



Could 'mosaic' irrigation & strategic feeding be a better economic option than broad-scale pasture or infrastructure development for livestock production in semi-arid environments? A case study from northern Australia.

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Road map



Background

Mosaic irrigation

Approach:

- Modelling
- Case studies

Case studies:

- Barkly Tableland (NT)
- Burdekin (Qld)
- Kimberley (WA)

Alternatives

Concluding remarks

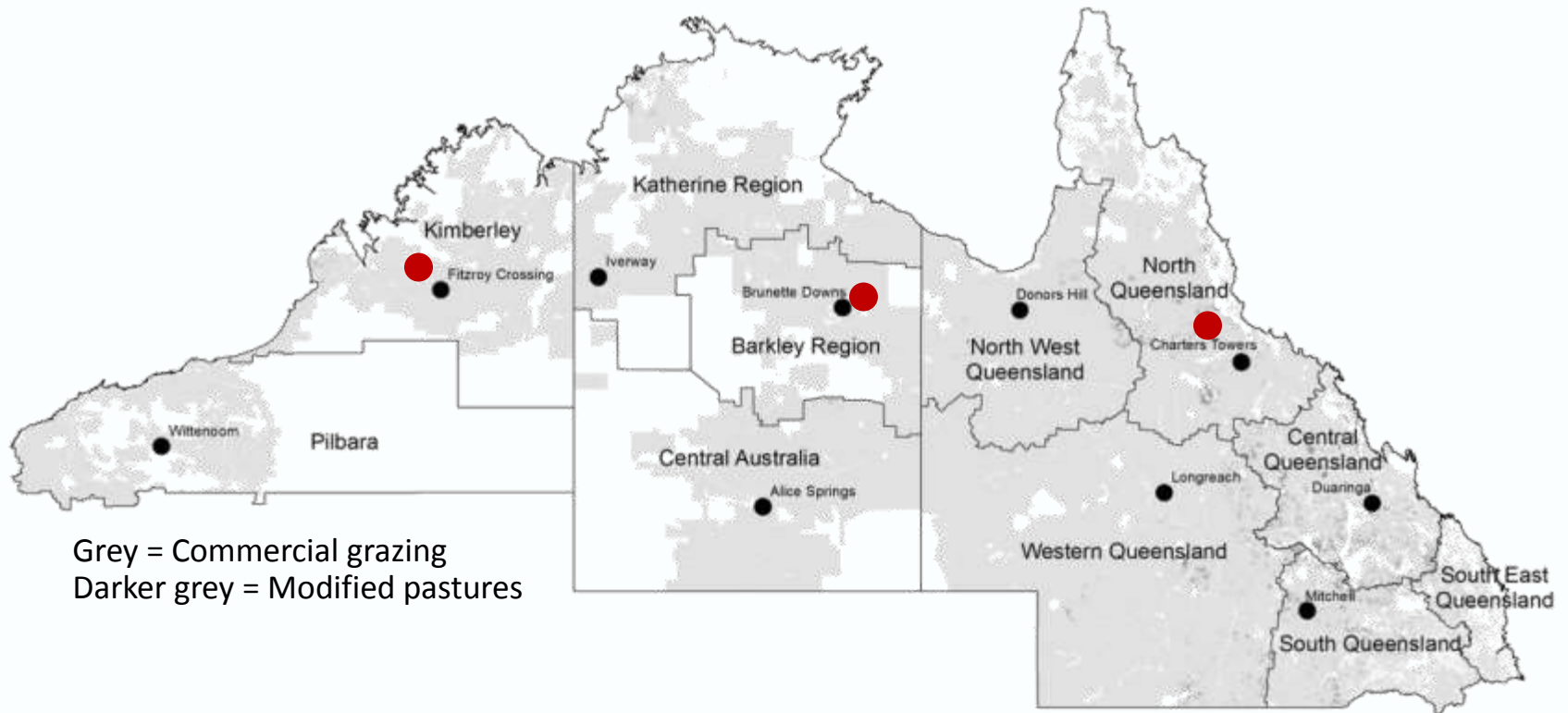
Background - North Australia Beef Industry

Cattle grazing major economic use of north Australian grazing lands:

~2.3 million km²

~ 14 million head of cattle (>50% national herd)

~ contributes \$2.0 billion to GDP



Sustainable Production Challenges

Many enterprises are neither profitable nor sustainable

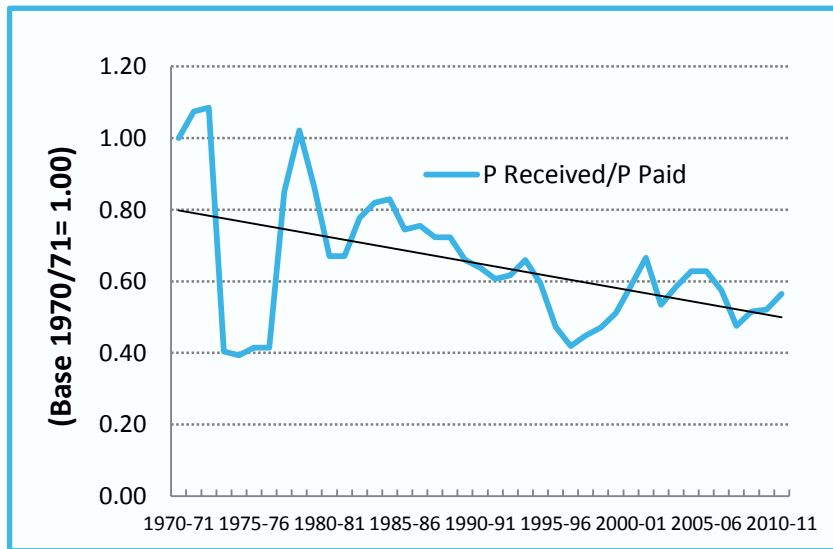
Beef prices are falling (TOT negative trend $\sim -2.0\%$ pa)

