# Can livestock have a long-term role in no-till cropping systems?

James Fisher,  Peter Tozer & Doug Abrecht

PRT Consulting

# Can livestock have a long-term role in no-till cropping systems?

Yes

# What is the 'fit' of livestock? It depends...

# Key Messages

- Livestock are an important source of farm diversification and risk management
- Negative impacts of livestock, especially on soil structure and surface cover may be balanced by benefits in weed control, diversification, biodiversity and nutrient cycling
- Nutrient redistribution to livestock camps is likely overestimated
- Adaptation through rotational grazing or livestock removal/agistment can improve integration

# The Issue

- Mixed farming across Australia's grainbelts
- Intensification of cropping in recent decades
- Further benefits from no-till from:
  - e.g. full stubble retention, disc openers, precision cropping and controlled-traffic
- Renewed interest in livestock's value
  - risk management, escalating crop input costs, climate variability and improved meat prices
- What is the 'fit' of livestock with highly developed, no-tillage cropping systems?

# Review

- Scientific review
  - scientific papers, reports, technical bulletins
- Focus groups
  - five workshops (4–12 people/workshop) across the southern Australian wheatbelt (Kojonup and Northam (WA), Osborne (NSW), Birchip (Vic.) and Riverton (SA)
- Economic analysis
  - data from 12 case studies

# Trade-offs

| Aspect | Positive/Negative |
|---|---|
| Ground cover | + Utilisation/ management of stubble<br>- Removal of ground cover, trampling, erosion risk |
| Soil compaction | + Compaction shallower and over smaller area than machinery<br>- Decreased pore space, increased bulk density, decreased infiltration, remoulding |
| Soil water | + Decreased recharge, lowering of water tables<br>- Drying of soil profile, decrease in crop yield (e.g. lucerne) |
| Nutrient cycling | + Supply of nitrogen, increased soil organic matter, increased biological activity<br>- Redistribution of nutrients to stock camps |
| Pest management | + Control of weeds, reduction of stubble and soil-borne diseases<br>- Redistribution or burial of weed seeds, reduction in beneficial species |
| Biodiversity | + Build-up of organic carbon, greater biodiversity compared with crop<br>- Decreased species abundance and diversity |

# Trade-offs

| Aspect | Options |
|---|---|
| Ground cover | Address feed gaps & **maintain ground cover** (options such as perennial pastures, summer fodder crops or dual-purpose crops)<br>**Ensure summer cover levels** above 50 per cent (1 t/ha DM stubbles or 750 kg/ha for dry pastures)<br>Grazing management or removal of stock to **maintain ground cover** |
| Soil compaction | **Prioritise maintenance of pasture cover** in grazing management decisions |
| Soil water | Integration of perennial pastures and crops— current options largely restricted to high rainfall areas |
| Nutrient cycling | Employ **more intensive grazing management** (e.g. rotational grazing) to control livestock nutrient deposits<br>Include a wider range of pasture plants in the diet or use feed supplements to modify grazing patterns |
| Pest management | Uphold crop hygiene including withholding periods of up to 10 days (re-distribution of weed seeds)<br>**Control seed-set with grazing** (possibly in combination with burning of chaff dumps)<br>Employ good husbandry practices (e.g. shearing prior to seed-set)<br>**Monitor timing and intensity of grazing** to minimise impacts on beneficial species (esp. invertebrates) |
| Biodiversity | Maintain native perennial grasses in pastures (productivity, water use, biodiversity benefits)<br>Target use of P fertiliser (soil tests)<br>**Reduce inputs and grazing intensity** in areas inhabited by high-value native grassland; maintain connected habitats (e.g. linked shelterbelts)—encourages beneficial predatory species |

# Experience

- Since 1990s livestock decreased from 40–60% to 0–30%
- Proportion expected to remain low or decrease further in the next ten years
- Not complete removal of livestock (for most)

# Experience

- Farmers with fewer livestock (or none)
  - general cropping focus & efficiency of cropping
  - need to maintain cover
  - concerns over erosion and other factors (e.g. labour, mulesing, emissions trading)
  - manage risk with different crops, marketing and possibly different times of planting

# Experience

- Mixed system
  - focussed on diversity of enterprises and spreading risk
  - relative profitability and viability of grazed pasture compared with crop legumes is an important factor keeping livestock in the system
  - enables retention of full-time staff
  - use of non-cropping paddocks

# Some quotes

"I got rid of sheep because of soil erosion. Compaction is also a big issue; sheep pads become bogs."

