A comparison of the growth of cattle grazing buffel grass under two different grazing regimes: High intensity rotational grazing vs Continuous grazing.

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Introduction: This trial compared Intensive Rotational Grazing (IRG) to Continuous Grazing (CG) over 9 years at the Douglas Daly Research Farm (DRRF).

The aim was to examine the effects of IRG on cattle performance.

(Note - I am a cattle scientist, not a pasture scientist).

Wet season

Dry season

- At the time there was conflicting information from scientific studies and anecdotal reports from producers.
- We wanted to provide some objective information

Douglas Daly Research Farm. 230 km south of Darwin. 1200mm average rainfall.

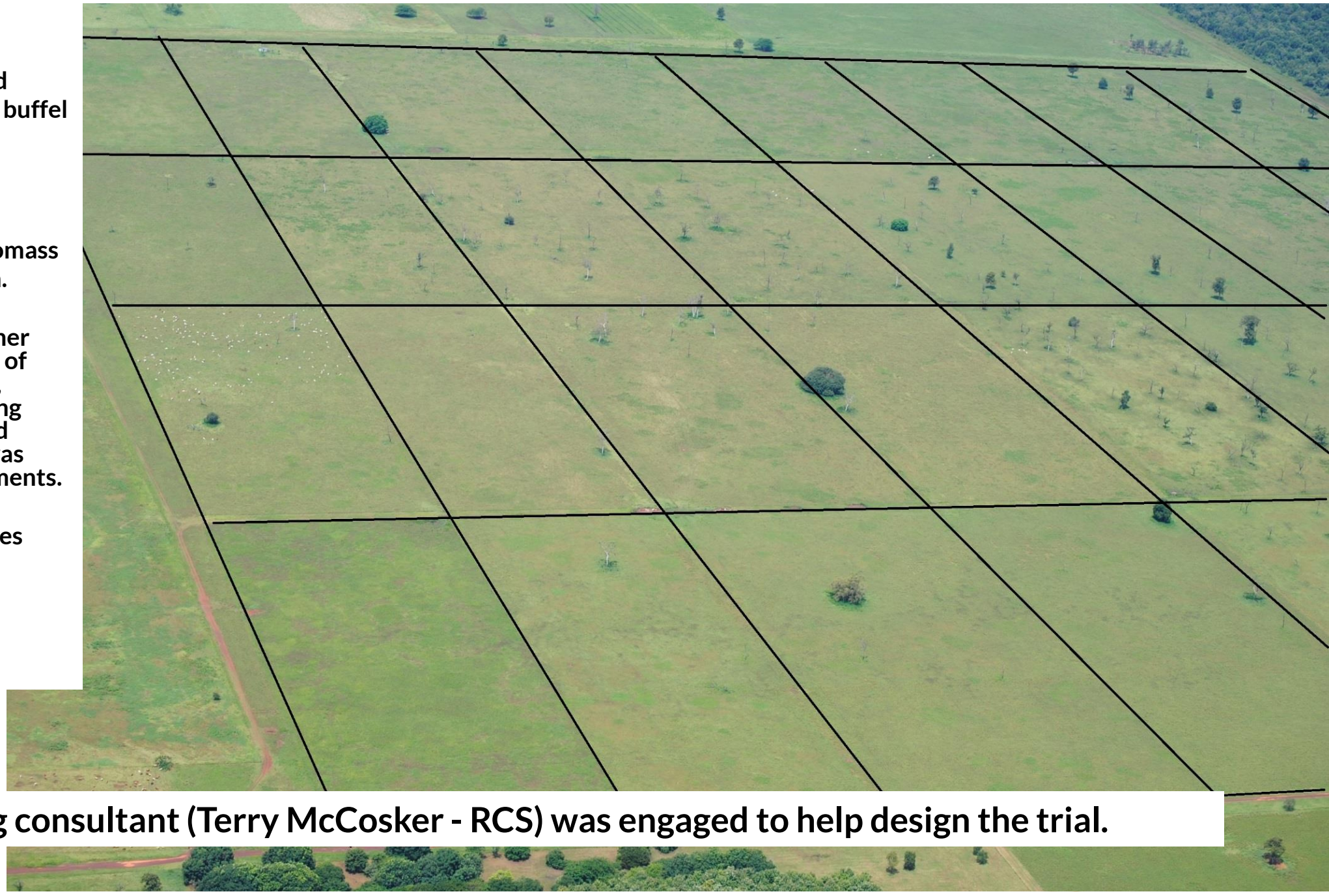
Method

Used an area at DDRF that had
32 x 6 ha paddocks of uniform buffel pasture.
Sandy red earth Blain soil.