Productivity has stalled in last decade

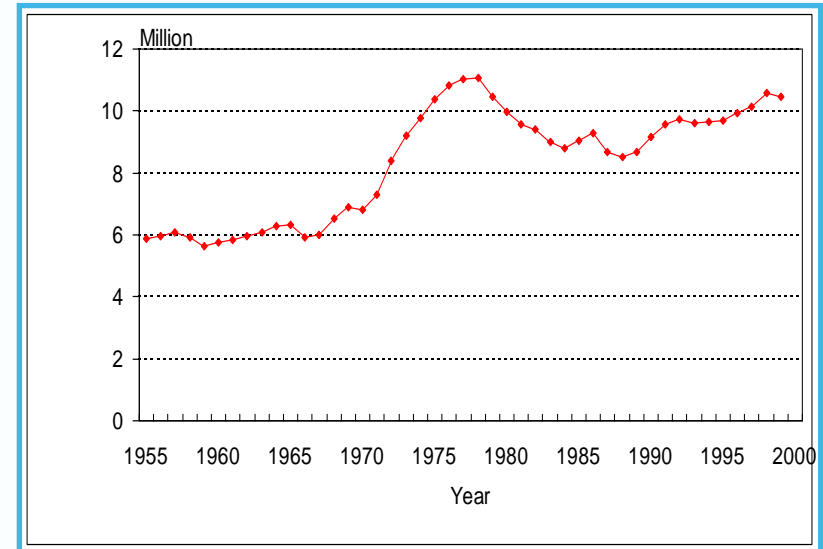
Resource degradation $\sim 55\%$ grazing lands require some rehabilitation

Projected climate change - generally adverse (less rain, more variable climate)

Beef terms of trade (-2% p.a.)



Beef cattle – Queensland:1955-2000



Productivity & Animal Nutrition

Major contributor to poor business performance:

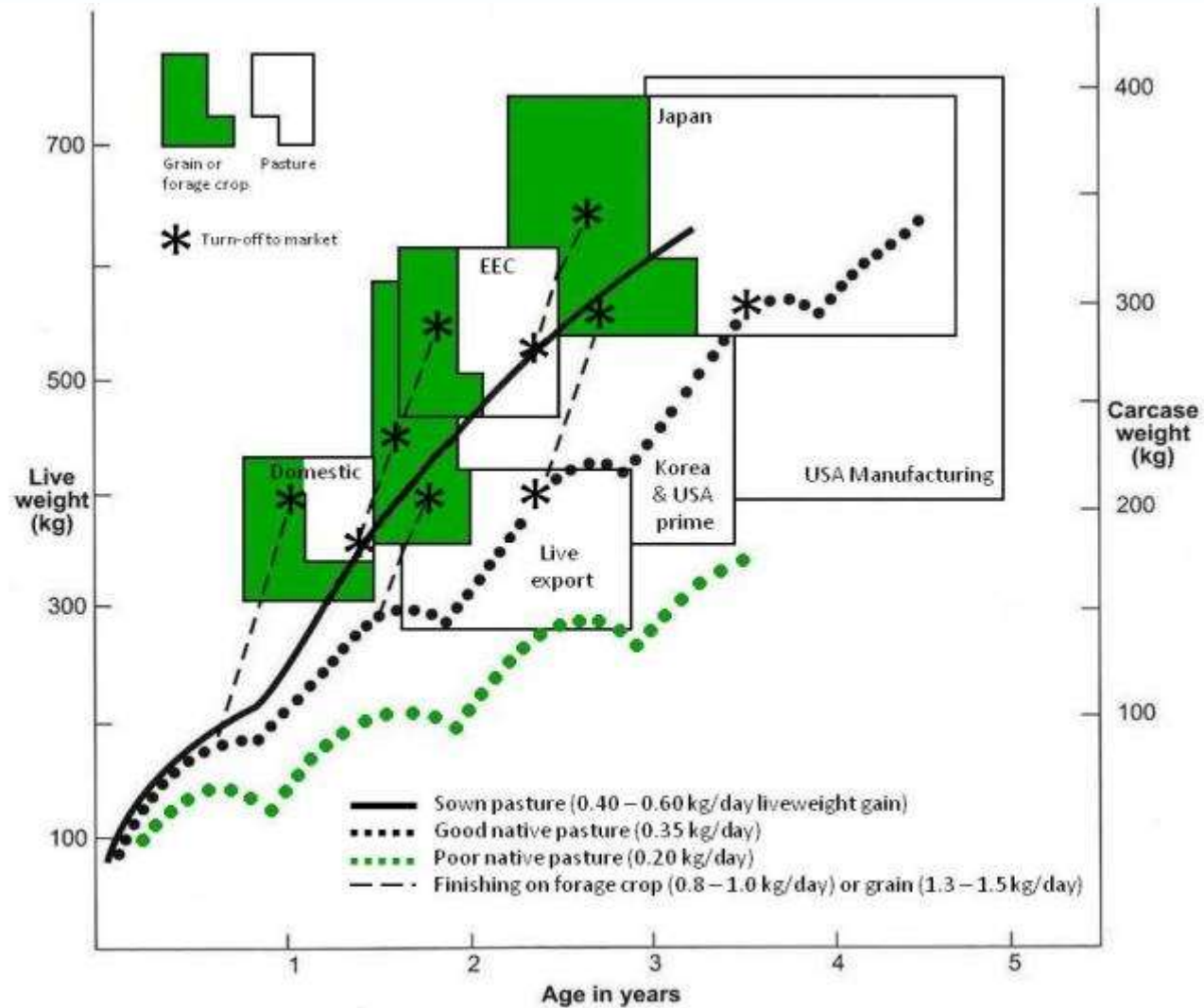
- low reproductive performance of breeders
- poor management of first calving heifers
- low calf growth rates
- low steer liveweight gain