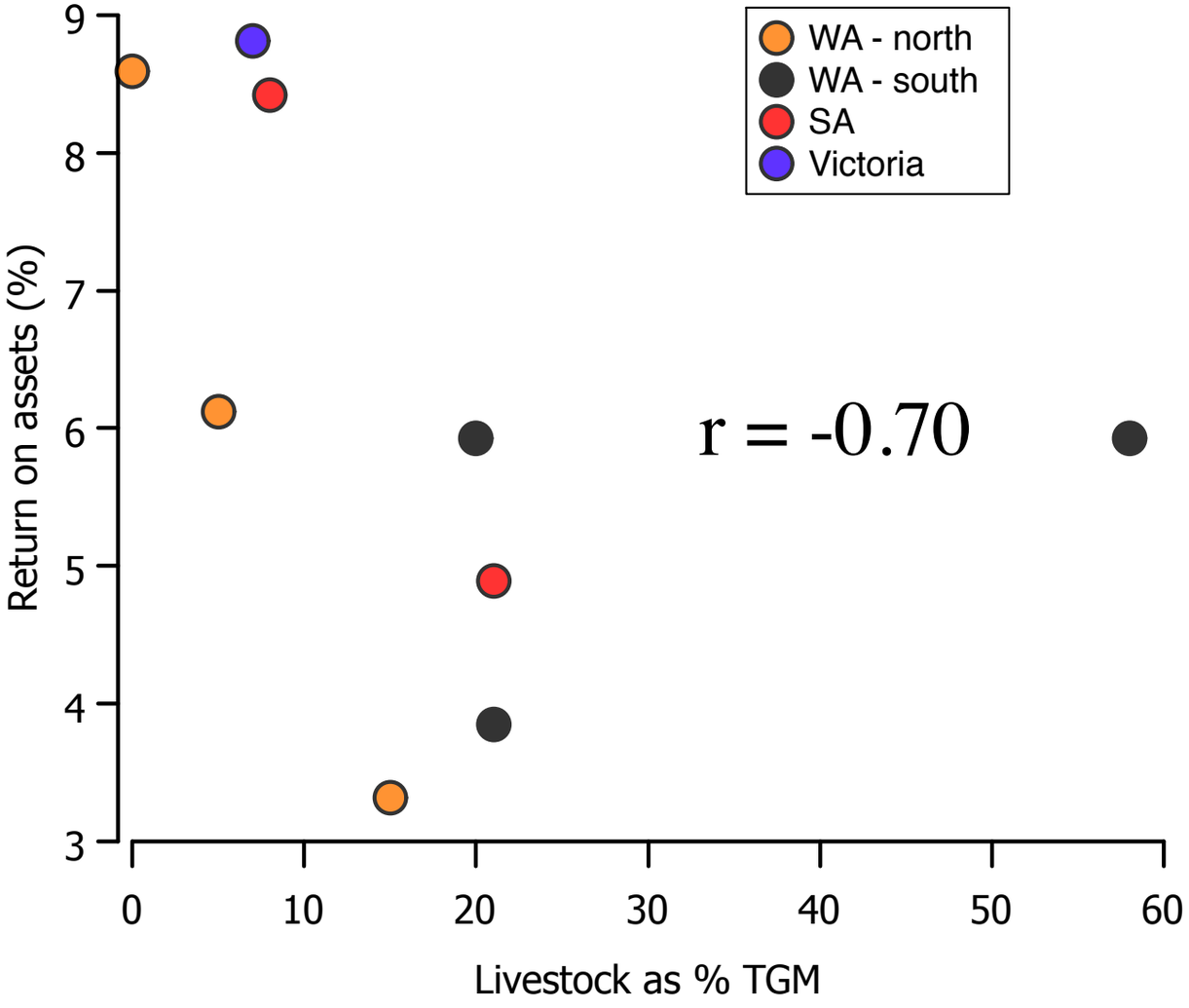
"Sheep fix the country so that you can grow a crop again!"

