed the Superdam system to collect and store more of the water from the collection area, before it is lost through evaporation. The collection area linked to the Superdam is approximately 3 – 5,000 hectacres in size.

After 9mm of rain, water starts running off the soil surface at Canegrass. The water meanders from the collection area towards a large, shallow dam which acts as a silt trap (see figure 2). The water settles in the silt trap and is then pumped over a wall into the Superdam.

The Superdam is a large dam that is built up on all four sides, like a turkey nest dam (see figure 1). The dam walls increase the depth of the dam and reduce the evaporation rate.

Deeper water does not heat up as quickly as shallow water, and therefore evaporation rates are reduced. Based on this, Greg believes a dam needs to store 5 – 6,000 litres per square metre of surface area to be sustainable. This benchmark was used to calculate the required wall height and depth of the Superdam

The Superdam does not require lining due to the clay soils present on Canegrass. Greg simply compacted the soil after the construction phase and has not had any trouble with seepage.

The water stored in the Superdam can be pumped to a series of water storage tanks which are located at a higher level on the property. Greg calls this his 'tank farm'. These tanks reticulate water to troughs throughout the property, enabling the Patten's to move stored water from the Superdam to where it is needed for livestock.

KEY FEATURES

The key features of the Superdam system include:

- It is 12 metres deep and holds 32 megalitres of water.
- The dam walls are constructed at a 45° angle.
- The bottom of the dam does not go beyond the shallow clay layer in the soil profile.
- Water is captured and stored from the collection area.
- A silt trap allows silt to settle before water is pumped into the Superdam.
- The diesel pump can move 1 million litres of water per day from the silt trap to the Superdam.

Figure 2: The Superdam system at Canegrass. Water is pumped from the silt trap (right) and stored in the Superdam (left) for future use.

Figure 3: Water drains from the collection area and has naturally formed a waterway to the silt trap.

WHAT ARE THE KEY BENEFITS?

The Superdam system has brought many benefits to Canegrass. These include:

- Increasing the volume of water stored and available for livestock. After a period of seven months without rain on Canegrass, the Superdam still held 16 megalitres of water.
- Enabling water to be harvested that would not normally be captured in the rangelands.
- Reducing evaporation in the dam by constructing the walls at an optimum angle and creating a deeper dam.
- Enabling the silt trap to be cleaned without losing any water storage capacity, as it is dry approximately 70% of the year.
- Reducing labour and dam cleaning costs which would occur every 8 - 10 years with the existing dams.
- Reducing the requirement to clean the Superdam, as silt is collected in the silt trap before it is pumped into the Superdam.
- Enabling water to be pumped from the Superdam to any water trough on the property.

KEY RESOURCES REQUIRED FOR THE INNOVATION

The materials and resources required to construct and implement the Superdam system are:

- An earthmover.
- A pump (diesel or solar powered).
- A foot valve on a float in the silt trap.
- Pipes to transport water from the silt trap to the Superdam.
- Pipes and storage tanks to transport water from the Superdam to water troughs.
- Labour.

POTENTIAL CAUTION AND RISK

If constructing a Superdam on your own property, it is important to consider the topography of the land and ensure you have a sufficient catchment area to fill the dam. It is also necessary to understand the soil types present on your property. This will affect the dam water holding capacity, the requirement for lining the dam, and how much surface water will run-off your 'collection area'.

FURTHER RESOURCES

You must check the state and pastoral legislation that applies to your property for any guidelines, assessment and restrictions on dam construction.

LOOKING FORWARD

As the initial Superdam technique has been proven, Greg now plans to build another five Superdams at Canegrass Station to replace the existing 23 dams and improve drought security. The design will not change.

COST BENEFIT ANALYSIS

Greg estimates it has cost him $10,000 to build the silt trap and Superdam, without using earthmoving contractors. This includes his investment in a large diesel pump which cost $3,000.

The pump only runs approximately 5 weeks of the year and uses 250 litres of diesel to move 32 megalitres of water into the Superdam. This costs Greg approximately $665 per year in running costs.

The Patten's believe the initial capital cost of building the Superdam is similar to the cost of cleaning the existing dams every 8-12 years at Canegrass.

THE FINAL WORD

"It gives us the ability to harvest water that would otherwise evaporate in this environment," said Greg.

Bestprac acknowledges the contribution of Greg and Alicia Patten in the development of this innovation profile.

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Figure 4: Water entering the silt trap and settling before it is pumped to the Superdam.

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