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Why would a pastoralist invest in irrigation to grow fodder in Western Australia?

Christopher Ham
Senior Development Officer
Irrigation and Pastoral Diversification
Broome, Western Australia

Twitter: @ChrisHamDPIRD

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Our region – NW Western Australia
Mosaic Agriculture

Red dots indicate irrigation sites across the West Kimberley and Northern Pilbara

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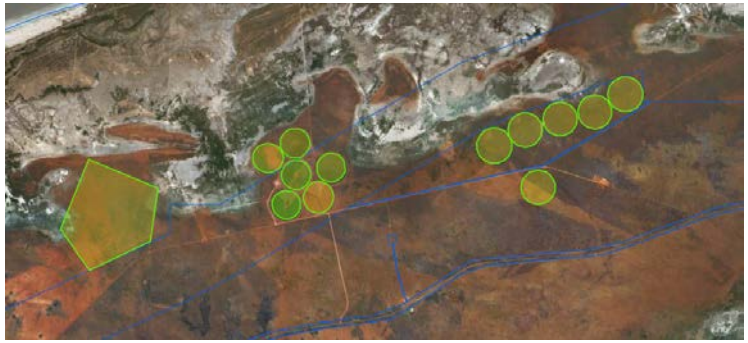
Investment into irrigation in the last 20 years

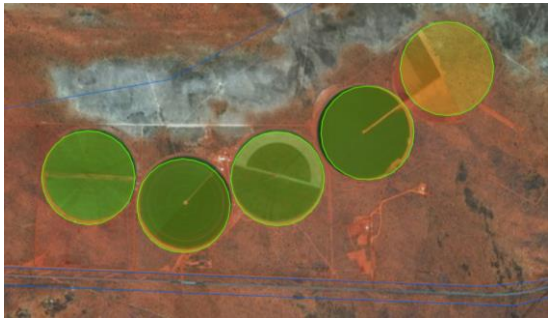
Shelamar Horticulture



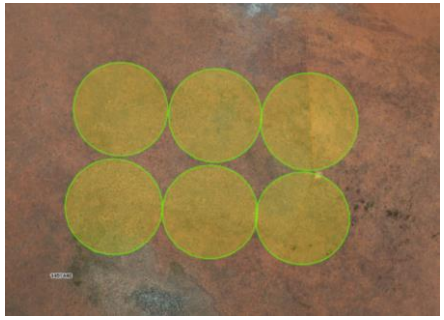
Pardoo Stages 1, 2 & 3

Shamrock Gardens

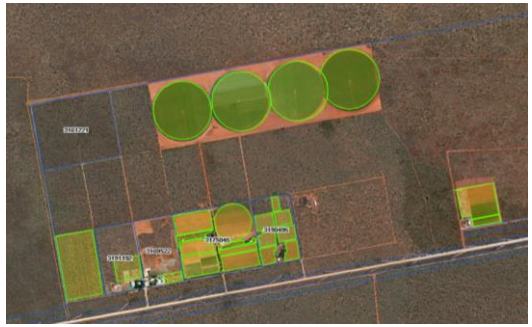
Kilto



Wallal Downs Stage 1



Wallal Downs Stage 2



Skuthorpe Stage 1

Plus
Anna Plains
Nita Downs
Mowanjum
Liveringa
Gogo
and others…

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What is driving the investment?

- Isolation and freight costs
- Limited rainfall (<800 mm)
- Limitations of natural pastures
- Pastoral landscape & policy
- Supply chain & abattoir
- Market forces

Kimberley Meat Company

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Water source & development costs

Shallow groundwater (Centre pivot)

Total capital costs per ha - $12,233 - $20,000 (CSIRO, 2018)

Artesian groundwater (Centre pivot)

Total capital costs per ha - $14,400 – $21,000 (Plunkett, Wiley 2017)

Surface water capture (Surface or pivot)

Total capital costs per ha - $10,000 - $21,600 (CSIRO, 2018)

High value horticulture (drip tape)

Total capital costs per ha - $40,951 (CSIRO, 2018) - $50,000 (FPG, 2018)

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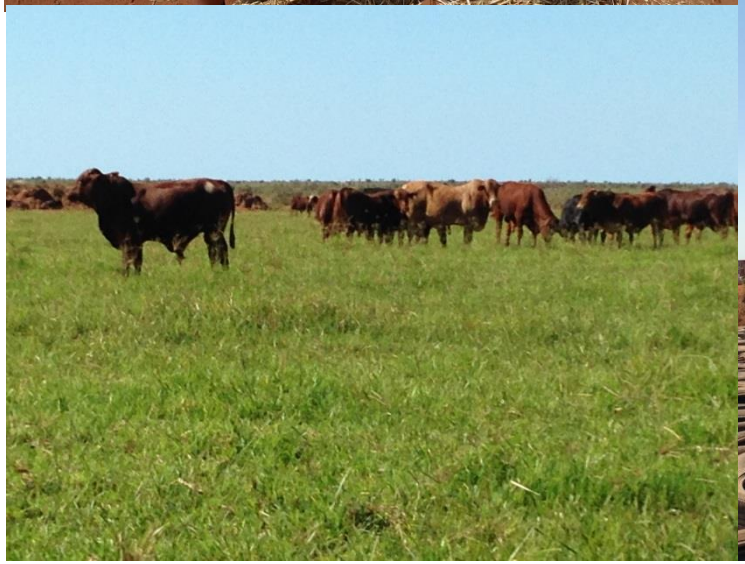
Hay, silage & stand and graze