Buffel grass made up:
80-95% of dry season total biomass
70-85% during the wet season.

The pasture included some other annual grasses, small amounts of Sabi and Whiteochloa grasses, Wynn cassia, and some invading weeds (mostly Sida, Hyptis and Crotalaria goreensis). There was little variation between treatments.

Average pasture mass estimates were:
3791 kg/ha in May
3226 kg/ha in October

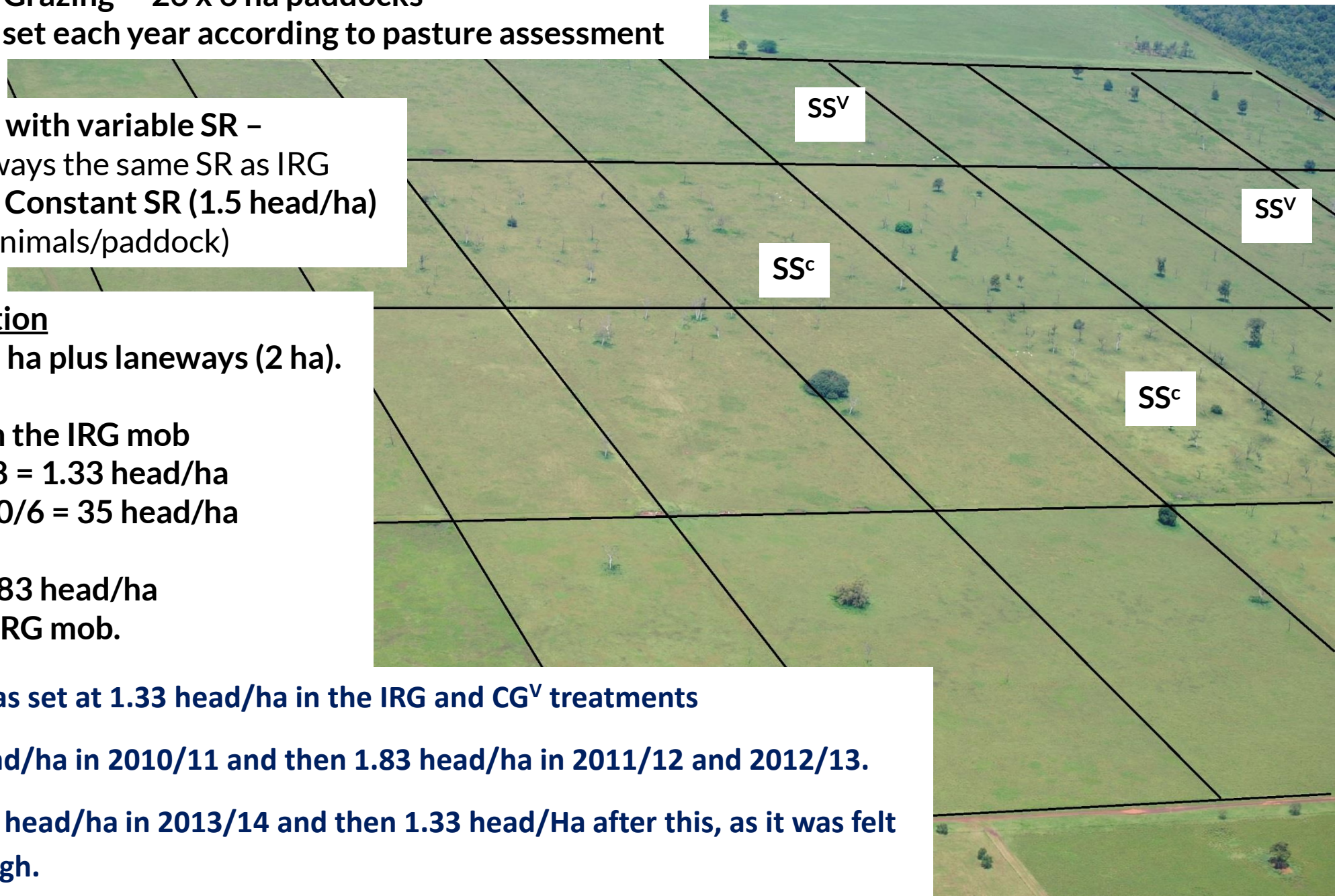


A rotational grazing consultant (Terry McCosker - RCS) was engaged to help design the trial.

