



PROMOTING EVIDENCE-BASED RESEARCH AND PUBLIC POLICY

Drought and drought adaptations in the Karoo, 2012-2019

Beatrice Conradie

2022 National Congress of the Wool Growers' Association

Gqeberha

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Funding: Karoo Management Panel

R144,252



R260,404



Progress 2012 –

- 112 farms
- Unbalanced panel of 428 observations
- 11 journal articles
- 12 reports in popular press
- **24** talks to industry stakeholders and farmers

Expectations and Recommendations



Food and Agriculture Organization
of the United Nations

FAO's expectations

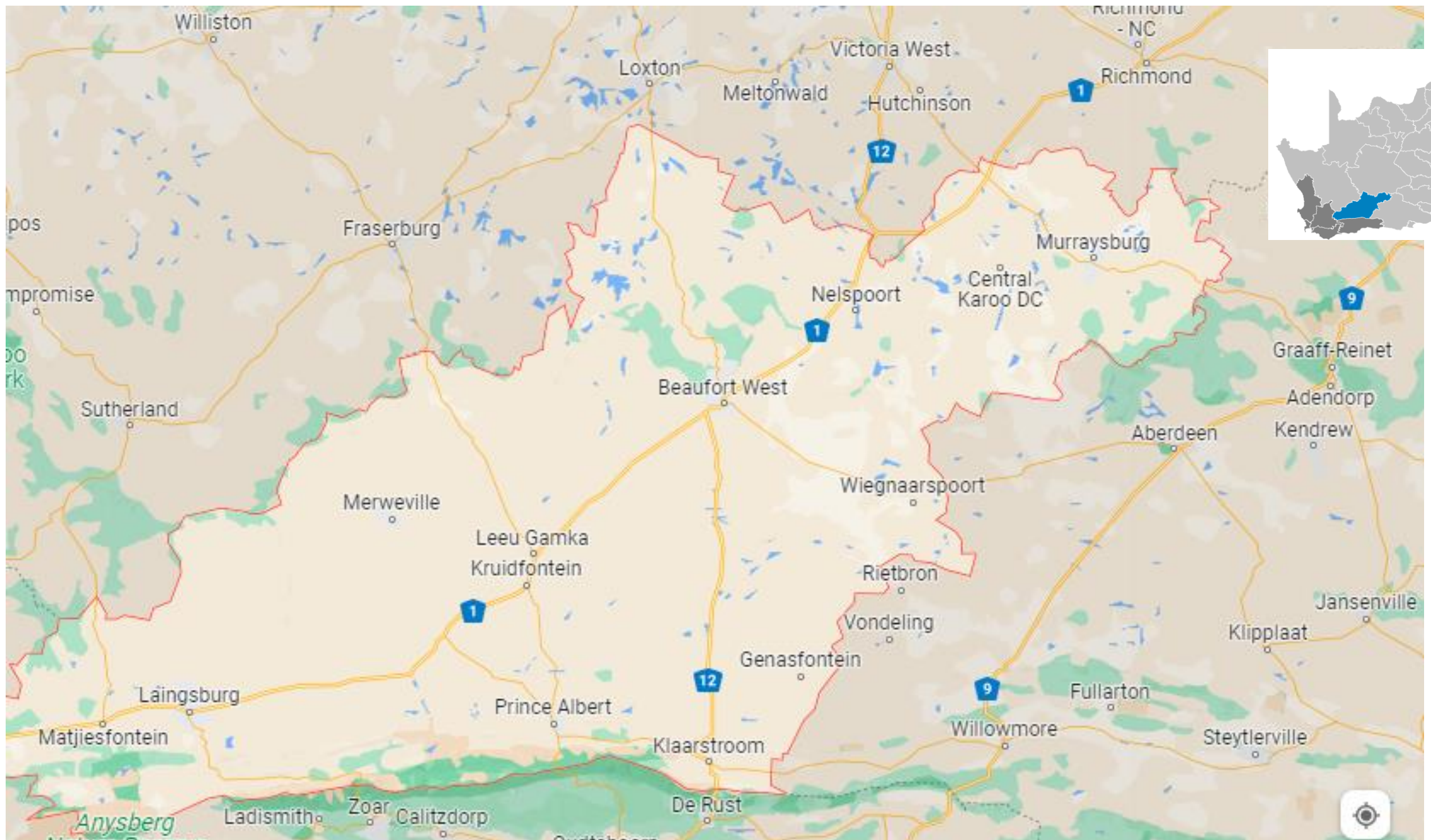
Agricultural system	Location	Climate change type	Sensitivity	Adaptive capacity	Options
Highlands	Himalayas, Central America, Rift Valley, Ethiopian plateau, Southern Africa	<u>Rainfall variability</u> , <u>droughts</u> , floods	High : mostly rainfed agriculture, poor soil moisture capacity	Low : limited options, knowledge and resources	Watershed management and on-farm water storage
Semi-arid tropics	Smallholder farming in West, East and Southern Africa , Sahal, Horn of Africa	High temperatures, variable rainfall, droughts	High : crop and animals at risk of high temperature and droughts	Low : limited options, knowledge	On-farm water storage, increased productivity
Rangelands	Pastoral and grazing lands on fragile soils, Eastern and Southern Africa	<u>High temperatures</u> , <u>variable rainfall</u> , <u>droughts</u>	High sensitivity due to reliance on <u>biomass</u> and water for livestock	Low : limited options, knowledge	Better integration of water supply and grazing <u>land management</u> , <u>reduction</u> of livestock density