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Crop options and rotations

Perennial tropical grasses

- C4 tropical grasses – Rhodes or Panics
- High growth in the Wet season
- Lower growth in the Dry season
- Mixed pastures – difficult to maintain

Annual rotations

Dry season options

- Cut and carry/silage – Maize or Sweet Sorghum
- Temperate crops - Oats, Lucerne – somewhat limited
- Alternative fodders – poor results in trials

Wet season options

- Sorghum/Millets
- Tropical legumes – Cavalcade, cowpea, blue pea etc

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Hay market summary (NW WA mainly)

Isolation drives prices up

- Oaten hay from Perth $150/tonne
- Freight to Broome - $200 (or more)…price comparison $350 – 400 per tonne

- Local hay has to be irrigated
- Dryland production constrained by rainfall and PLB policy
- Irrigated production constrained by land availability, risk, complexity, PLB policy
- Quality is driven by word of mouth

Break even at $1600 - $2600/ha/year (CSIRO, 2018)

Price per tonne/yield	20 tonnes per ha	31 tonnes per ha	36 tonnes per ha
$150 per tonne	**- $1,211**	$ 438	$ 1,188
$200 per tonne	**- $211**	$ 1,988	**$ 2,988**
$250 per tonne	$ 788	**$ 3,538**	**$ 4,788**
$300 per tonne	$1,788	**$ 5,088**	**$ 6, 588**

Gross Margin – 120 ha Irrigated Rhodes Grass – shallow ground water – VC only included

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Clever producers do well

Quality is being rewarded

- Maximum leaf – short cutting cycle
- Silage pits & wrapping bales
- Irrigation and nutrient monitoring

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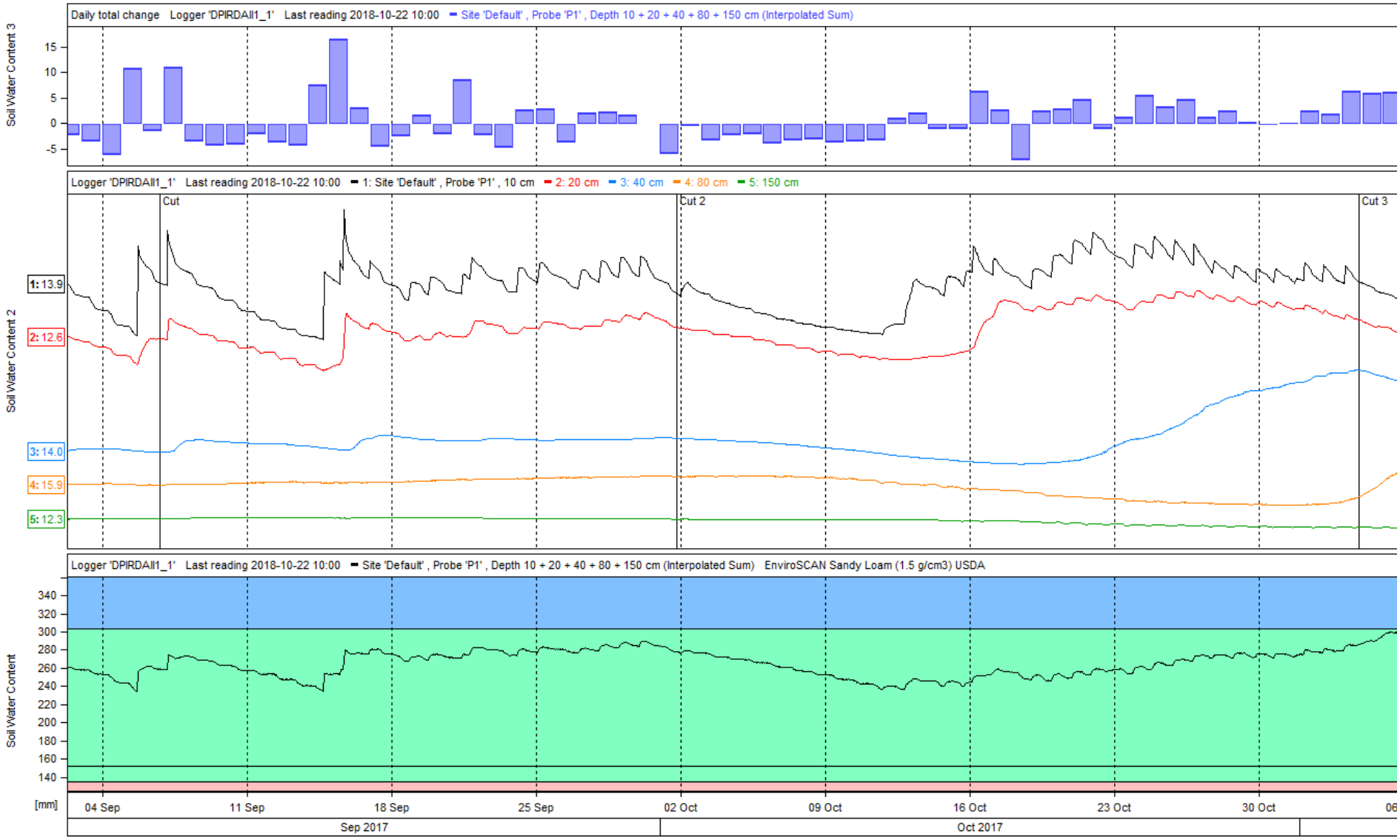
Hay irrigation strategy - cyclic