3 Treatments for the first 6 years:

IRG : Intensive Rotational Grazing - 26 x 6 ha paddocks
- the stocking rate was set each year according to pasture assessment

CG^V : Continuous Grazing with variable SR –
3 x 6 ha paddocks. Always the same SR as IRG
CG^C : Continuous Grazing Constant SR (1.5 head/ha)
3 x 6 ha paddocks (9 animals/paddock)



IRG stocking rate calculation

26 x 6 ha paddocks = 156 ha plus laneways (2 ha).
Total area = 158 ha
Initially there were 210 in the IRG mob
SR in total area = 210/158 = 1.33 head/ha
SR in a 6 ha paddock = 210/6 = 35 head/ha

SR ranged from 1.33 to 1.83 head/ha
ie. 210 – 285 head in the IRG mob.

Initially the stocking rate was set at 1.33 head/ha in the IRG and CG^V treatments

It was increased to 1.67 head/ha in 2010/11 and then 1.83 head/ha in 2011/12 and 2012/13.

It was reduced back to 1.50 head/ha in 2013/14 and then 1.33 head/Ha after this, as it was felt the stocking rate was too high.

Generally the IRG group was moved to a new paddock: - every 2-3 days in the early wet season (Nov-Dec)
- daily during the mid to late wet season (Jan-March)
- every 3 days during the dry season (Apr-Oct)

(This was generally what happened but it varied a bit according to the manger's assessment of pasture)

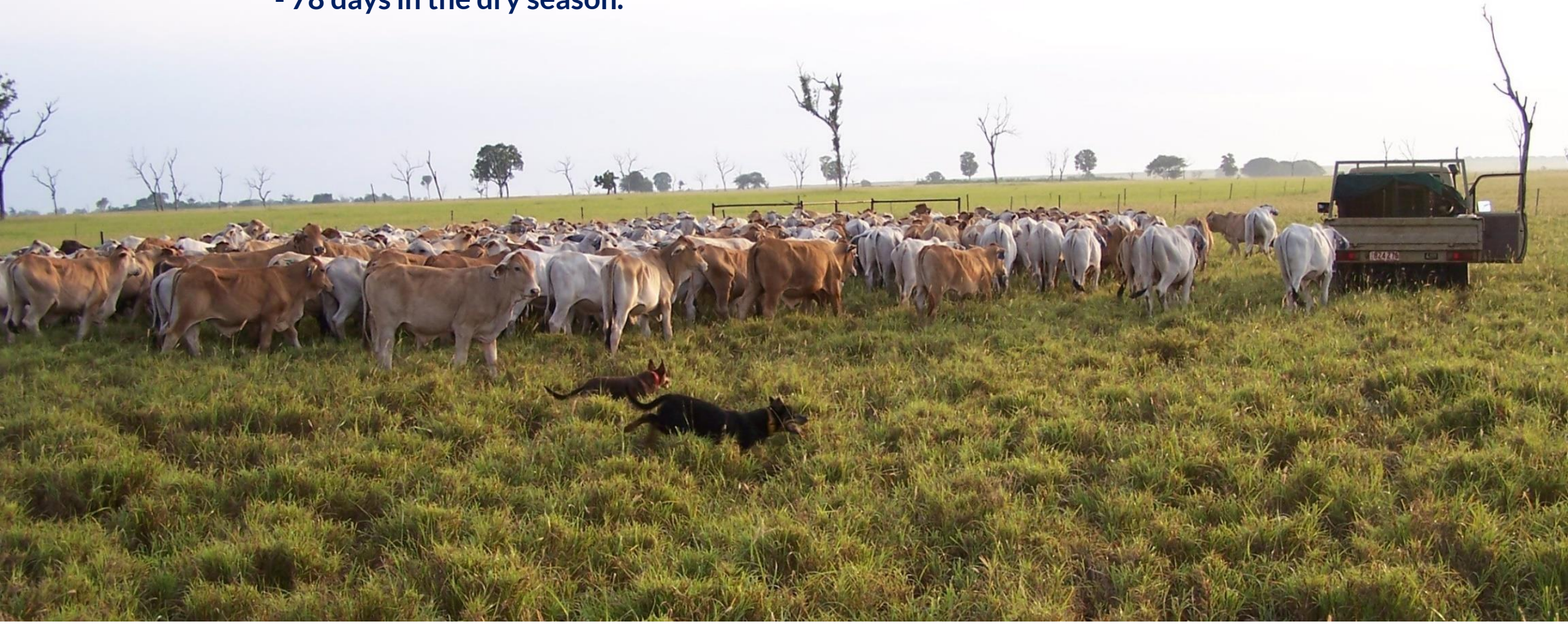
The cattle used were weaners that stayed in the trial for 1 year and then were replaced by the next year group of weaners. Eg. average start weight of 170 kg in July and finish at 310 kg in June the following year (+140 kg).