Specific recommendations

	Specific aspects	Data in Karoo Management Panel
Diversify livelihoods	Off-farm	Household income from off-farm jobs
	On-farm	Farm income from non-livestock enterprises
Make up for failing biomass	Raise feed cost	Feed cost in Rand / stock sheep
	Lower stocking rate	Stocking rate compared to norm of 36 ha/LSU
	Transhumance	Multiple non-adjacent cadastres
	Rotational grazing	
Protect animal welfare	Shade & cooling	
	Drinking water	
	Hardier flocks	% boer goats, Meat masters, Damaras in flock

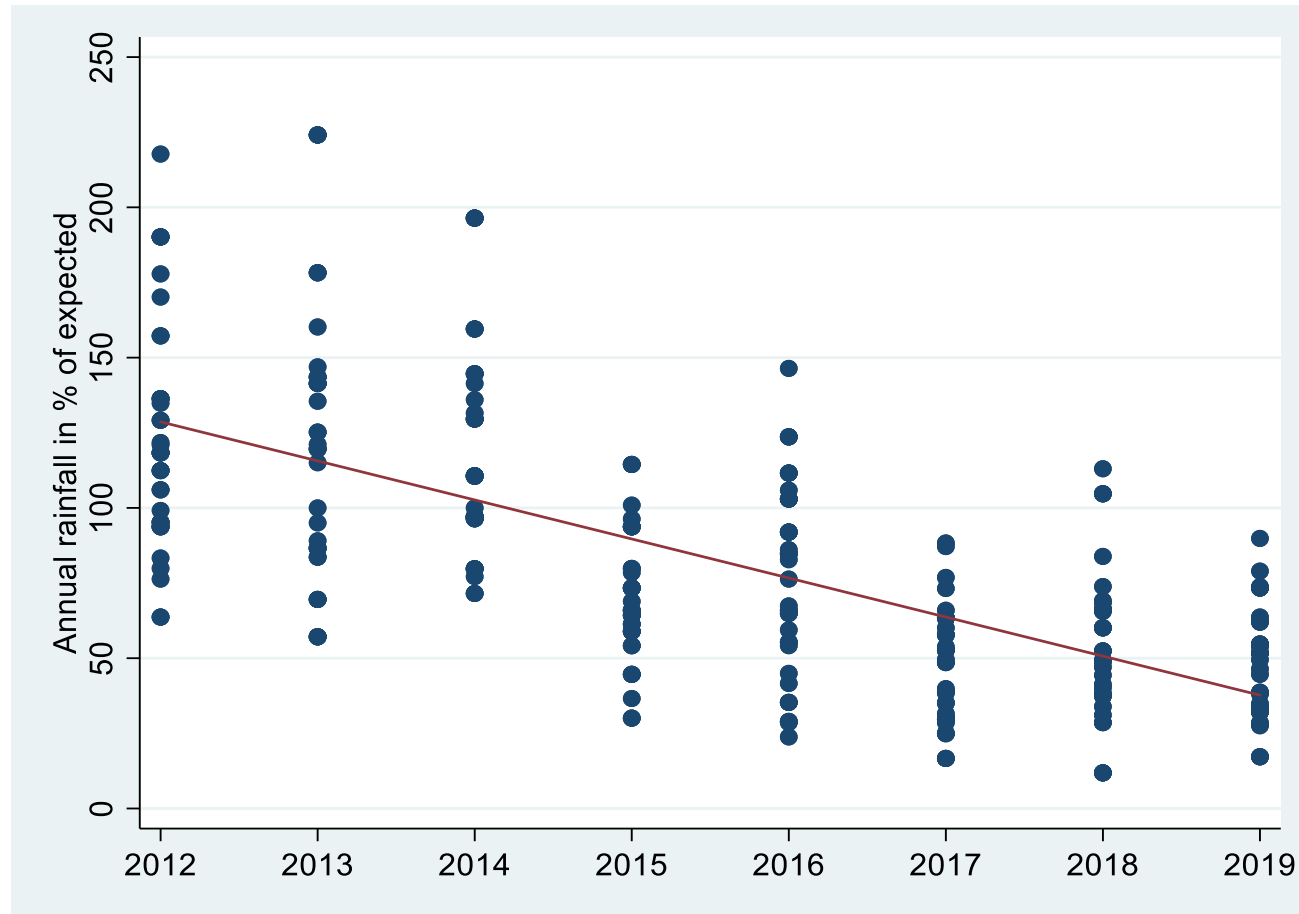
Drought in the Central Karoo



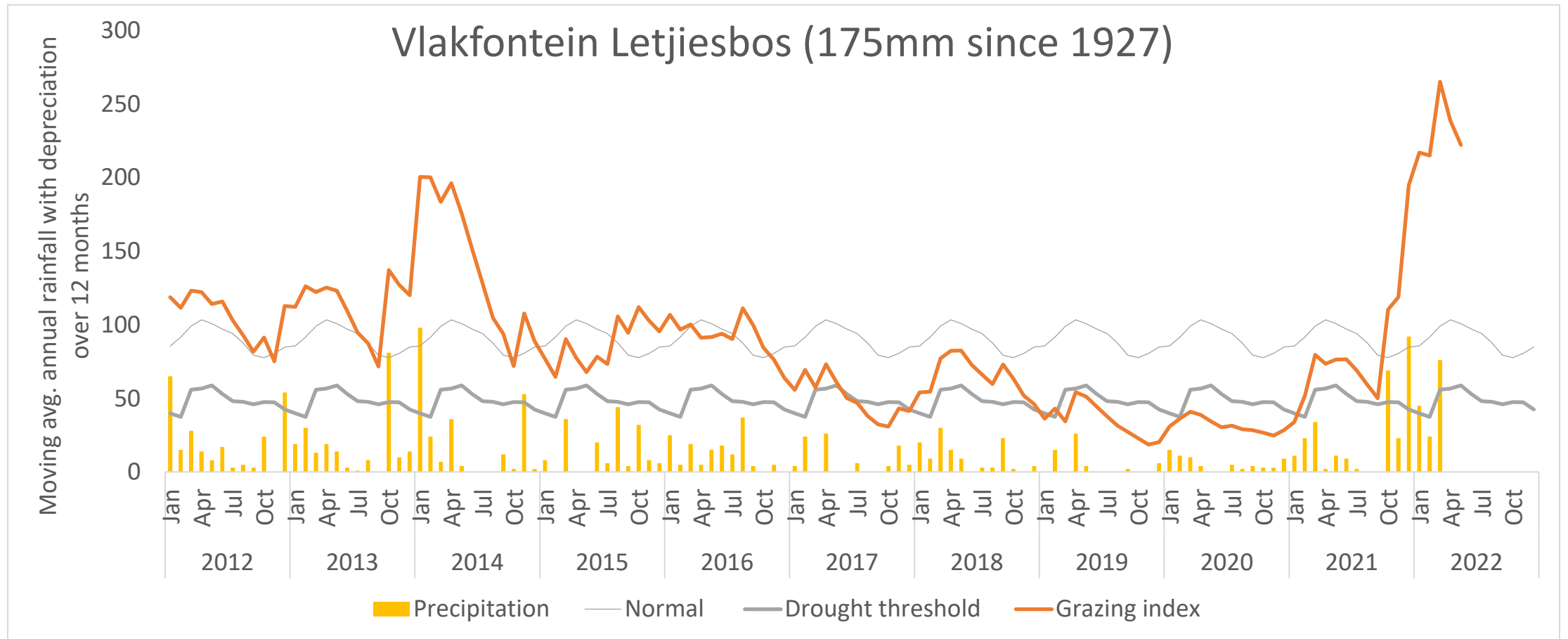


Farm-level rainfall as % of expected

Laingsburg 112 mm
Beaufort West 238 mm



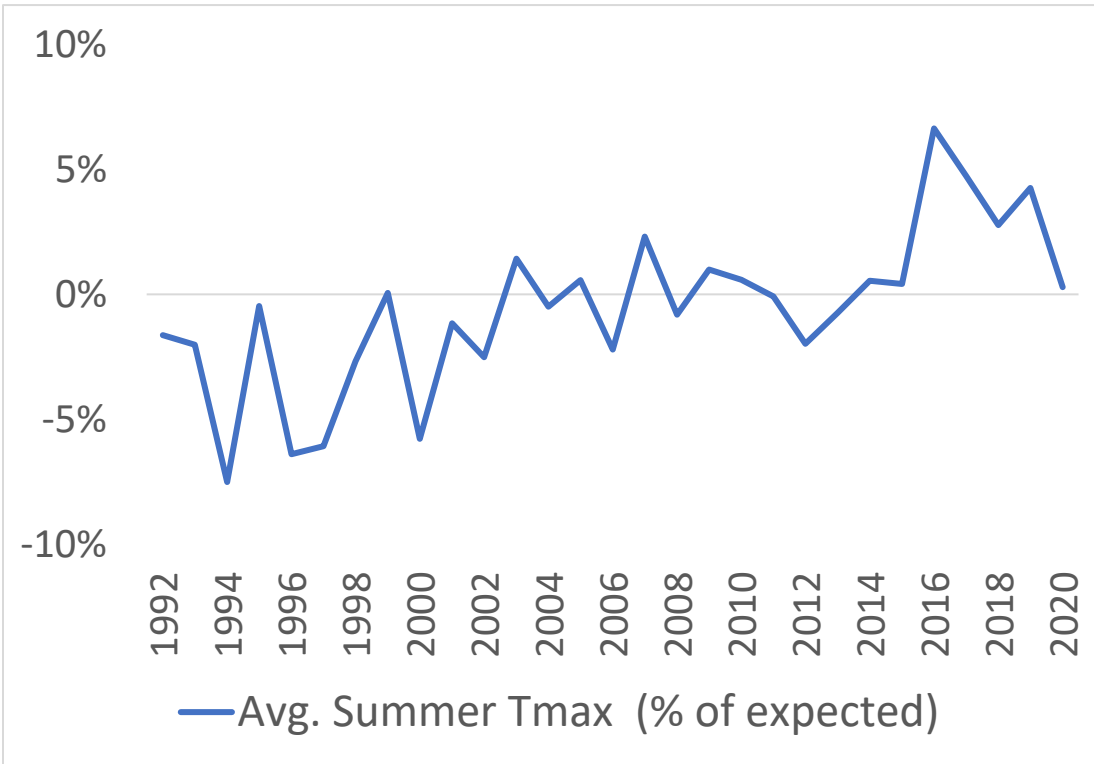
Typical grazing conditions



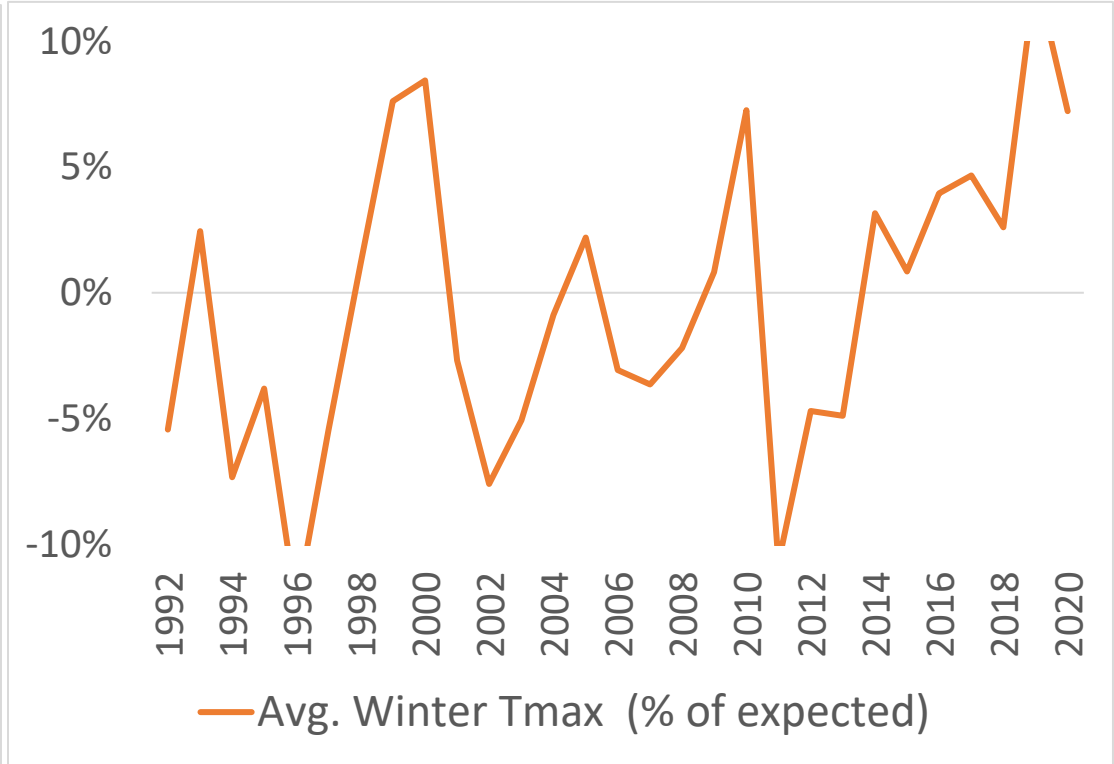


Avg. daily Tmax

Summer



Winter





Adapting to the Drought

40 farms x eight years

Adapting at the extensive margin

	Farms adapting (%)	
Recommendation	2012 – 2015	2016 – 2020
Diversify into off-farm employment	35	32
Diversify on-farm income	12	25
Introduce hardiness	21	26
Transhumance is possible (<i>trekboerdery</i>)	57	48
Buy feed	87	93
Stock below recommended rate	86	93