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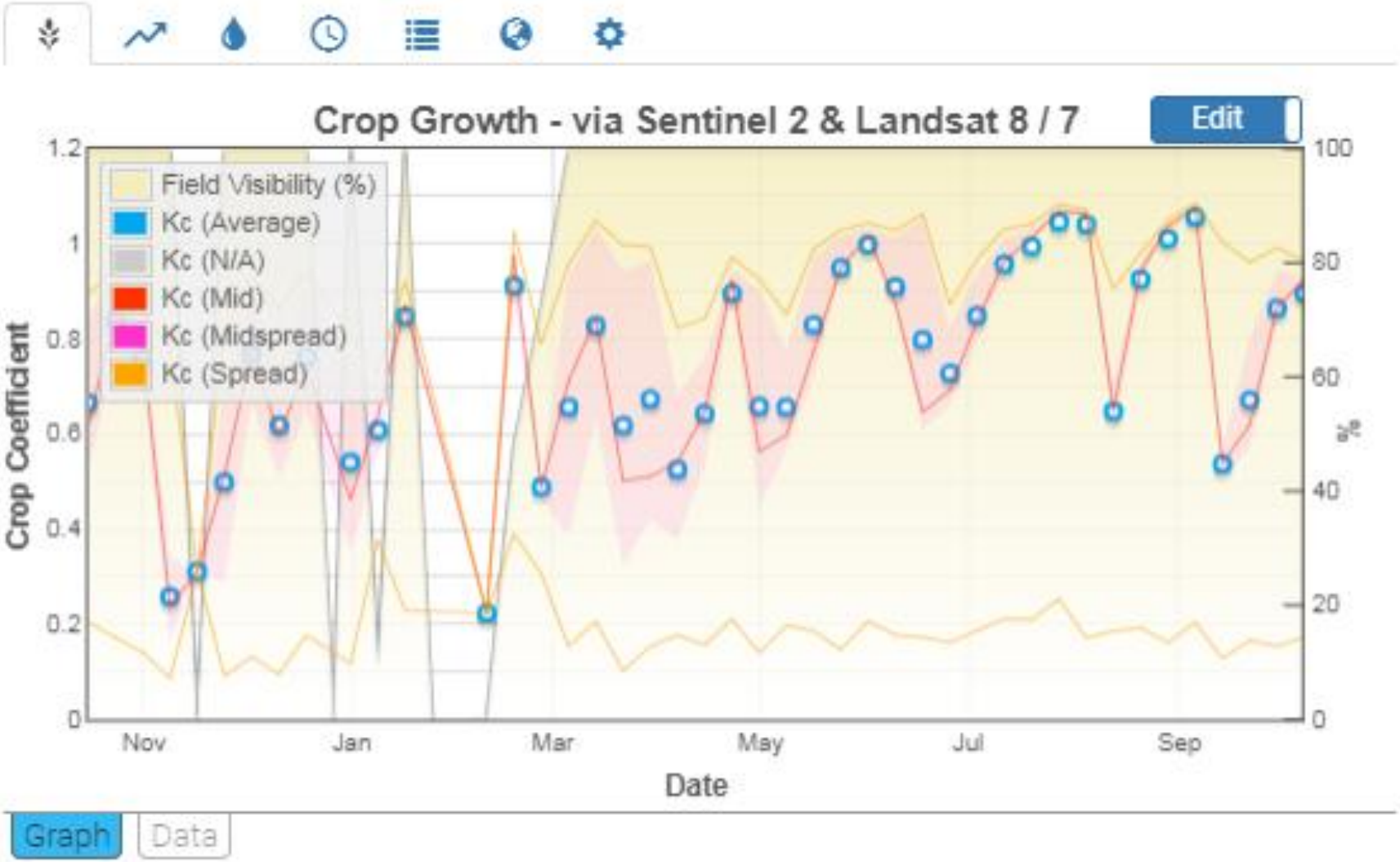
Rhodes hay crop growth cycle



Data source: Irrisat website https://irrisat-cloud.appspot.com/

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Investment decisions differ

Wallal Station

Invested in:

- Genetics
- Infrastructure

to improve carrying capacity & utilisation

Invested into irrigation:

- Heavier cattle
- Avoid forced sales &
- Manage poor seasons

Plunkett, B., Wiley, T., (forthcoming)

Pardoo Station

Invested in transformational project

Phasing out existing cattle

Seeks purebred Wagyu herd

Exclusive Wagyu product

- 3 lines of boxed beef
- Integrated supply chain
- Seeks partnerships

Pardoo Beef Corporation, 2016

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Optimal growth or fecundity?