Randomly allocated, stratified by weight, so that the average weight of each treatment was similar (within 1 kg).

All paddock moves and stock handling were done by staff trained in low stress stock handling and with a good knowledge of stock psychology.

The number of rest days between grazes was usually:

- **60 days in the early wet season**
- **26 days in the mid to late wet season**
- **78 days in the dry season.**



The cattle were supplemented using Phosrite® lick blocks during the wet season and Uramol® blocks during the dry season. The IRG group lick blocks were put on a "sled" that could be moved with the mob each time they went to a new paddock.

Cattle were weighed following an overnight curfew 3 times a year (start, end of dry season and end of wet season), and a couple of other times during the year without a curfew.
Insecticidal fly tags were used during the wet season.
Paddocks were spot sprayed for weeds during the wet season (usually once).

Results: Published in a scientific journal: Animal Production Science

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In the paper we analysed liveweight gain data using Average Daily Gain (ADG) to account for slightly different lengths of time that cattle were in the trial each year.
In this presentation using Kg – very similar and easier to visualize.

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Effect of high-intensity rotational grazing on the growth of cattle grazing buffel pasture in the Northern Territory and on soil carbon sequestration

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Abstract

Context. Scientific and anecdotal reports conflict on the effects of intensive rotational grazing (IRG) on cattle growth, and very limited objective data are available from cattle grazing in northern Australia that producers can use to decide whether to adopt IRG.

Aims. This study aimed to compare liveweight gain and sequestration of soil organic carbon when cattle grazed buffel grass (*Cenchrus ciliaris* L.) under either continuous grazing (CG) or IRG.

Methods. In each year of this 9-year study, a cohort of Brahman and Brahman-cross weaners was randomly allocated to IRG and CG treatments. They grazed predominantly buffel pasture at Douglas Daly Research Farm from shortly after weaning for about a year, at which time they were replaced by the next year's group, and the average liveweight gains of the treatments over the post-weaning year were compared each year for 9 years. Soil organic carbon was measured in the topsoil (0–30 cm) twice each year for 5 years (2009–14) and changes in carbon stocks over time were compared between treatments.

Key results. In each year of this study, the growth of cattle grazing buffel pasture was lower under IRG than CG. In each year, liveweight gain was lower ($P < 0.05$) per head and per hectare under IRG. Topsoil soil organic carbon stocks did not increase in the IRG treatment over the 5 years of this study.

Conclusions. This study found that cattle growth, both per head and per hectare, was lower under IRG than CG, and that IRG did not result in any increase in soil organic carbon over time.

Implications. The lower per head and per area production from the IRG system, combined with the extra infrastructure and operating costs for IRG systems, make it unlikely that adoption of IRG would improve the profitability of cattle-grazing operations on similar pasture systems in northern Australia. However, the findings of this study may not apply to other pasture systems and environments.

Additional keywords: cattle growth.

