WaterSmart Dams

Dam covers

Introduction

As part of the WaterSmart Dams project, this trial examined the use of floating dam covers, deployed at full scale to evaluate real-world effectiveness in reducing evaporation losses. With two demonstration sites in Western Australia's south-west, the project aimed to evaluate the actual effectiveness of the floating cover design, livestock compatibility, and ease of installation to assess if they may contribute to drought resilience and farm water security.

Overview & Objective

This trial assessed the effectiveness of floating continuous covers in reducing dam evaporation. At sites in Gairdner and Scotts Brook, monitoring and modelling were used to:

- Measure seasonal water retention under covered vs. uncovered conditions and simulate results
- Evaluate cover performance across different surface areas and dam types
- Analyse the cost-efficiency and practical viability of cover installation for broader farming application.

Key Players

This project was conducted with the following partners:

- Jones Family – Landholders (Gairdner)
- Robertson Family – Landholder (Scotts Brook)
- University of Western Australia (UWA) – Technical support
- Department of Primary Industries and Regional Development (DPIRD) – Technical support
- Grower Group Alliance (GGA) – Project management
- Southern Dirt and FBG – Grower group support

Challenges

The key challenge was to optimise the dam and catchment system for water storage, reducing losses from evaporation and overflow. With declining rainfall and rising evaporation rates, farm dams in the region are becoming increasingly unreliable, threatening water security for modern farming operations. To adapt, farmers need cost-effective, low-maintenance solutions that ensure consistent water availability for livestock, especially during late summer and autumn dry spells.

This project is jointly funded through the Australian Government's Future Drought Fund (FDF) and the Western Australian state government's Agriculture Climate Resilience Fund.

Solution & Approach

Robertson Family– Scotts Brook (Shire of Boyup Brook)

In March 2023, Robertson's installed a Daisy Dam cover on their 25m x 36m stock dam to evaluate its effectiveness in reducing evaporation and improving water reliability. The cover was installed with gaps along the edges to allow livestock access, with the gap size varying over time due to dynamic water levels, which is a key consideration in selecting this cover design. Installation required two people and was a straightforward process with minimal labour. Since installation, the cover has needed no maintenance and has helped maintain water availability during dry periods.

Dam Volume:	1938 m^3 (1.9 ML)
Maximum Depth:	3.66 m
Cover Size:	177 m^2 (covers 13% of surface area at full capacity)

Jones Family– Gairdner (Great Southern WA)

In August 2023, the Jones installed a Daisy Dam cover on a key dam, to evaluate evaporation savings under real farm conditions. The cover was deployed to accommodate fluctuating water levels and integrated with pumping infrastructure in the middle of the dam, with practicality assessed in the windy conditions of the south-coast region. The dam is a key water resource supported by a good catchment, supplying domestic garden and farm water use.

Dam Volume:	2662.4 m^3 (2.7 ML)
Maximum Depth:	3.9 m
Cover Size:	506 m^2 (covers 36% of surface area at full capacity)
Catchment Size:	~2.5 ha

The Process

01 **Site instrumentation & data collection:**

A fixed-bank weather station was installed at the Jones' dam to capture on-site meteorology data. Data from the nearest DPIRD weather station was used at Robertson's dam. A rain gauge was installed at both sites, along with a water depth and temperature logger.

02 **Simulation modelling:**

The General Lake Model (GLM) was used to simulate dam performance under both covered and uncovered scenarios.

03 **Comparative analysis:**

Data from real-world monitoring was compared with modelled outcomes.

"I'm happy with the Daisy Dam cover. There have been no ongoing costs or maintenance needed, and the sheep have taken to drinking from the dam well. The installation was straightforward, and the cost is proportional to dam size, making it a cost-effective solution. I'm planning to install more covers on my property"

WAYDE ROBERTSON, SITE HOST

Rationale

The Daisy Dam cover was chosen for its potential to significantly reduce evaporation, improving the dam's reliability. The cover delivered significant water savings across both dams, with performance affected by surface pooling, edge exposure, and water levels. None of the covers were impacted by high winds during our trials.

Results & Insight

Based on the WaterSmart Dams project monitoring and modelling, the average cost of water saved by covers was $2.10-3.60/kl, with the cover paying for itself over a period of 10-44 months (1-4 years), well less than the estimated lifespan (10 years).

Covered area efficiency averaged between 67-70%. Note this is well below the manufacturer's estimated (99.9%).

Evaporative Savings

Jones – Gairdner (Great Southern WA)

- 37% annual evaporation reduction (total dam)
- Starting full on October 1st, the dam retained 64% of its storage by April 1st, compared to just 52% if left uncovered
- The cover can save up to 450 kL of water annually if starting at full capacity, or 268 kL at half capacity

Robertson – Scotts Brook (Shire of Boyup Brook)

- 25% annual evaporation reduction (total dam)
- Starting full on October 1st, the dam retained 52% of its storage by April 1st, compared to just 43% if left uncovered
- The cover can save up to 230 kL of water annually if starting at full capacity, or 131 kL at half capacity