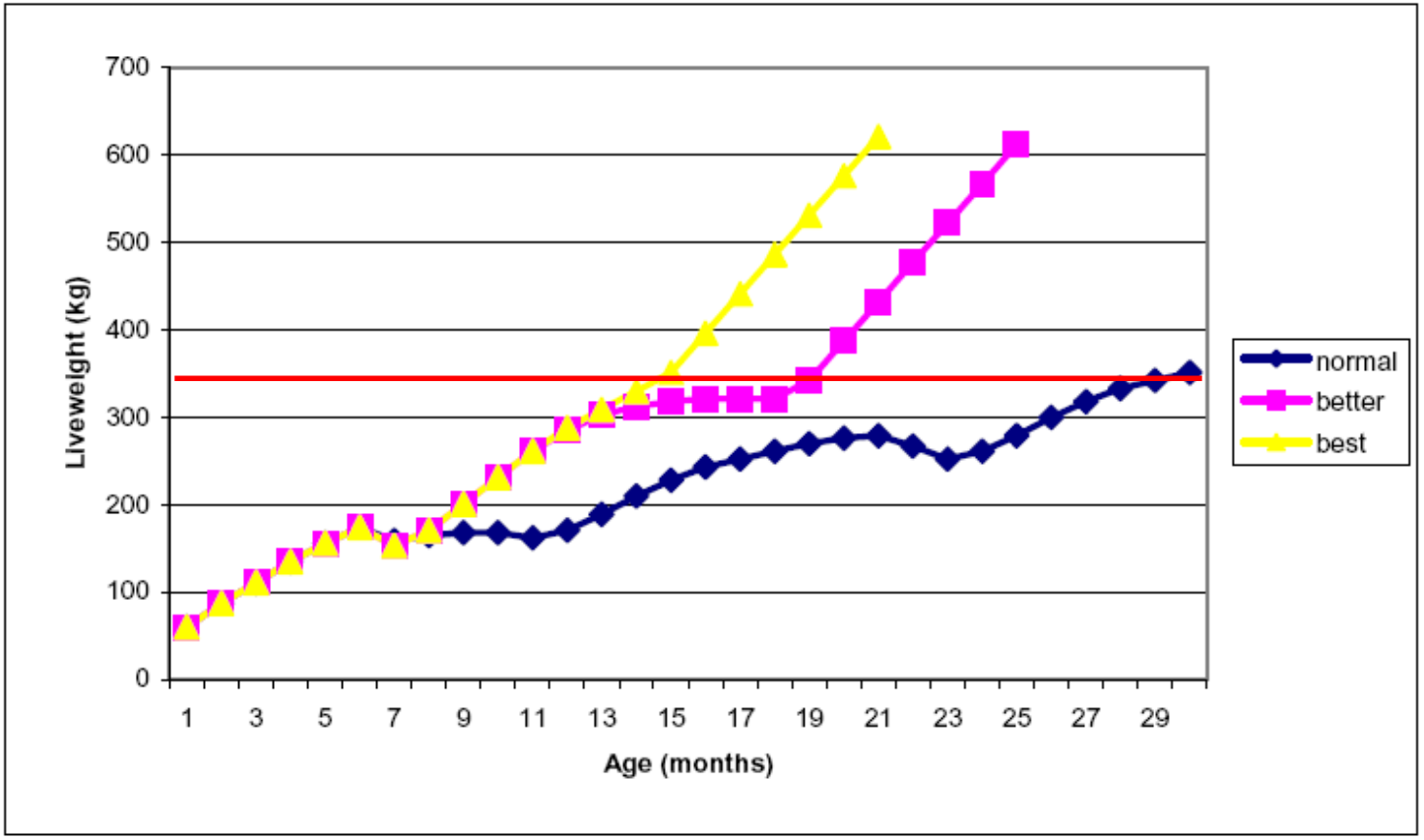

Figure 6. Impact of growth rate on weight and age of turn-off.

'Normal': (Average growth rate 0.36 kg/day) an average beast grown out on a pastoral station (assume born in January).

'Better': (Average growth rate 0.78 kg/day) the same beast weaned at six months on station, then grown out on pasture in the agricultural region to 350 kg, then lot fed for 150-180 days.

'Best': (Average growth rate 0.94 kg/day) same beast weaned at 6 months on station, then grown out on pasture/tagasaste in the agricultural region to 350 kg, then lot fed for 150-180 days.