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Results from first 6 years

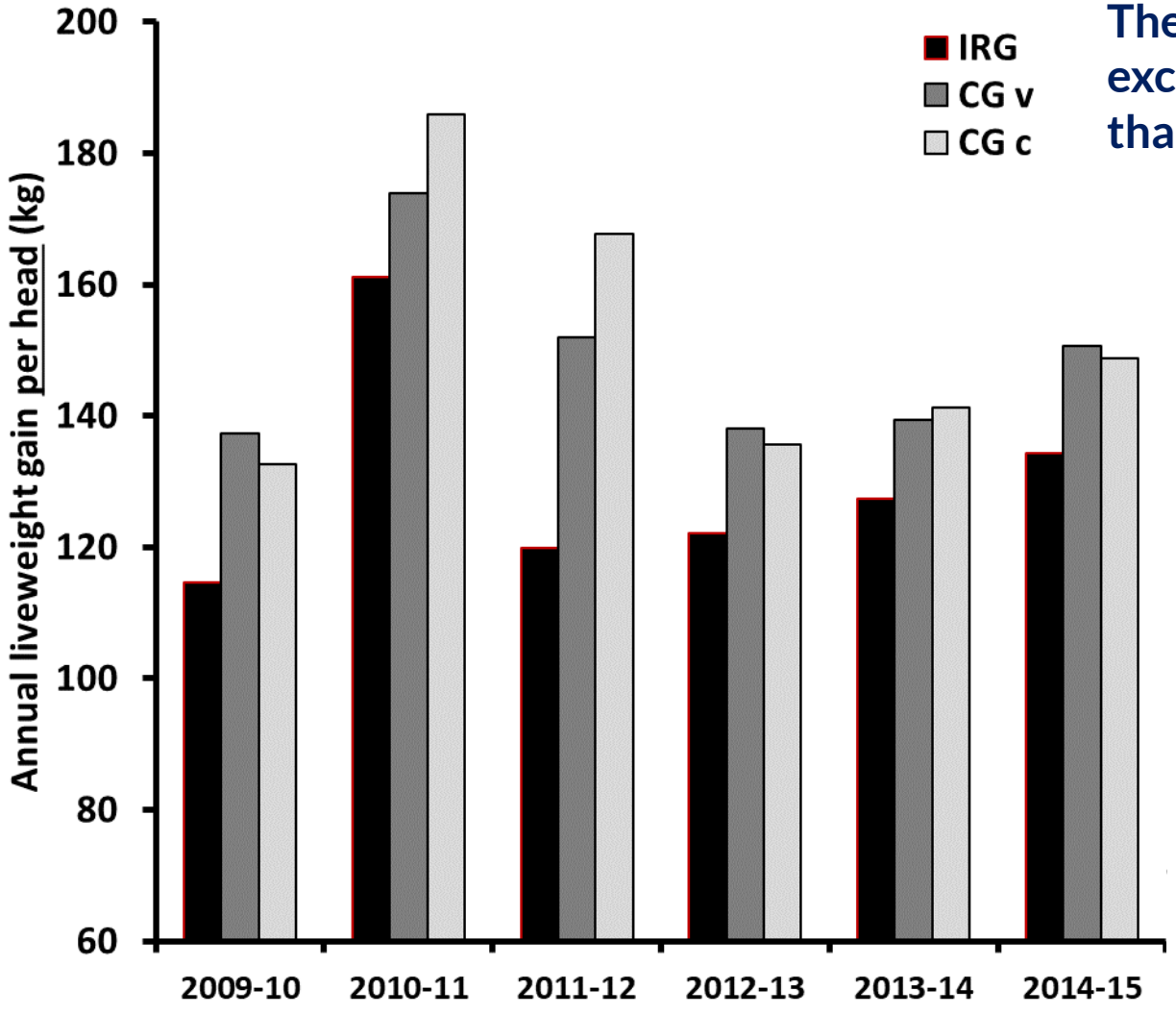
In each year LWG was lower in IRG than both CG^C and CG^V - both per head and per hectare

LWG was always highest:

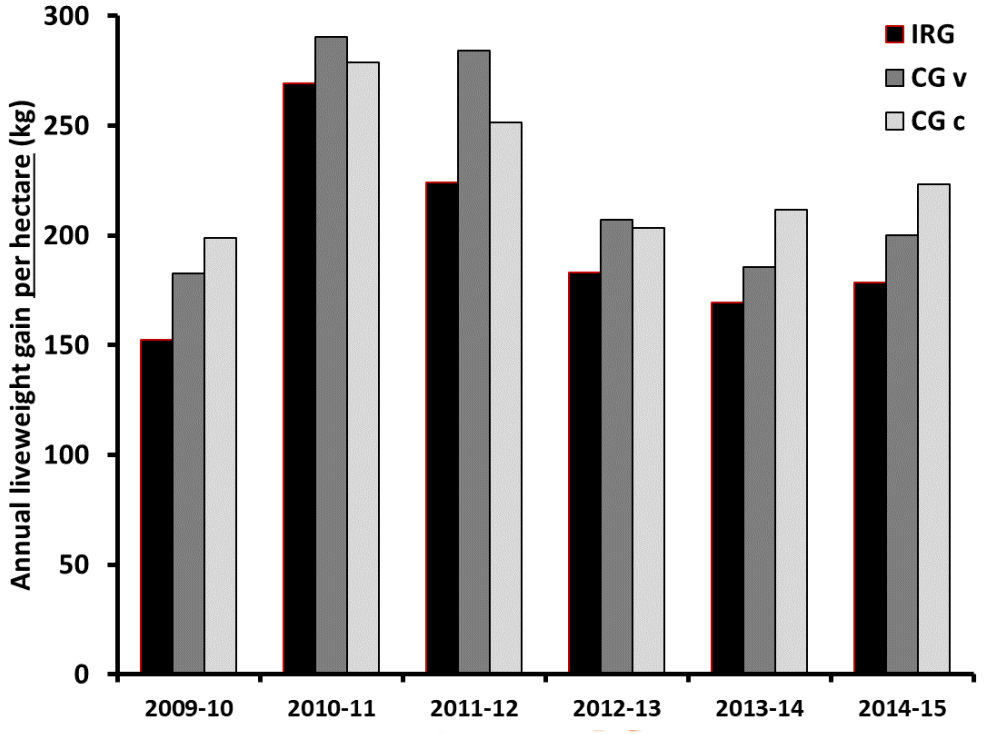
- per head in the CG treatment with the lowest SR.
- per ha in the CG treatment with the highest SR.