Linked to nutrition management & low quality of native pastures

Pasture improvement technologies available but uptake poor:

- Most enterprises have nil areas of developed pasture or crops
- Pasture development is mainly confined to Qld savannas
- Mainly mechanical tree clearing with sown grasses & legumes or tree poisoning to exploit of elevated native herbage yields.

Nutrition & Markets



Irrigation on beef holdings

Longstanding public interest in irrigation for the 'north':

- tapping runoff from high annual seasonal rainfall
- extensive areas of land
- proximity to Asian markets for products of irrigation development

But outside a few large scale schemes minimal uptake:

- Irrigated land on holdings <1% in most regions
- Mainly for fodder (hay for weaners) cf. strategic targeting of markets

Scope for irrigation:

- Expansion limited by water availability (esp. peak demand dry season)
- 60,000-120,000 ha (i.e. <1% of ~49m ha technically suitable)
- Would still be 200-400% increase of the existing irrigated cropping area
- Stream & surface capture too contested – likely to be based on bores
- Small scale & dispersed systems (*mosaic irrigation*) technically appealing
- Largely untested with few indicators of production & economic benefits

Mosaic irrigation



Mosaic Irrigation

Approach:

- Detailed soil, hydrological, engineering studies of suitable regions
- Simulation modelling of suitable forages & crops
- Regional case studies of potential economic returns

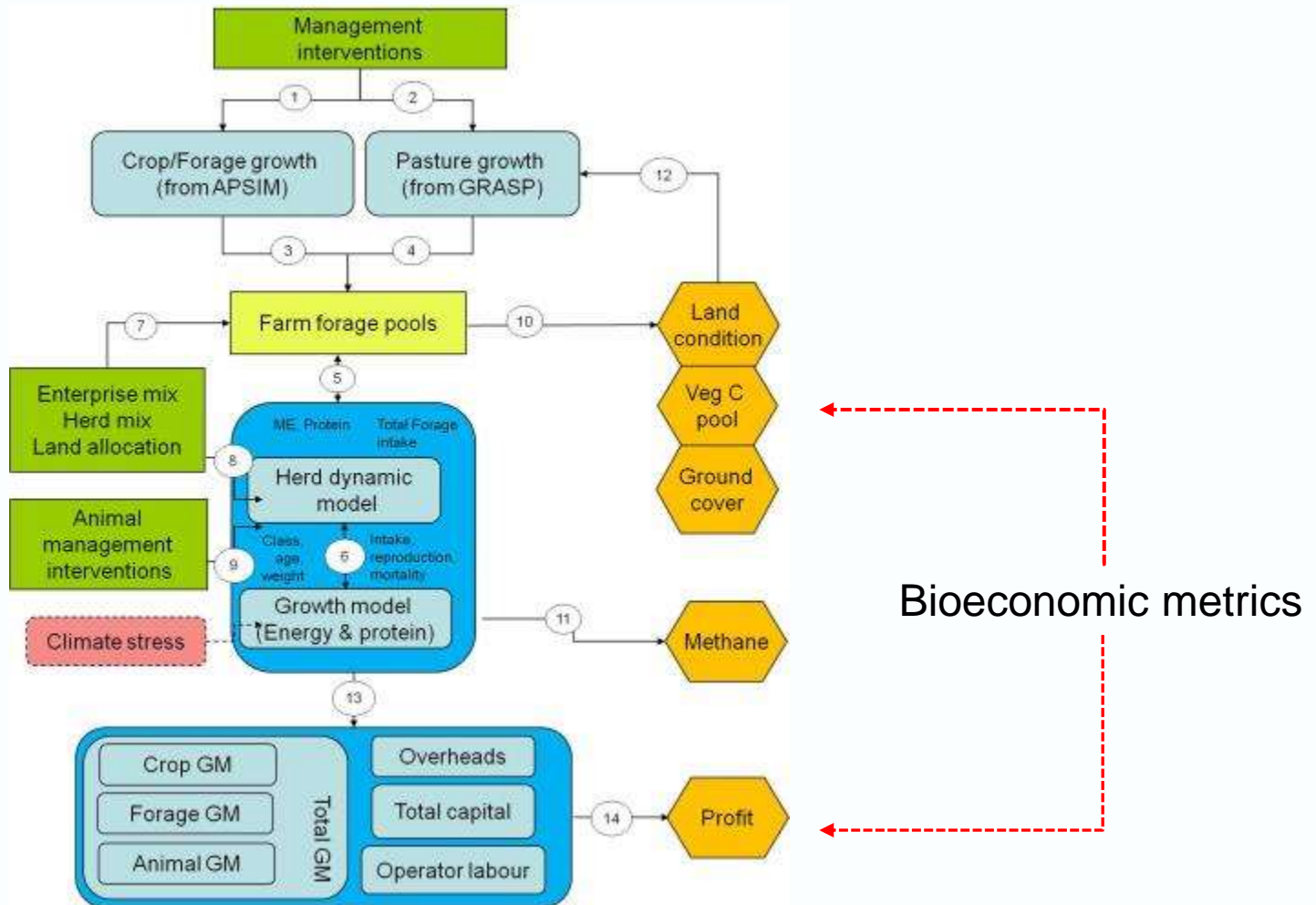
Modelling:

- APSIM - cereal (sorghum), grain legume (lablab), grass (Bambatsi panic)
- NABSA - beef enterprise, driven largely by nutrition & animal response
- Simulation trials – 20yrs 1990 - 2010

Case studies:

- Barkly Tableland (NT)
- Burdekin (Nth Qld)
- Kimberley (WA)

NABSA



Barkly Tableland

Baseline:

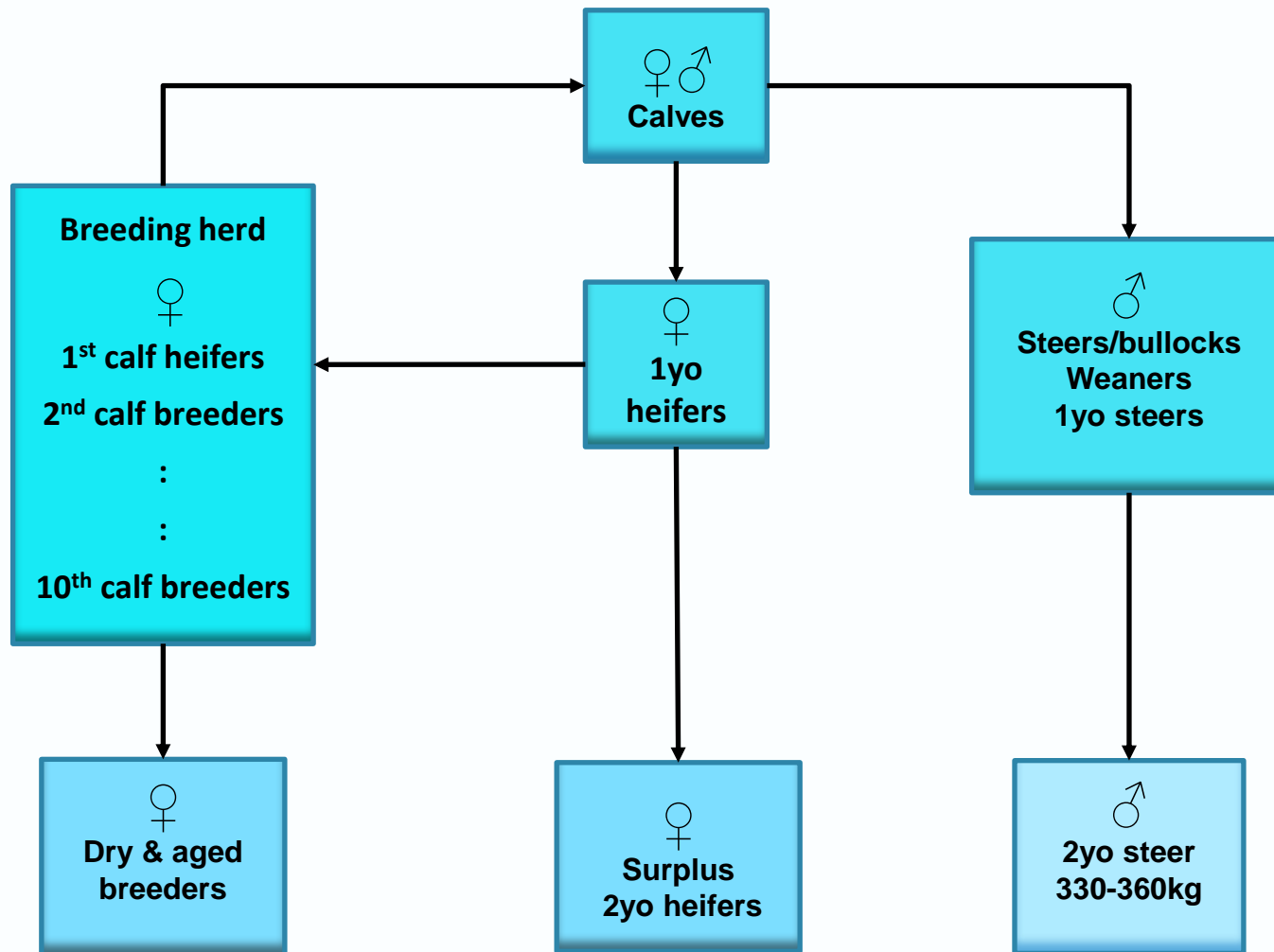
- Holding size - 5,000km²
- Self-replacing Braham herd - 22,000 mixed age breeders
- Native pasture - turning off 24m steers to live export ~350kg/hd

Irrigation scenario:

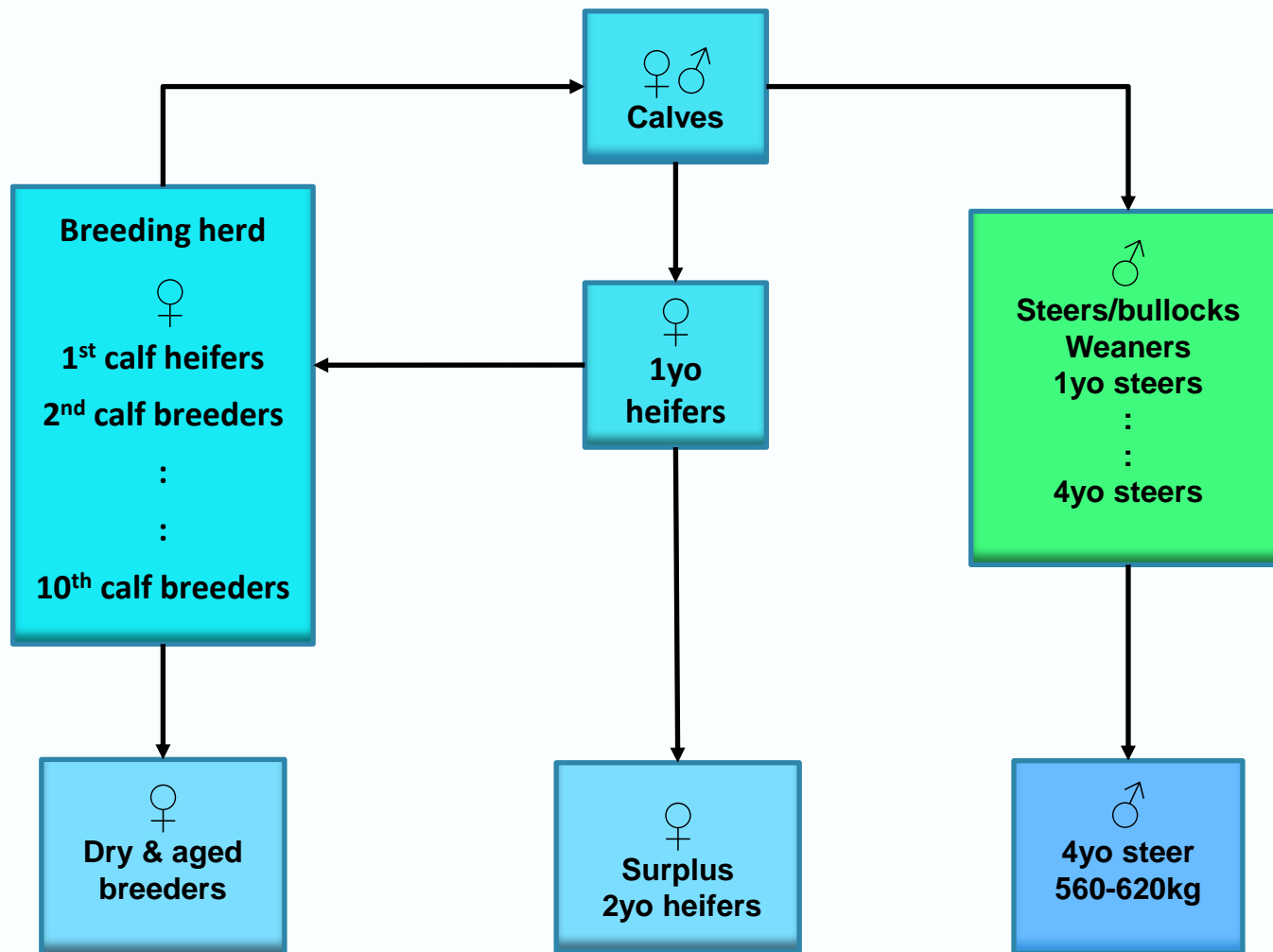
- 550ha pivot fed from local bore (reliable 80% of years)
- Lablab annually sown & fed to steers late spring/summer
- Aim to turnoff 42m steers @ ~ 590kg/hd
- Establishment cost ~ \$5,500/ha

\$AUD1.00 ~ 9.2 Rand

Barkly Tableland - baseline



Barkly Tableland - scenario



Burdekin

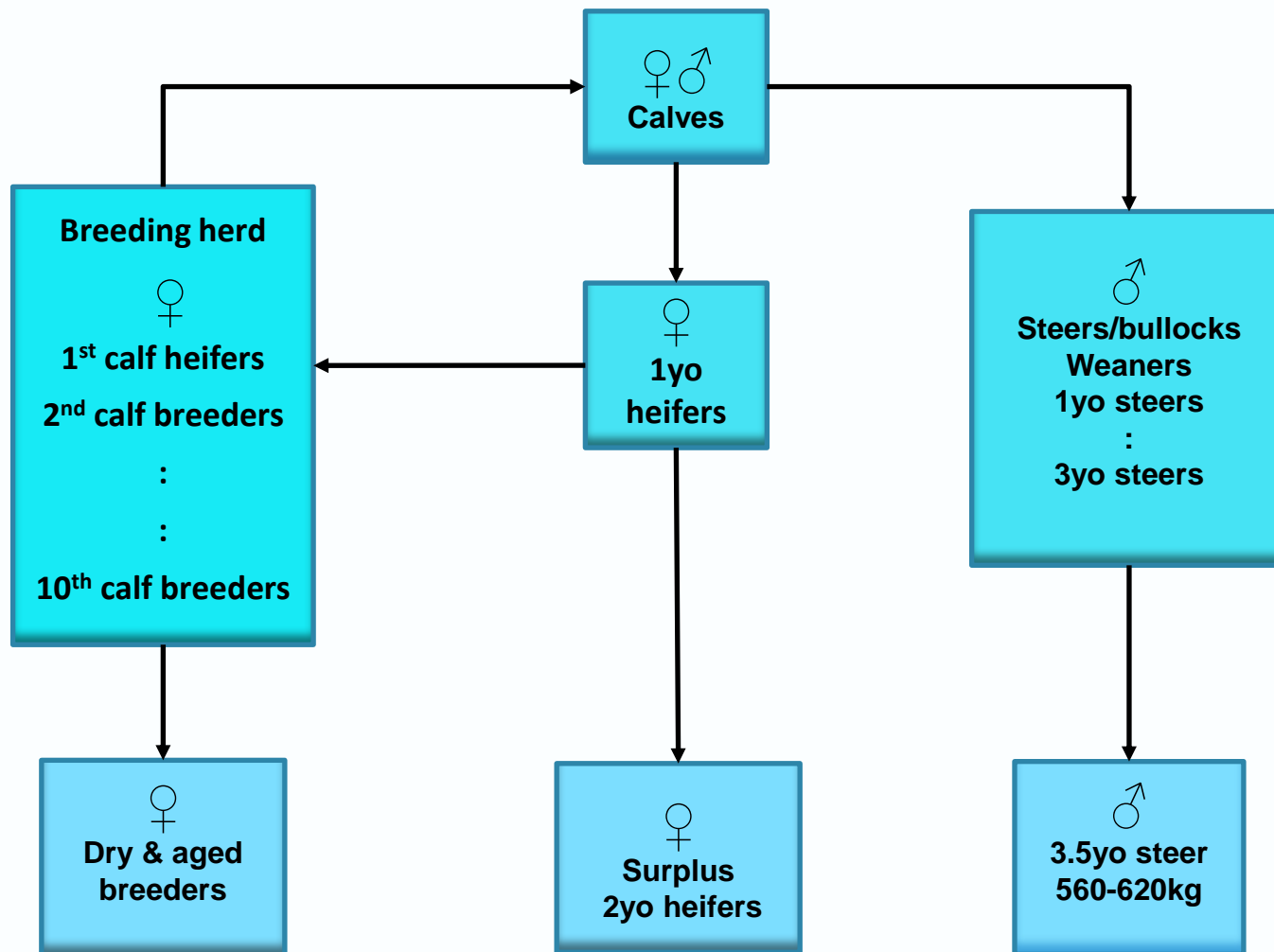
Baseline:

- Holding size - 30,000ha
- Self-replacing Braham herd – 1,800 mixed age breeders
- Native pasture - turning off 42m heavy (Jap Ox) steers ~590kg/hd

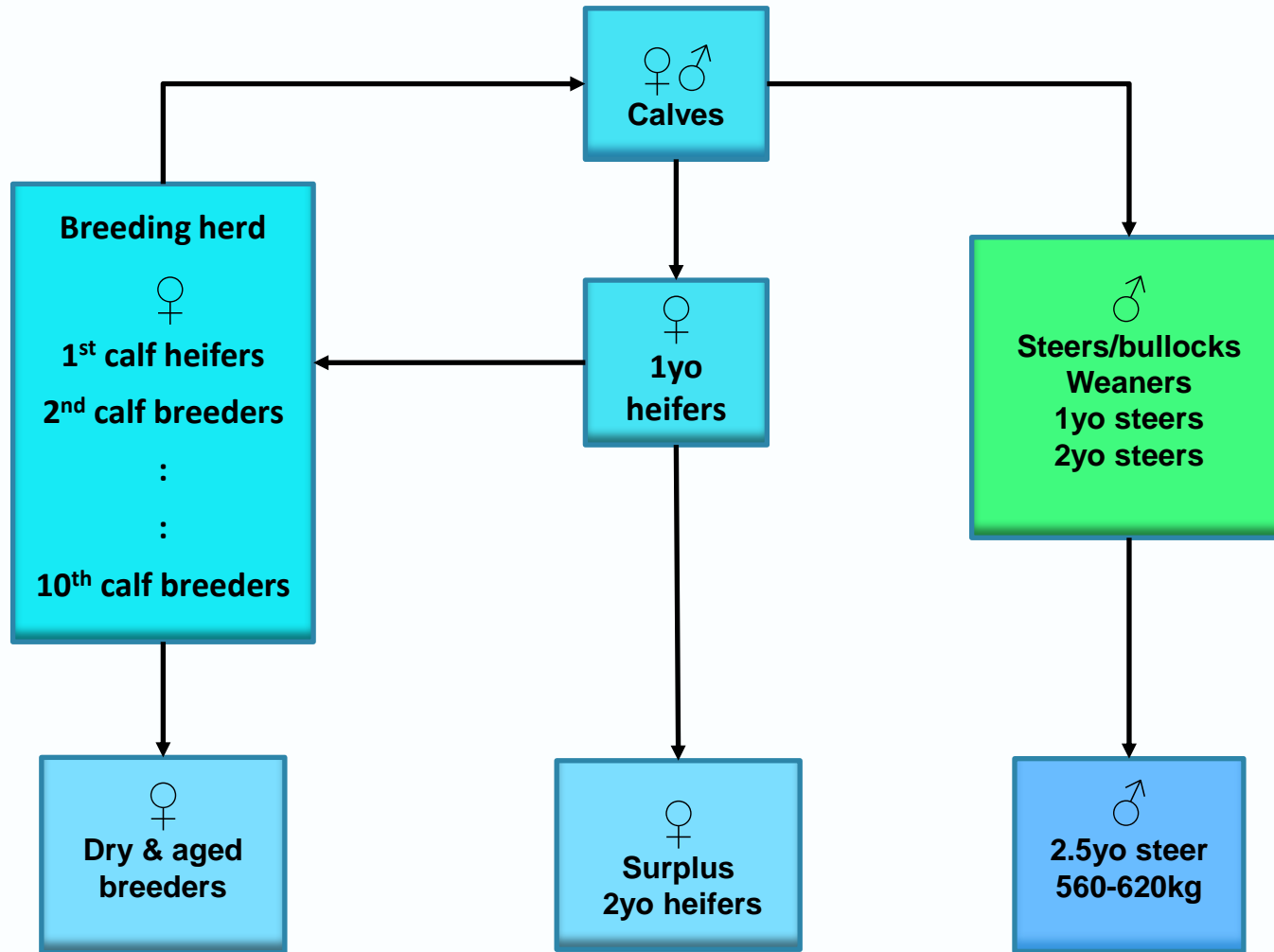
Irrigation scenario:

- 50ha pivot fed from local bore (reliable 80% of years)
- Bambatsi panic (perennial) fed to steers year around when ready
- Aim to turnoff steers ~590kg/hd @ ~30m
- Establishment cost ~ \$7,300/ha

Burdekin - baseline



Burdekin - scenario



Kimberley

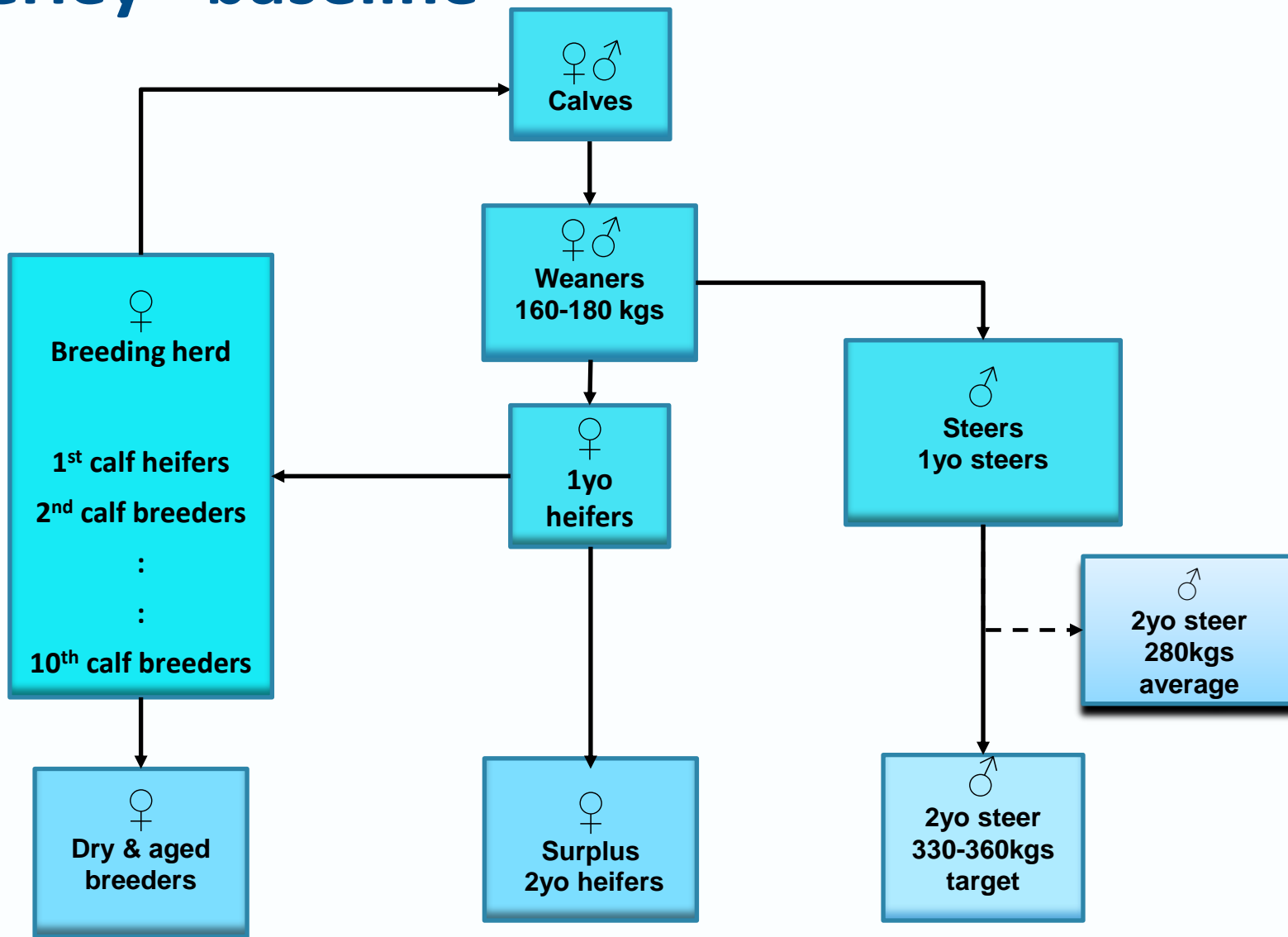
Baseline:

- Holding size - 2,800km²
- Self-replacing Braham herd - 11,000 mixed age breeders
- Wean at ~8m @ ~160-180kg/hd
- Native pasture - turning off 24m steers to live export ~350kg/hd
- But fail to meet target in 75% of years - sell 24m @ ~280/kg/hd