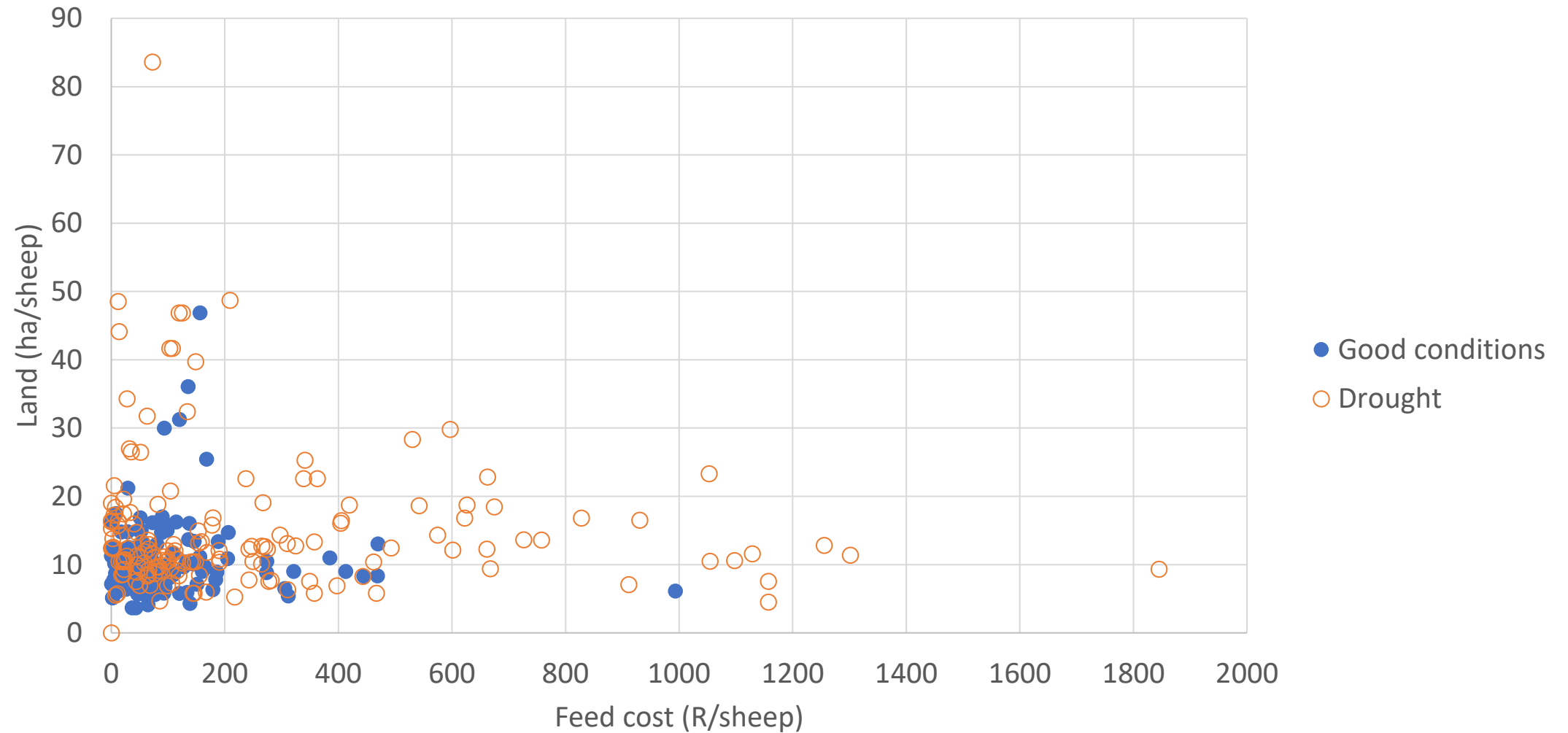
Statistically significant differences in red

Degree of adoption amongst adopters

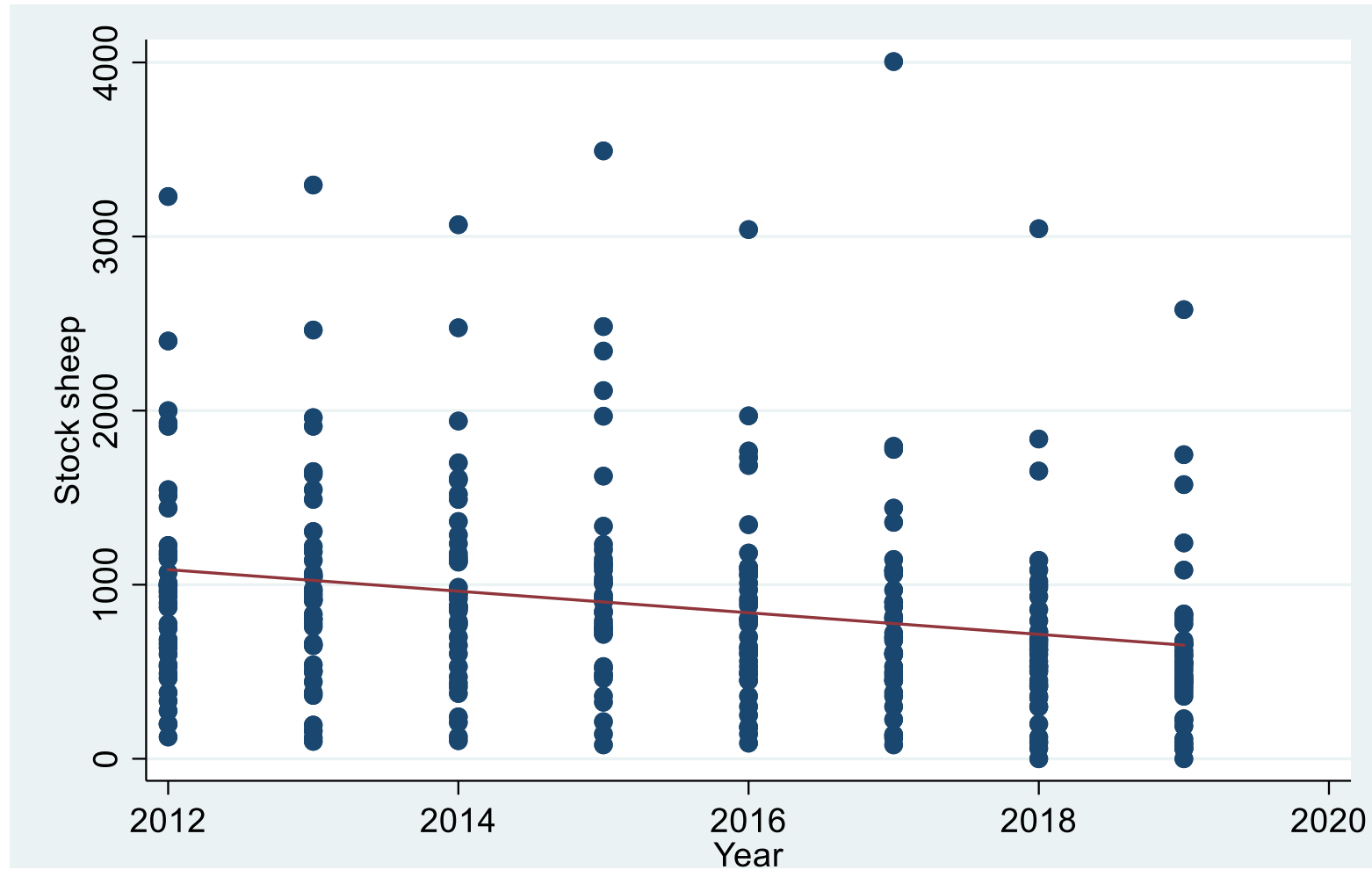
	Adopters only	
Measure of adoption	2012 – 2015	2016 – 2020
% household income from off-farm wages	49	68
% farm income from seed, hunting, wind energy	18	18
% hardy breeds in flock	23	38
Feed cost R/stock sheep	122	310
Stocking rate - % below official norm	37	52