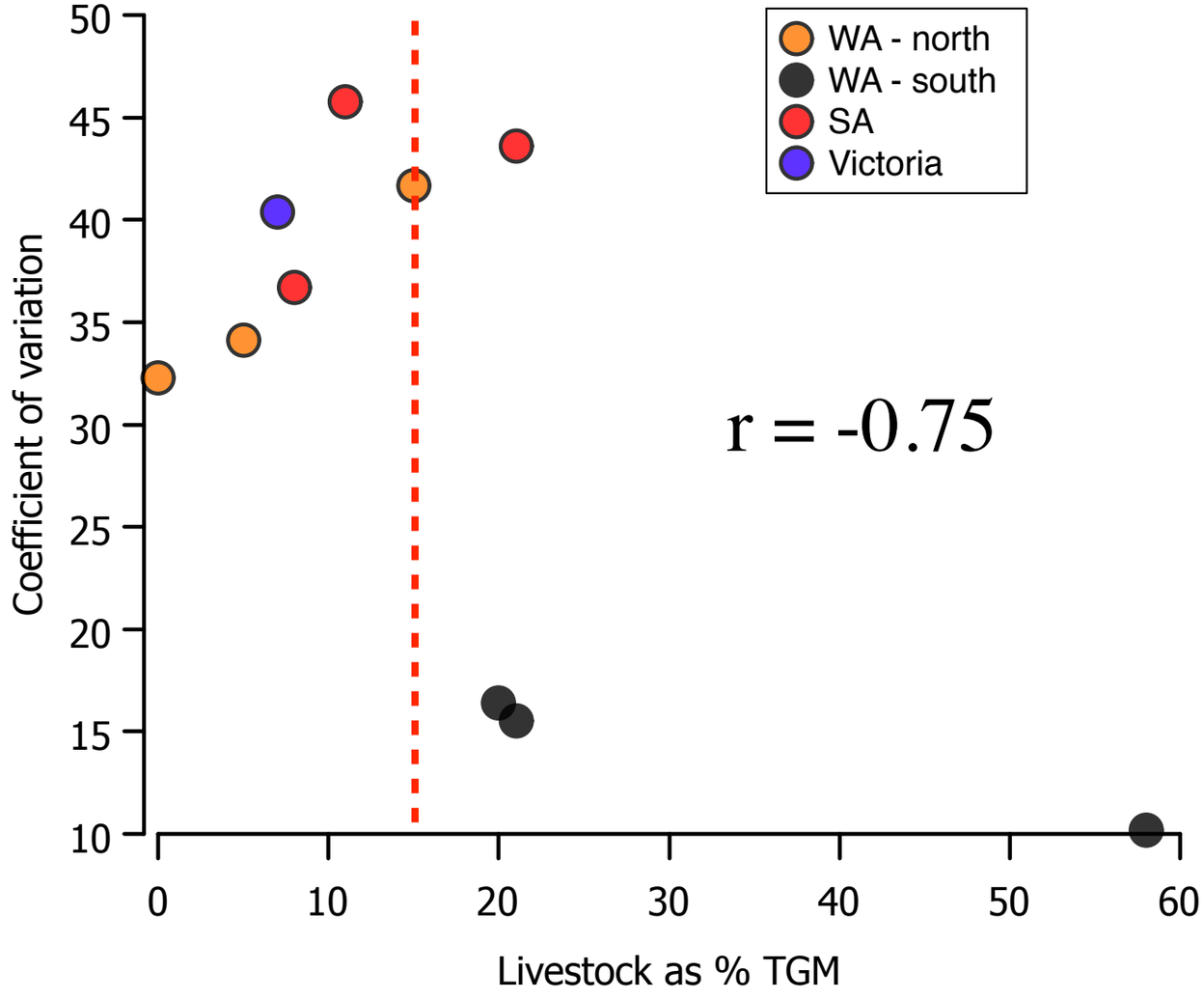
"Crop converts a lot more water into money than sheep"

"You will always make more money from cropping in a good year, but you cannot afford to sell machinery in a bad year while you can trade stock"

# Economics

- Case study data
  - consultants from four regions (northern and southern wheatbelt WA, SA and western Vic.)
  - information regarding three farming systems in their area
  - calibrated a whole farm budget for ten of the farms
  - 10 000 iterations of each around pessimistic, optimistic and ‘expected’ prices and costs


WA - north
WA - south
SA
Victoria
r = -0.70
Return on assets (%)
9
8
7
6
5
4
3
0
10
20
30
40
50
60
Livestock as % TGM


WA - north
WA - south
SA
Victoria
r = -0.75
Coefficient of variation
50
45
40
35
30
25
20
15
10
0
10
20
30
40
50
60
Livestock as % TGM

# Conclusion

- Livestock **may** be combined with no-till cropping systems
- 'Fit' of livestock determined by:
  - the productive capacity of the land
  - relative profitability of cropping and livestock,
  - the management of herbicide-resistant weeds
  - sensitivity of soil to damage from grazing and trampling
  - farmer's passion, preference
  - willingness to apply increased management to livestock

"Part of the problem is the tendency for people analysing the system to place people in one or other pigeon hole. Just as with any population, there is a mix in the approach taken by growers."

# Acknowledgements


- Focus group participants
- Local contacts
- David Beurle
- Consultants who contributed case studies
- Various authors, researchers workers and supporters of the research used

GRDC
Grains
Research &
Development
Corporation

Curtin University


Full report available from GRDC website

Department of Agriculture and Food

GOVERNMENT OF WESTERN AUSTRALIA

GRDC Grains Research & Development Corporation

# CROP updates 2011