The differences were significant ($P < 0.05$) in every year except for 2013–14, when IRG was significantly lower than CG^C but not CG^V

Annual average liveweight gain per head.



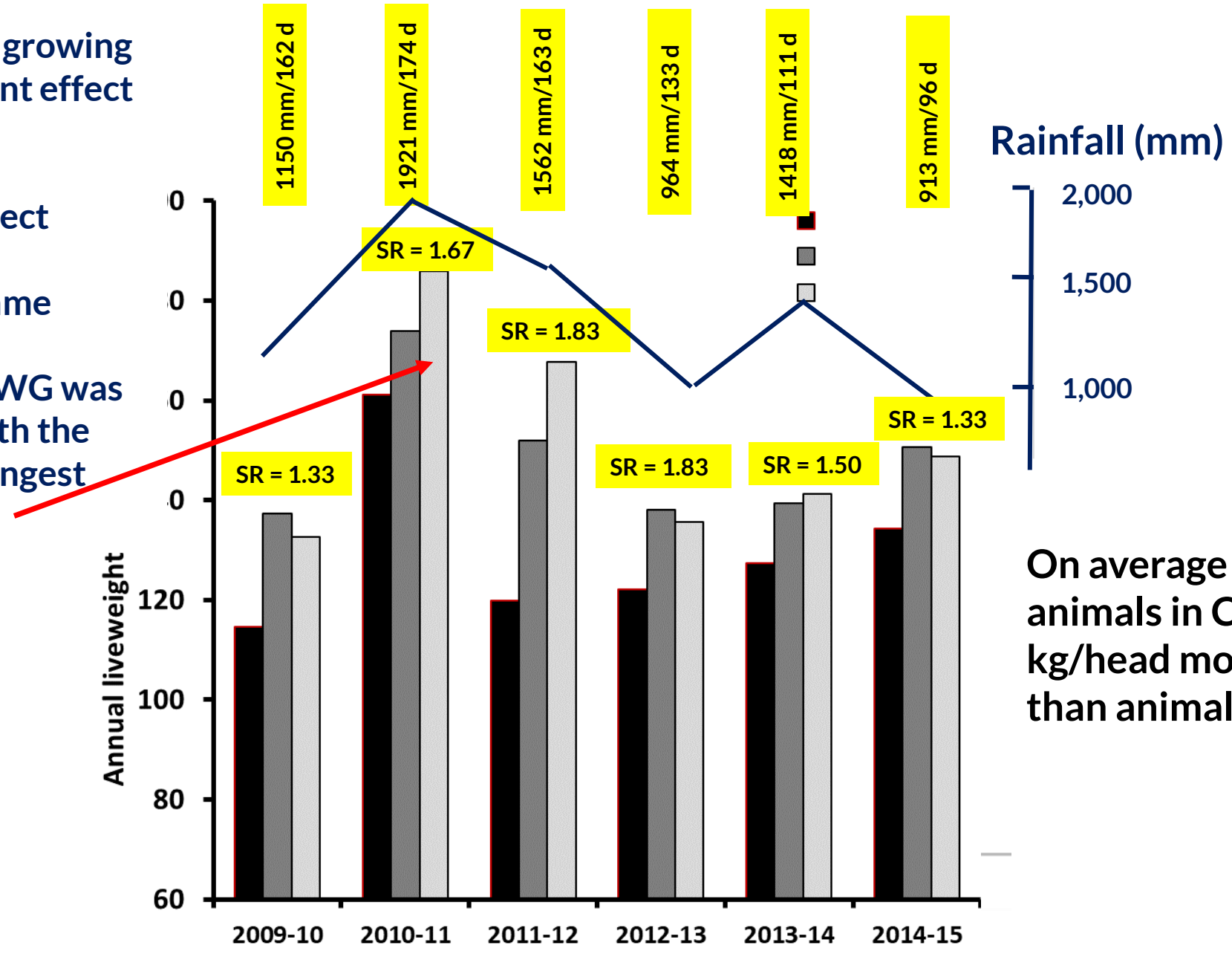
Annual average liveweight gain per hectare.