Burgraaff . W. (2004)

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Feed quality & live-weight gain

Cattle live-weight	DMD 50% ME 7 MJ	DMD 62% ME 9 MJ	DMD 74% ME 11 MJ
200 kg	– (3.8 kg)	**0.6 kg** (5 kg eaten)	**1.25 kg** (6.3 kg eaten)
400 kg	– (6 kg)	**0.5 kg** (8 kg eaten)	**1.25 kg** (10 kg eaten)
600 kg	– (6 kg)	**0.5 kg** (9 kg eaten)	**1.0 kg** (10.5 kg eaten)

To gain 1.25 kg/day need both quality and quantity!

Calculated from "**MLA Beef Cattle Nutrition"** Table 1 ME requirements and
Figure on page 17 on Intake versus Digestibility
Assumes adequate protein
Compiled by Geoff Moore DPIRD Senior Research Officer

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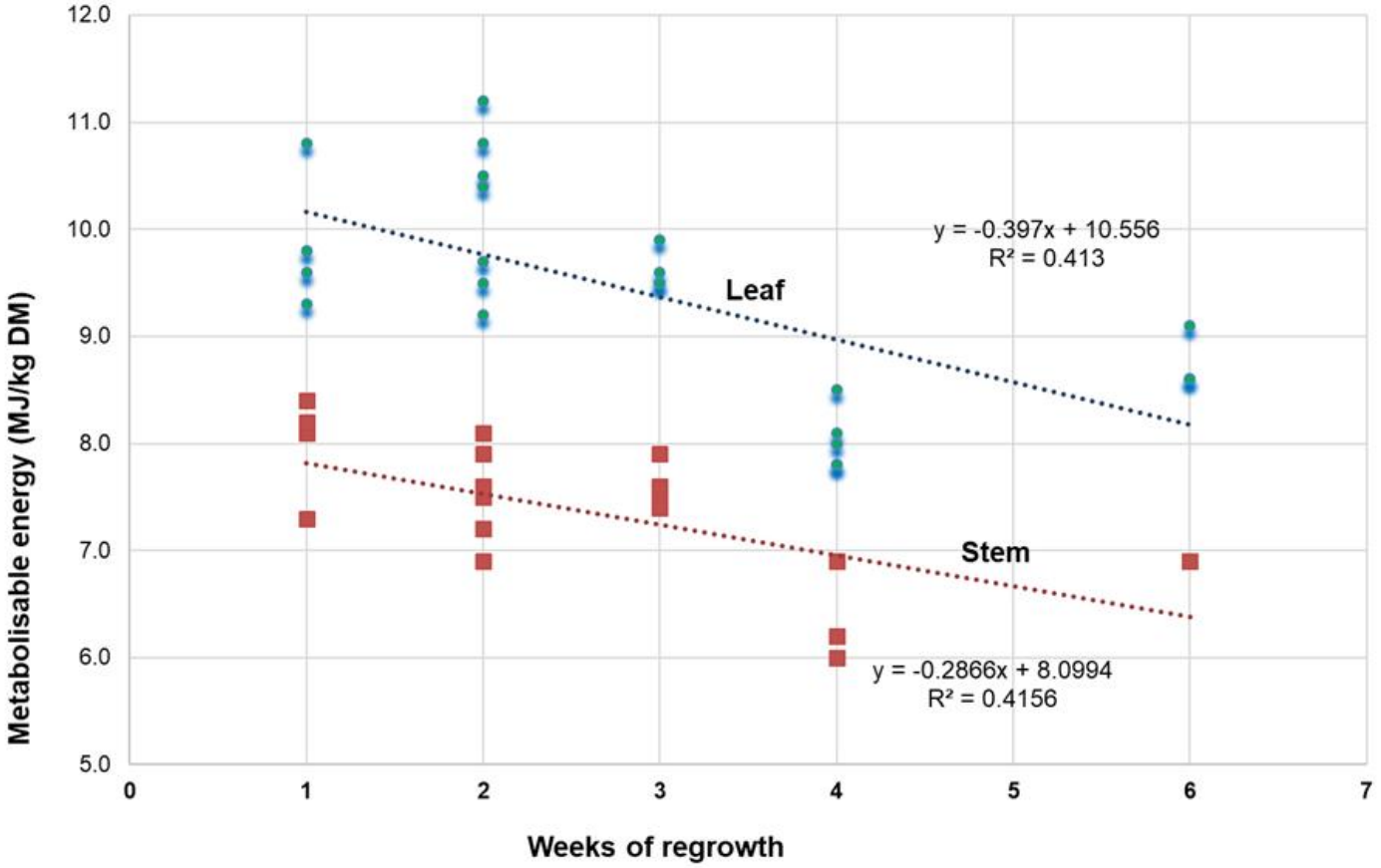
C4 grasses – composition