Statistically significant differences in red

Trade-offs along veld-feed axis



Stock sheep



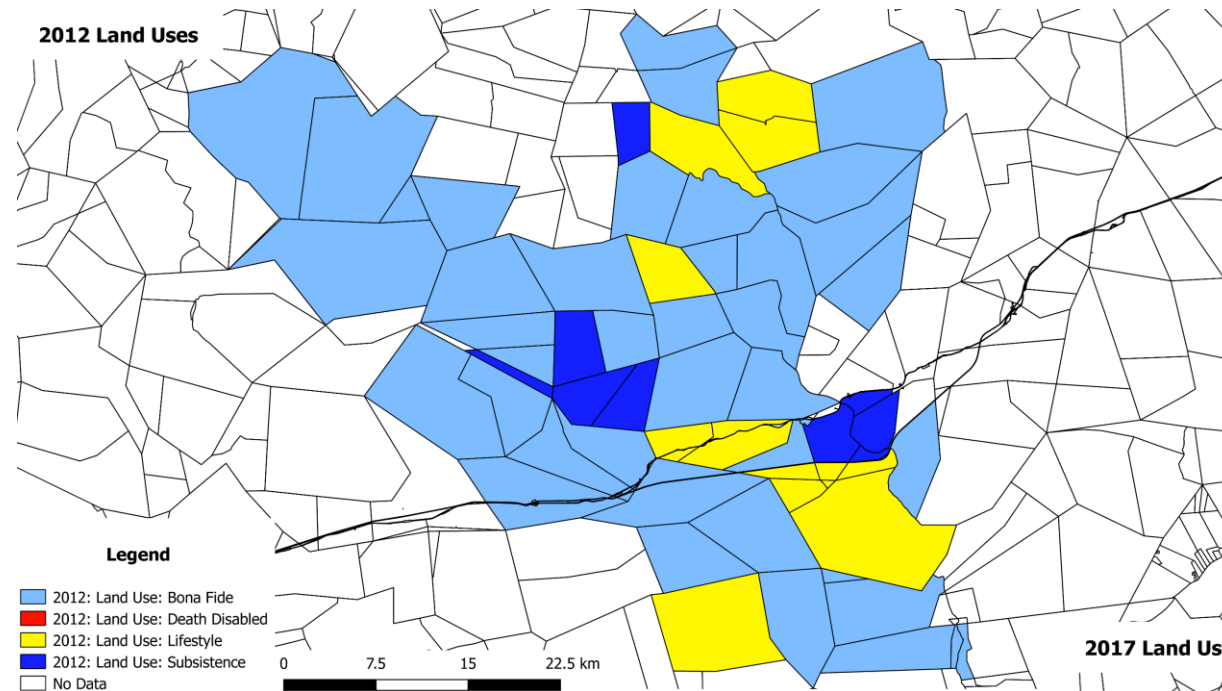
Evolving feed strategies of the big spenders

	12	13	14	21	27	32	47	48	56	69	86
2012											
2013		F		F							
2014		F									
2015		F		F		F					
2016		F		F		F		F			
2017		F	F	F			F	F	F	F	
2018	F	F	F	F	F	F				F	
2019	F	F	F	F	F	F	F	F		F	F

- R450 – R2000 per stock sheep per year
(avg. value = R782; median value = R618 per sheep / year)
- In Williston feeders produce and raise slaughter lambs R755 per stock sheep per year



