

Vortex Structured Water on Dairy Farm Irrigation

Arthur Cornwall, Dairy Farmer — Canterbury Plains, New Zealand

6-Year Update Interview · Recorded 14 May 2026 · Units installed 2019 (7th season of operation)

Overview

Arthur Cornwall has run Vortex structured-water devices on his Canterbury dairy irrigation systems for seven consecutive seasons — first on a smaller property, and for the last five years on a 160-hectare centre-pivot on his current farm. This update revisits performance after six years, covering water penetration, soil biology, nitrogen use, energy draw, and drought resilience.

Key Outcomes at a Glance

- Independently flagged improvement in soil penetration — confirmed by a third-party pivot-monitoring technician, not just farmer opinion.
- ~19% drop in irrigation pump electricity draw (89 → 72 amps), observed within 30 minutes of activation.
- Full-depth soil wetting achieved (250 mm vs. ~150 mm previously), based on soil-probe readings.
- Nitrogen input cut by more than half (60 → 20 units, up to 40 with a supplementary crop) while maintaining pasture growth.
- Seven seasons of maintenance-free operation — zero faults or warning lights.
- Pasture held up better than neighbouring conventional farms through the 2020 and November 2025 dry periods.
- Dramatic rise in earthworm activity on the same land — from zero to 10–20 worms per dig in five years.
- Framed by the farmer as “a pretty low up-front cost” against compounding, multi-year benefits — “for the investment, it’s a no-brainer.”

Water Penetration & Irrigation Efficiency

- At least 25% better water penetration recorded in a single pivot round after installation, per the pivot company’s own soil-moisture monitoring data.
- A pivot-company technician initially suspected a machine calibration fault because penetration readings were so much higher than other clients on the same system.
- Previously could only wet soil to ~150 mm with a 250 mm probe; post-installation, wetting reliably reaches the full 250 mm depth.
- This allowed Arthur to back off total water applied — running the pivot at ~15 mm per pass and resting it for a couple of days, rather than continuous overwatering (previously estimated at roughly two-thirds more water than needed).
- During a dry November 2025 “summer,” the stated regional guidance was ~35 mm/week; Arthur applied under 30 mm/week with pasture still “good, keeping up.”
- Mechanism cited (per the interviewer): lowering the water’s oxidation-reduction potential (ORP) changes how it interacts with negatively charged soil, encouraging more even dispersal through the profile instead of channelling straight down the path of least resistance.

Soil Health & Biology

- Earthworm counts have gone from effectively zero (worms were manually relocated when found) to 10–20 per dig on the same ground within five years — used as an accessible proxy for soil-biology recovery.
- More uniform soil moisture distribution reported, replacing the “path of least resistance” channelling seen with standard irrigation water.
- Farm is exploring further soil-biology work, including an upcoming study on fungal ratios in the soil.

Nutrient & Fertiliser Efficiency

- Nitrogen use reduced from a historic target of 60 units to 20 units (up to 40 in years with a supplementary crop) — roughly a 55–67% cut.
- Applied via sulphate of ammonia only (urea avoided), typically one spring application plus two to three foliar feeds (biology, seaweed, calcium ammonium nitrate).
- Better, more even water penetration is cited as the reason less nitrogen is pushed past the root zone — directly linking the irrigation mechanism to reduced leaching risk.
- Directly relevant to Canterbury’s regional nitrate-in-groundwater concerns, positioning the ~20-unit regime as a comparatively low-leaching-risk approach.

Cost & Efficiency Savings

- Electricity: ~19% reduction in pump amperage draw on the 160 ha pivot — described by Arthur as “significant,” though no dollar figure was calculated on camera.

- Fertiliser: substantial reduction in nitrogen spend (60 → 20/40 units) with pasture growth maintained.
- Positioned as low upfront cost relative to seven years of compounding benefits, with no maintenance costs reported over that period.

Drought Resilience

- 2020 drought: neighbouring farms visibly stressed and “a bit average,” while Arthur’s pasture held up — attributed qualitatively to improved soil-moisture retention.
- November 2025 dry spell: pivot ran continuously for the month at 15 mm/pass (~4-day full rotation), applying under 30 mm/week against a 35 mm/week regional guideline, with pasture still performing well.

Quantitative Results Summary

Pump electricity draw (160 ha pivot)	89 amps	72 amps	~19% reduction (within 30 min of startup)
Soil moisture penetration (per pivot-company data)	Baseline	–	At least 25% better in a single round
Soil wetting depth (250 mm probe)	~150 mm	Full 250 mm	Full root-zone profile now wetting
Nitrogen fertiliser use	60 units N	20 units N (up to 40 with a crop)	~55–67% reduction, sulphate of ammonia only
Irrigation depth during dry period (Nov 2025)	Regional guide: 35 mm/week	< 30 mm/week applied	Below guideline; pasture held up
Earthworm counts (same ground, 5 yrs)	0 (relocated any found)	10–20 per dig	Strong soil-biology recovery
System reliability	–	7 seasons	Zero faults or warning lights
Bloat losses	–	0 in last 2–3 years	Anecdotal; multi-factor

Strongest Statements from the Interview

“There’s got to be some problems with the calibration of the machine.” — Third-party pivot-company technician, reacting to unusually high penetration readings

“For the investment, it’s a no-brainer.” — Arthur Cornwall

“It’s a pretty low up-front cost really.” — Arthur Cornwall, on accumulated benefits vs. cost

“You’re compounding the benefits... when you can see them on a power meter, when you can see them in the soil profile.” — Arthur Cornwall

“We’re chugging along [in drought]... pretty happy here.” — Arthur Cornwall, comparing to neighbouring farms

Notes on Evidence & Verification

All figures above are single-farm and self-reported/anecdotal, drawn from a farmer interview rather than a controlled trial or independent audit. They should not be presented as typical, average, or guaranteed results.

- The 25% penetration figure is Arthur's own recollection of the pivot company's data, not the underlying report itself.
- The amp-draw reduction wasn't isolated from other possible variables (pivot speed, pressure, seasonal load).
- No yield/tonnage data was given to confirm pasture output alongside the nitrogen reduction — this is a satisfaction claim, not a paired yield comparison.
- Worm counts are informal/observational, not a soil-biology assay; other farm-management changes over the same 5 years could also have contributed.
- Animal-health outcomes (sick bin, bloat losses) are explicitly multi-factor and not attributed by Arthur solely to the units.
- The ORP/soil-charge mechanism was offered informally by the interviewer, not sourced to a study in this video, and should be checked against validated technical documentation before commercial use.