Metabolisable energy (MJ/kg DM) for leaf and stem of Rhodes grass

As the stand gets older the quantity increases and the quality drops



Geoff Moore and Clinton Revell DPIRD Research Officers

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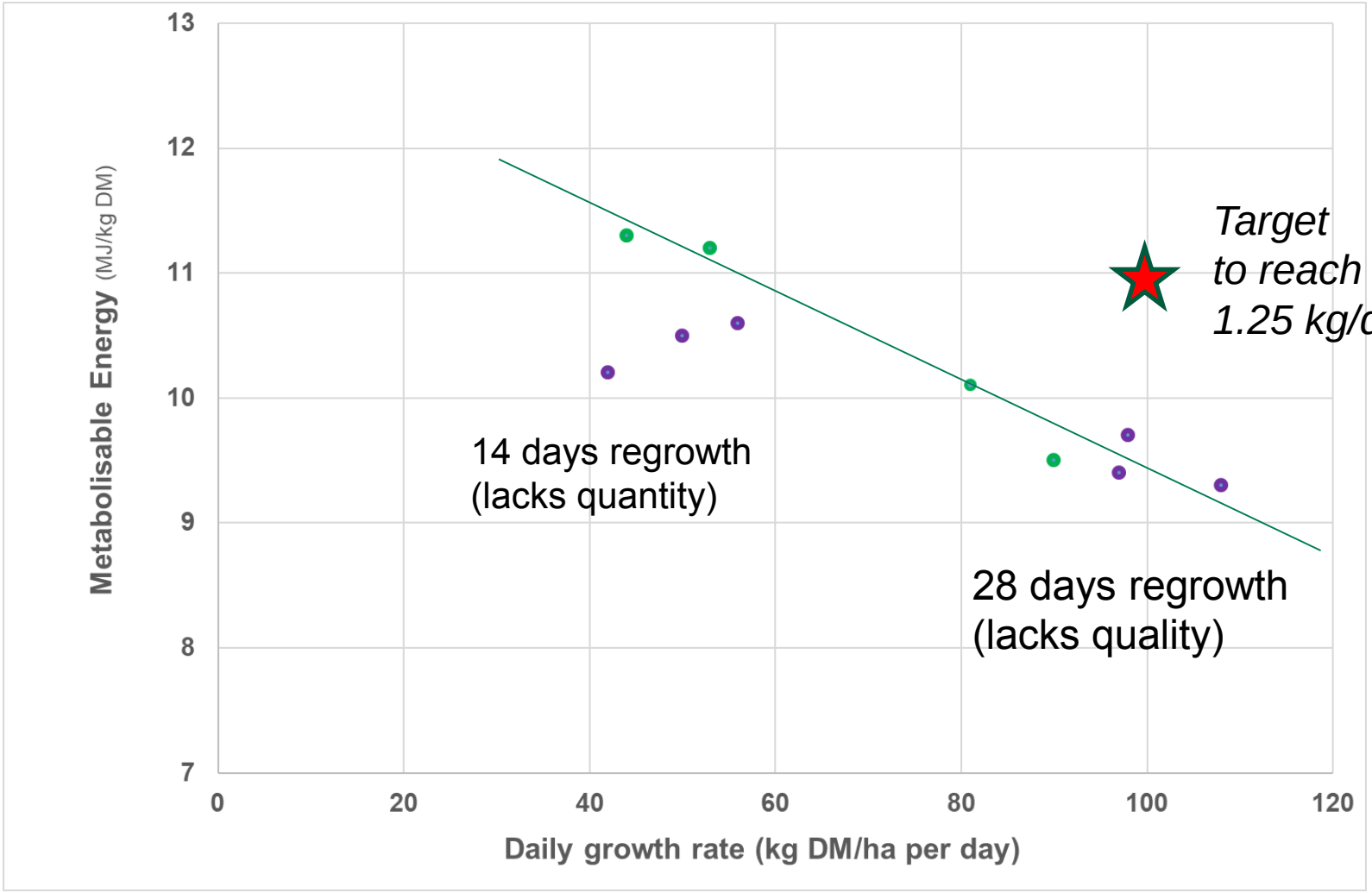
MEnergy limited on tropical pastures

There are limits on what a tropical pasture can achieve compared to temperate grazing systems even under irrigation



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Grazing Management

- Matching pasture growth with consumption
- Forecasting rotations based on incoming cell growth stage
- Forecasting seasonal pasture variation and numbers
- Calculate based on tonnes of beef per pivot
- Predictive animal behaviour

Credit: Mick Courtney – Pardoo Beef Corporation

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Selective grazing and utilisation

Cattle select for leaf rather than stem

- Uppermost leaves first
- Then leaf bearing stem
- Then stem – if forced to…stem slows down intake
- Regrowth of around 3 to 4 weeks is best
- Weight gain determined by amount & ease of accessing leaf – irrespective of the amount of cattle grazing

Credit: Professor Kevin Bell – Pardoo Beef Corporation

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Pasture Management

- Slashing – resetting the pasture
- Baling – storage of excess
- Timing is critical to manage leaf & stem
- Efficiency of operations & labour
- Taking the foot on or off the "**N Pedal"** in times of lower or higher stocking rates
- If we can't use it …don't grow it.
- Managing irrigations