Annual average liveweight gain per head.

Rainfall and length of growing season had a significant effect on annual LWG.

Best to look at the effect in CG ^{c} ▭ as SR remained the same each year.
As expected annual LWG was highest in the year with the highest rainfall and longest growing season



On average over the 6 years animals in CG^{v} gained 22.1 kg/head more each year than animals in IRG.

After 6 years we evaluated the project and after discussion with the consultant, decided to make some changes which were implemented for the next 3 years (mid 2015 to mid 2018):

The CG^C treatment was discontinued and the 3 x 6 ha paddocks plus another 33 ha paddock were added to IRG.

This had the effect of increasing the number of paddocks in IRG to 30 and the number of rest days between grazes to around

- 70 days in the early wet season
- 35 days in the mid to late wet season
- 105 days in the dry season.

<u>The 2 treatments were now:</u>

IRG : 29 x 6 ha and 1 x 33 ha paddocks (total area = 207 ha)

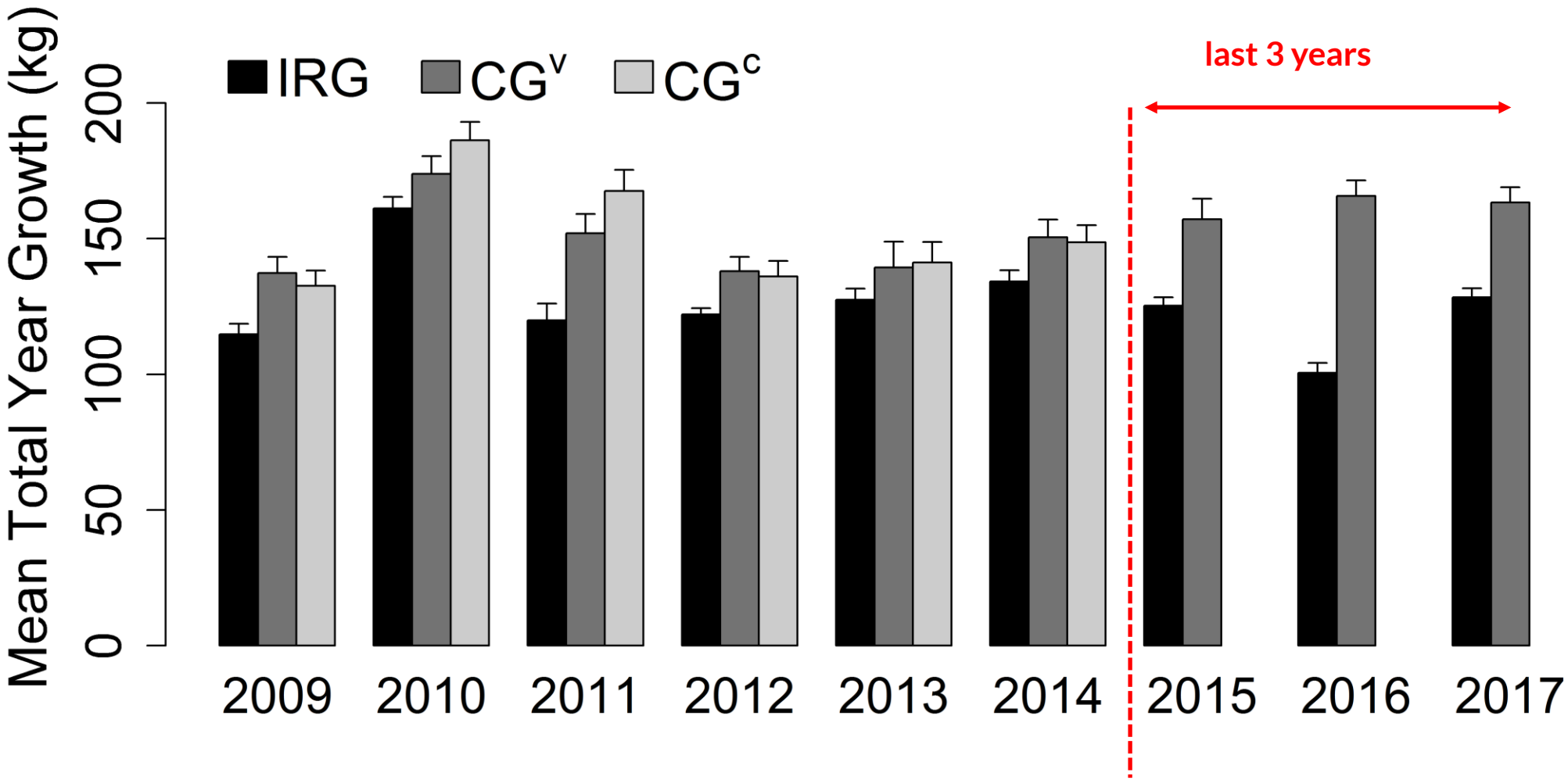
CG^V : 3 x 6 ha paddocks.