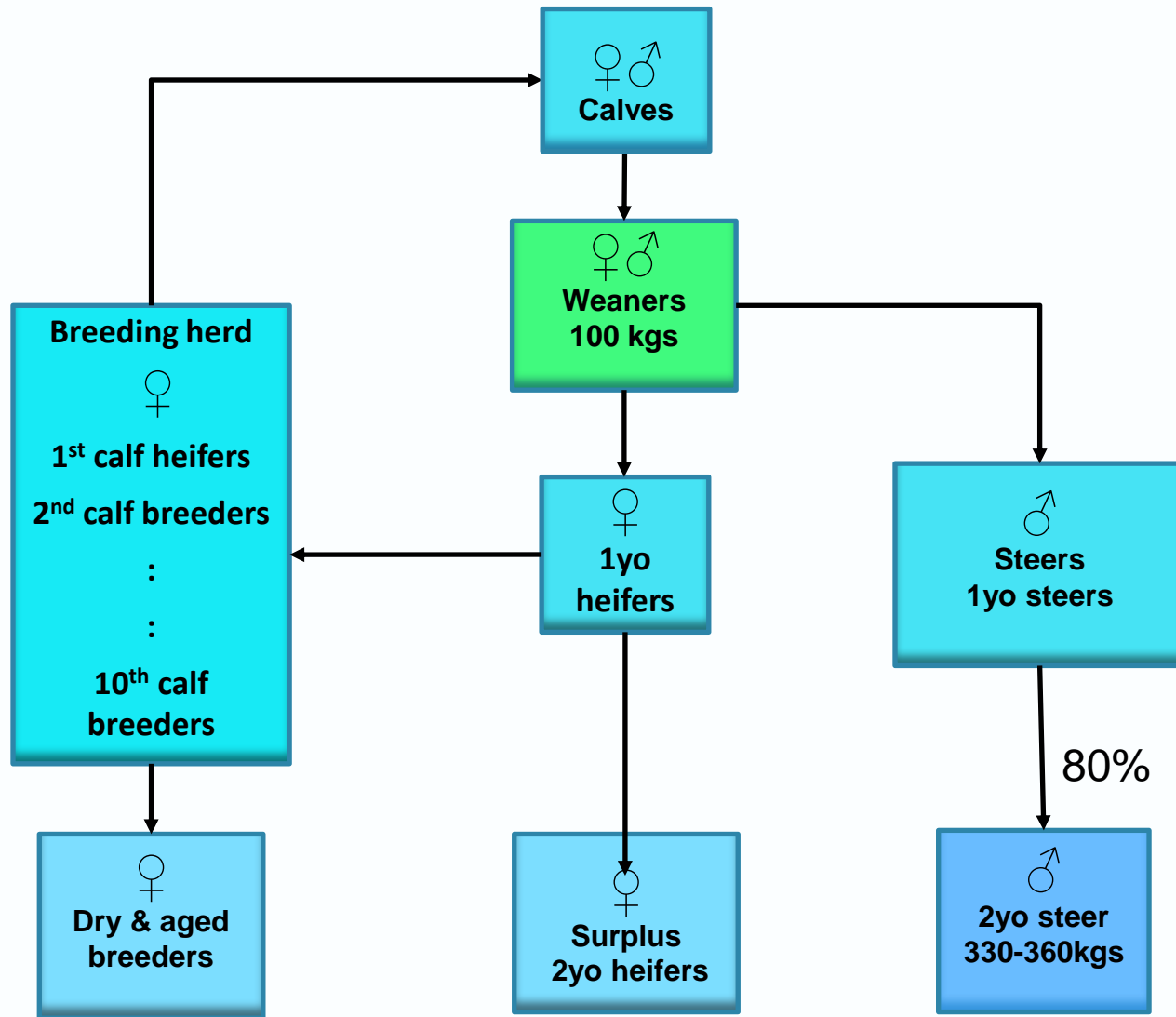
Irrigation scenario:

- 60ha pivot fed from local bore (reliable 80% of years)
- Bambatsi panic (perennial) fed to steers year around when ready
- Implement an early-weaning program (~100/kg/hd)
- Aim to turnoff 24m steers to live export @ ~350kg/hd (in 80% yrs)
- Establishment cost ~ \$7,300/ha

Kimberley - baseline



Kimberley - scenario



Results

	Barkly Tableland	Burdekin	Kimberley
<i>Baseline - nil irrigation</i>			
Total stock carried (AE)	26,774	2,867	10,876
Gross Margin/AE	\$114	\$122	\$62
Av. Net profit	\$1,643,763	\$155,406	\$25,867
Av. Turnoff liveweight/steer	303	535	276
<i>Irrigation development (80% reliability)</i>			
Irrigated crop	Lablab	Bambatsi	Bambatsi
Scale (ha)	550	50	60
Capital investment	\$4.7 million	\$422,750	\$507,300
Irrigation cost - annual operating	\$329,505	\$32,205	\$53,046
Total stock carried (AE)	31,502	2,644	11,248
Gross Margin/AE	\$137	\$182	\$81
Av. Net profit	\$2,595,958	\$257,295	\$229,249
Av. Turnoff liveweight (kg/steer)	583	585	349
Av. Return on investment	20%	24%	40%

\$1AUD ~ 9.2 Rand

Alternatives



Pasture development



Infrastructure



Cell grazing

Results

	Broadacre pasture development	Conversion to cell grazing	Water & fencing infrastructure
Region	Burdekin (Qld)	Fitzroy (Qld)	Barkly Tableland (NT)
Av. return on investment	24%	10%	21%
Study reference	Hunt <i>et al.</i> (2012)	Hall <i>et al.</i> (2011)	MacLeod <i>et al.</i> (2013)

Concluding remarks

- Northern beef industry needs productivity gains urgently
- Nutrition is a primary driver for productivity & market access
- Strategically feeding selected animals can exploit opportunities
- Mosaic irrigation offers technical scope to achieve that goal
- Projected returns vary across regions but are largely marginal
- Highest gain with perennial forage & shifting market targets

But:

- Alternative means to alter nutrition are available
- Projected returns from alternatives are largely comparable

Wait & see how actual field experience pans out



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Thank you