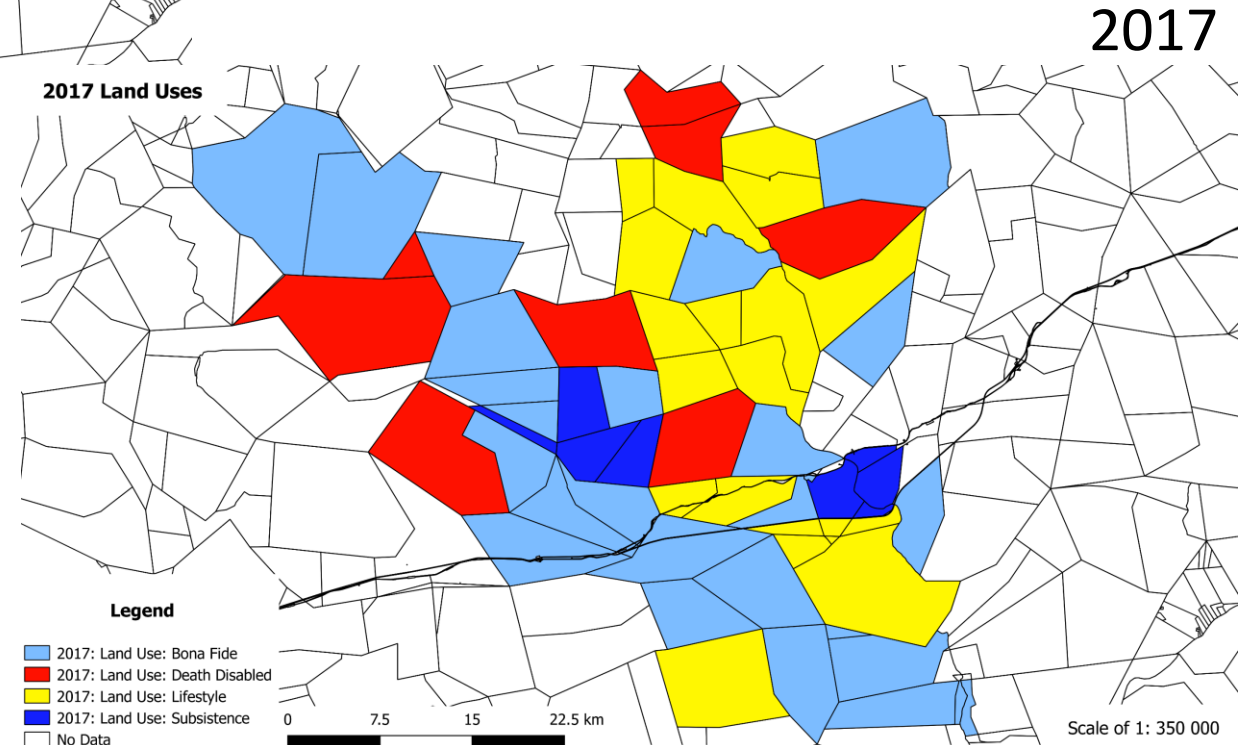
To survive is to feed



2012

Legend

- 2017: Land Use: Bona Fide
- 2017: Land Use: Death Disabled
- 2017: Land Use: Lifestyle
- 2017: Land Use: Subsistence
- No Data



2017

Financial implications of feeding

R/stock sheep	Drought		Normal conditions	
	Control	Feeders	Control	Feeders
Gross revenue	719	1147	693	818
Feed	116	608	73	194
Other direct cost	297	568	309	444
Foreign factor cost (interest)	52	124	50	52
Total unit cost	465	1316	432	690
Net farm income	254	-142	261	128

Statistically significant differences in red

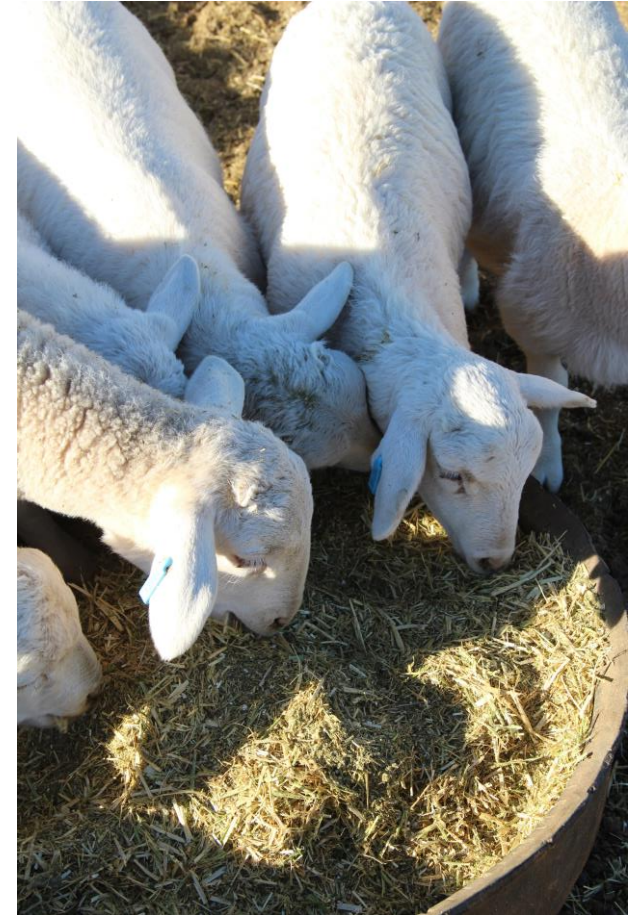
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Total unit cost	465	1316	432	690
Net farm income	254	-142	261	128
Stocking rate (ha/sheep)	15.7	13.3	10.6	9.2
NFI /ha	16.12	-10.30	27.70	18.88
% profitable firms	75%	45%	75%	75%