The stocking rate (SR) was mostly the same in CG^V as IRG, although in the last 2 years the SR was lower in IRG especially in the dry season – Aimed for more commercially relevant management ie. Turn off heavy steers in March as they approached the export limit and lighten the SR during the dry season

Results - In the last 3 yrs LWG continued to be lowest per head and per ha in IRG ($P<0.05$)

- The differences between treatments were actually greater in the last 3 years than in the previous 6 years.

- The average difference in total year LWG per head between the IRG and CG^V was:
  +22.1 kg over the first 6 years and +44.0 kg over the last 3 years



Summary: In every year, for 9 years, LWG was lower in IRG than CG.

How do these results compare to other studies?

Briske *et al.* (2008) reviewed 28 studies (mostly in the USA and southern Africa) and found that livestock production both per head and per hectare under CG was greater than or equal to that under rotational grazing in 93% of the studies where the stocking rate was the same in both treatments.

McIvor (2013) reviewed 29 comparisons of CG and cell grazing (a form of IRG) that were published in peer-reviewed journals and stated that the review confirmed the conclusion of Briske *et al.* (2008) that plant and animal production under continuous grazing are equal to or greater than those under rotational grazing.

O'Reagain and Turner (1992) reviewed over 50 studies in southern Africa and concluded that continuous and rotational stocking differed little in terms of their effects on livestock production or range condition.

Hall *et al.* (2016) found that diet quality was higher during the pasture-growing period in continuously grazed pastures. They compared the effects of different grazing methods (including IRG) at 9 sites over 4 years in Qld and found no consistent differences between stocking methods for herbage mass, plant-species composition, total and litter cover.

Dowling *et al.* (2005) conducted studies at 5 locations in south-eastern Australia over 6 years and found no benefit from multi-paddock rotational grazing over CG for maintaining favourable botanic composition.

The scientific literature is pretty consistent…… but why does it differ from the differ from the experiences of many commercial cattle producers who have found cell grazing (a form of IRG) to be beneficial?

The production benefits noted by some producers when they have changed from CG in large paddocks to IRG in smaller paddocks may be due to reduced paddock size rather than rotational grazing.

In northern Australia it is common for large numbers of cattle to graze large paddocks continuously with few water points, which leads to overgrazing around the water points and cattle having to walk increasingly larger distances between water and pasture as the dry season progresses. Reducing paddock size overcomes this effect.

Hart et al. (1993) stated that reduced paddock size and distance to water may be responsible for the purported benefits of intensive, time-controlled rotational grazing systems, and they found that cattle LWG was not significantly different under rotational or CG where the paddock size was the same but that performance was better under both of these grazing regimes than when cattle grazed in bigger paddocks.

McCosker (2000) - most of the scientific studies did not implement cell grazing properly with regard to grazing period, rest period, overall stocking rate (number of animals in the total area being grazed) and stocking density (number of animals in individual paddocks while they are being grazed).

We tried to overcome these issues by employing him to provide advice on designing and implementing the IRG treatment.

Just to clarify: I am not anti rotational grazing or cell grazing. I am just a scientist who went into this study with an open mind and am reporting the results that we found.

I think that rotational grazing is a good grazing strategy for some situations: eg. I have a trial at DDRF where we are using intensive rotational grazing to control gamba grass, keep it short and palatable and improve cattle production - it is giving a win:win outcome for the environment and cattle producers.

But the findings of this study were pretty clear:
In every year, for 9 years, LWG was lower in IRG than CG.

"We always got our pen of steers for the show from the CG treatment"

<u>Acknowledgements</u>

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