Credit: Mick Courtney – Pardoo Beef Corporation

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Rhodes pasture growth cycle

Data source: Irrisat website https://irrisat-cloud.appspot.com/

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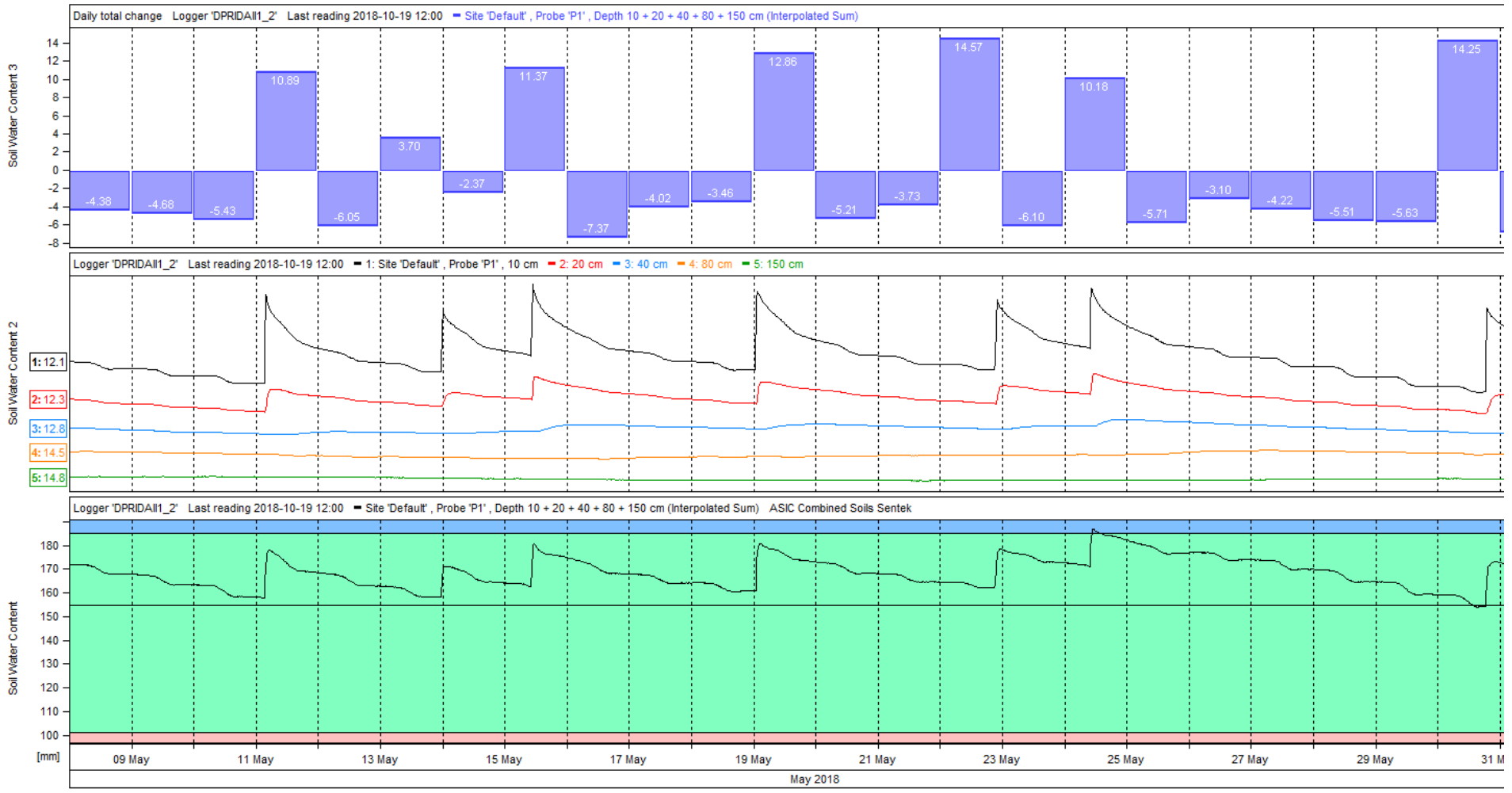
Pastures strategy - consistent

Apps | Environmental sites | General sites | Irrigation sites | Travel sites | Google | New Tab | Leadership

IrriMAX Live

Home Mick Courtney DPRIDAll1_2 (2)



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Infrastructure placement

- Watering point placement & enclosures
- Weighing equipment either manual or automatic must be considered.
- If we can't measure it….we can't manage it
- More than one exit point per pivot cell away from water point
- Consider water points "off" the irrigation area

Credit: Mick Courtney – Pardoo Beef Corporation

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Animal health and welfare

- Fertiliser can be toxic
- Congregation points increase risk of disease and parasites
- Potentially Leptospirosis, Rotavirus, Worm burdens, Pestivirus, calf pneumonia
- Induction protocols & acclimatisation
- Back up plan for natural disasters, breakdowns and feed shortages