Statistically significant differences in red

Arguments in favour of feeding

- Larger flocks recover more easily
- Good nutrition for young ewes ensures better lifetime performance
- Feeding limits time to market
- Larger flocks and shorter period to market maintain cashflow, which keeps the banker happy

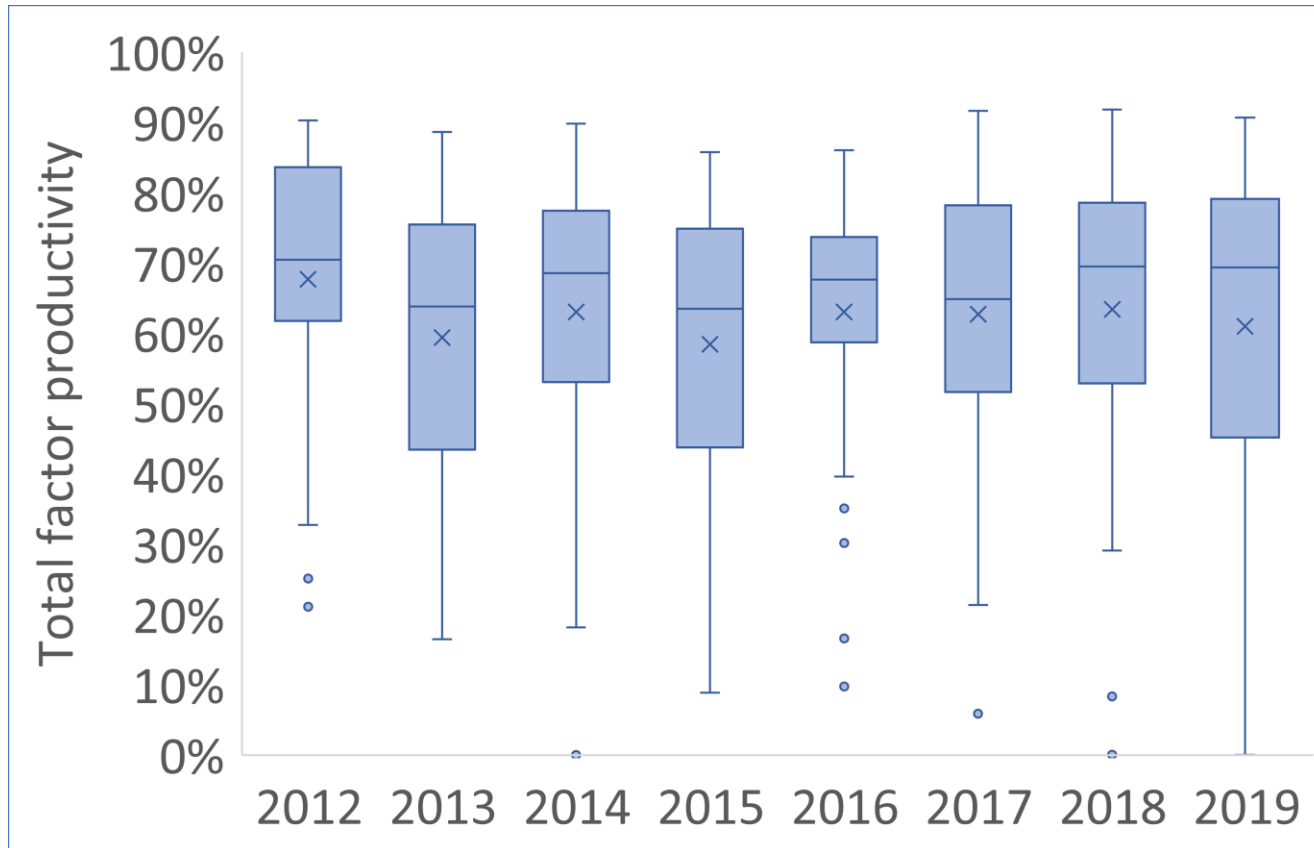




Total factor productivity

Efficiency with which inputs are converted into outputs

Adaptations on productivity



	Average %	CV
2012	68	0.28
2013	59	0.34
2014	63	0.31
2015	58	0.37
2016	63	0.28
2017	63	0.30
2018	63	0.35
2019	61	0.42

Summary and conclusion

Conclusions

Beatrice.Conradie@uct.ac.za

- Just a first cut into adaptation
 - Pay more attention to **temperature**, primary and secondary effects
 - Need field experiments to work out how & when to feed
 - Close partnerships with rangeland scientists on recovery & carrying capacity
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- Are you still feeding passengers?
 - Is your local cooperative prepared for logistics & procurement?
 - Is your road network adequate?
 - Does your value chain justify the extra investment?
 - Are you ready for the next drought?