Credit: Mick Courtney – Pardoo Beef Corporation

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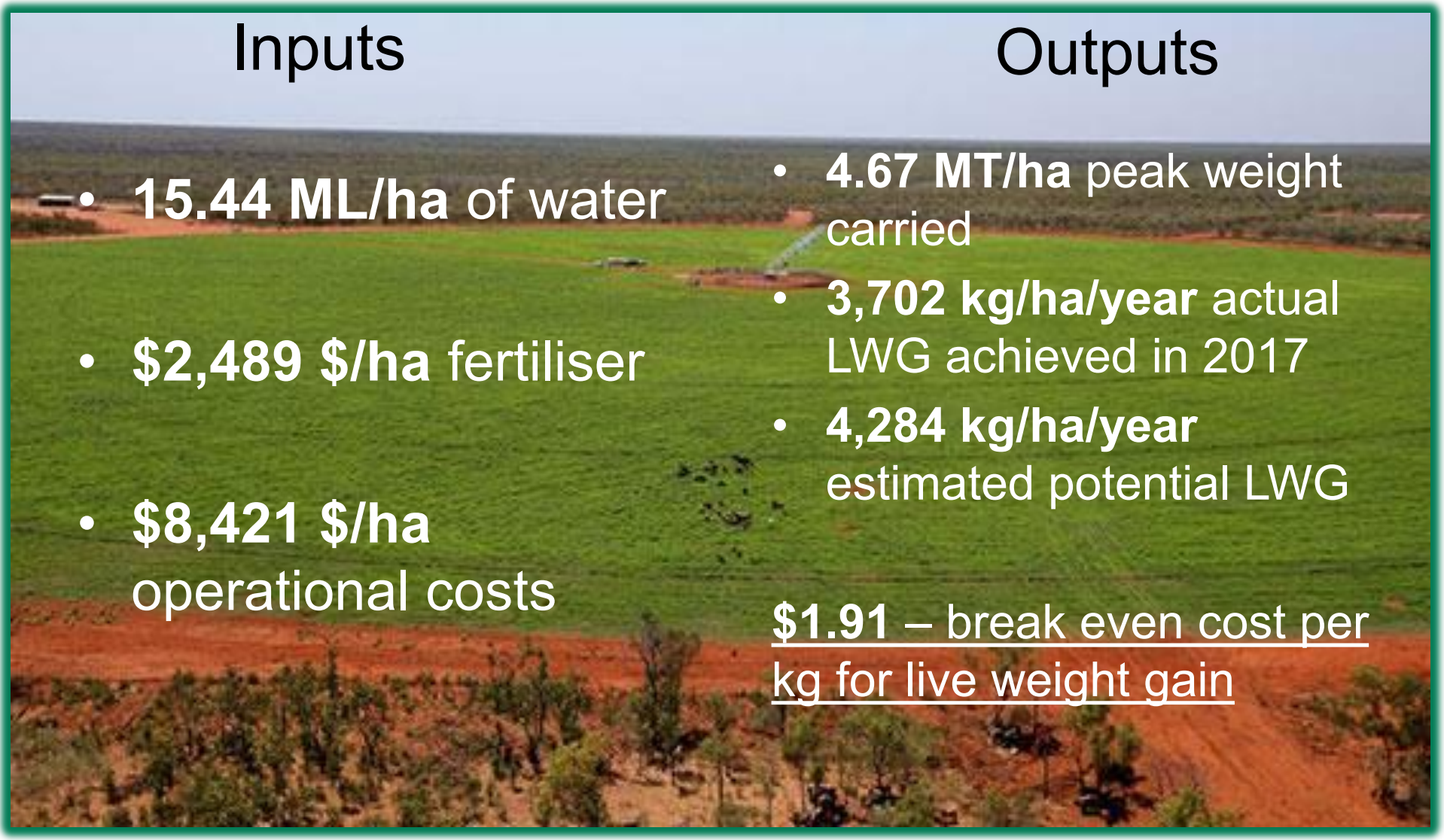
Mowanjum trial, Derby



Inputs

- **15.44 ML/ha** of water
- **$2,489 $/ha** fertiliser
- **$8,421 $/ha** operational costs

Outputs

- **4.67 MT/ha** peak weight carried
- **3,702 kg/ha/year** actual LWG achieved in 2017
- **4,284 kg/ha/year** estimated potential LWG

$1.91 – break even cost per kg for live weight gain

Giovi Agriculture, 2018 – Mowanjum final report - www.agric.wa.gov.au

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Some other important points…

- Unique situations change economics
- Cost out other options – investment comparison
- Policy environment in WA unique
- Costs and risks – pre feasibility
- Good management = success
- Approval time and costs significant
- Staff skills and retention
- Service industry capacity in remote regions

So, why would you invest in irrigation?

There is no romance involved….
It’s a slow steady grind, high management - potentially good returns if you get it right!

Thank you

Visit dpird.wa.gov.au

Twitter: @ChrisHamDPIRD