



# Effects of condensed tannins on growth performance of free-ranging goats in a semi-arid savanna

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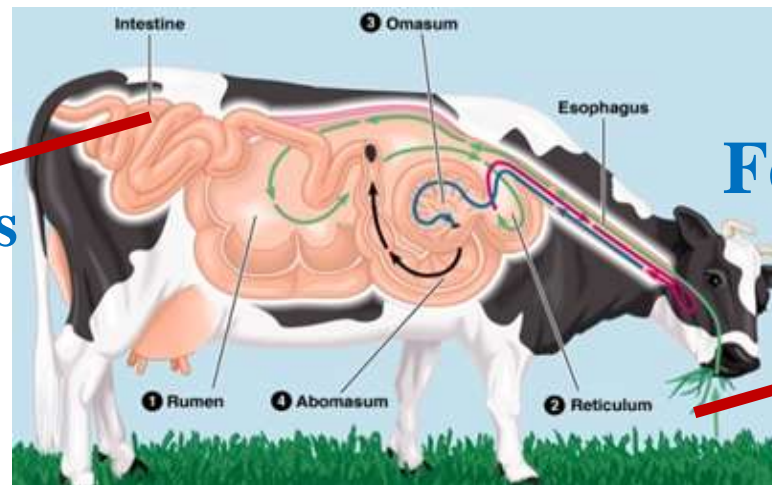
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# What are Condensed Tannins (CTs)?



Feeding deterrents



Digestibility reducers



## Effects depend on [CT]s in diet:

- At **low quantities** (20-45g CTs/Kg DM) = **beneficial** effects
  - Bypass protein
  - Lower internal parasite burden, bloating
  - Reduce methane emissions
- At **high quantities** (>55g CTs/Kg DM) = **detrimental** effects
  - Reduce feed intake,
  - Reduce live-weight gains,

# They over-simplify the situation

**Plant variety is a rule, not an option = plant-herbivore interactions are complex**

**Behavioural**

**Physiological**



**The next step is to translate the roles of CTs from feeding experiments into the field.**

# Study Objective

Determine the effects of CTs on **growth performance** of free-ranging goats

**Body weights**

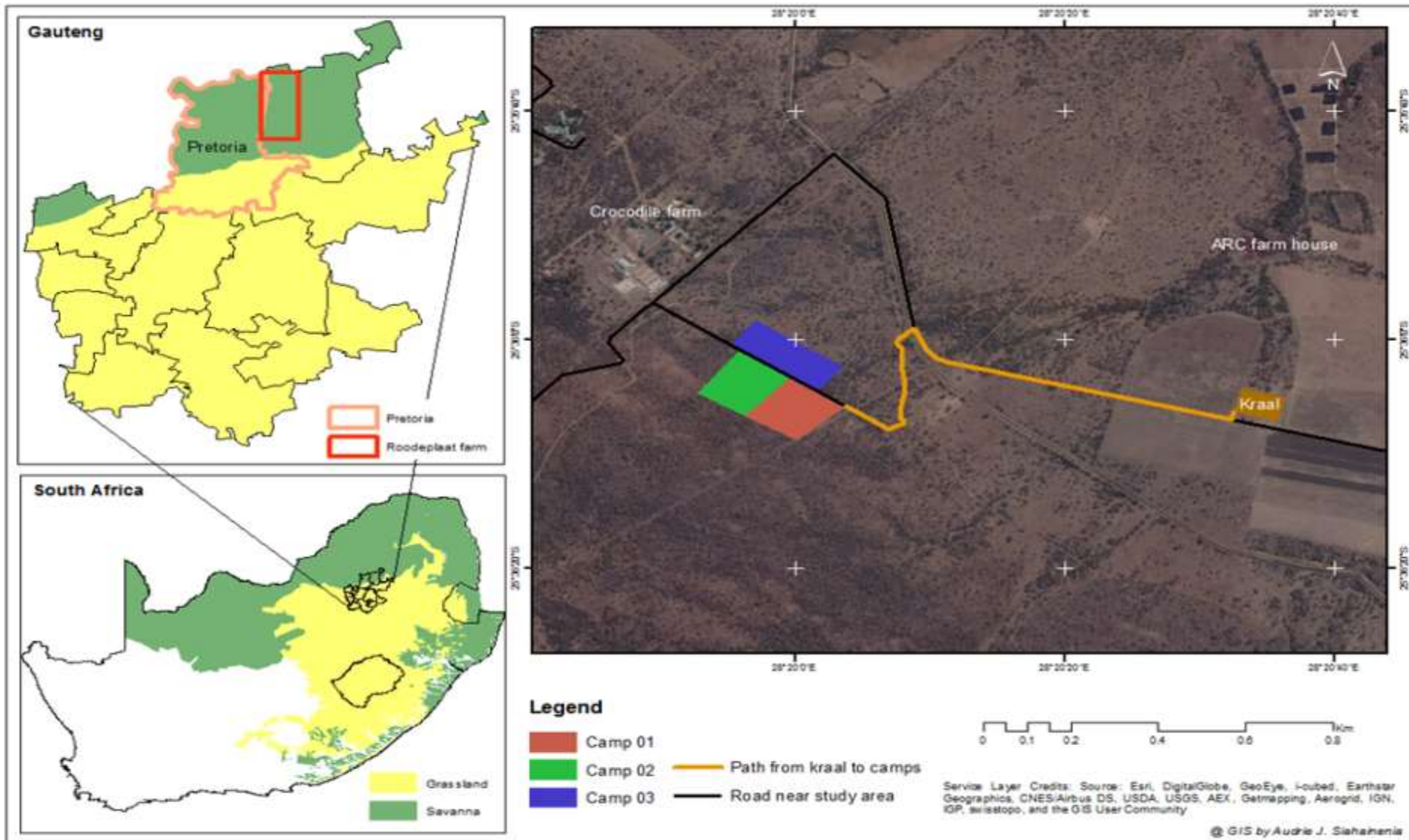
**Faecal Nitrogen**

**Blood metabolites**

- Glucose
- Urea
- Total Protein
- Non Esterified Fatty Acids

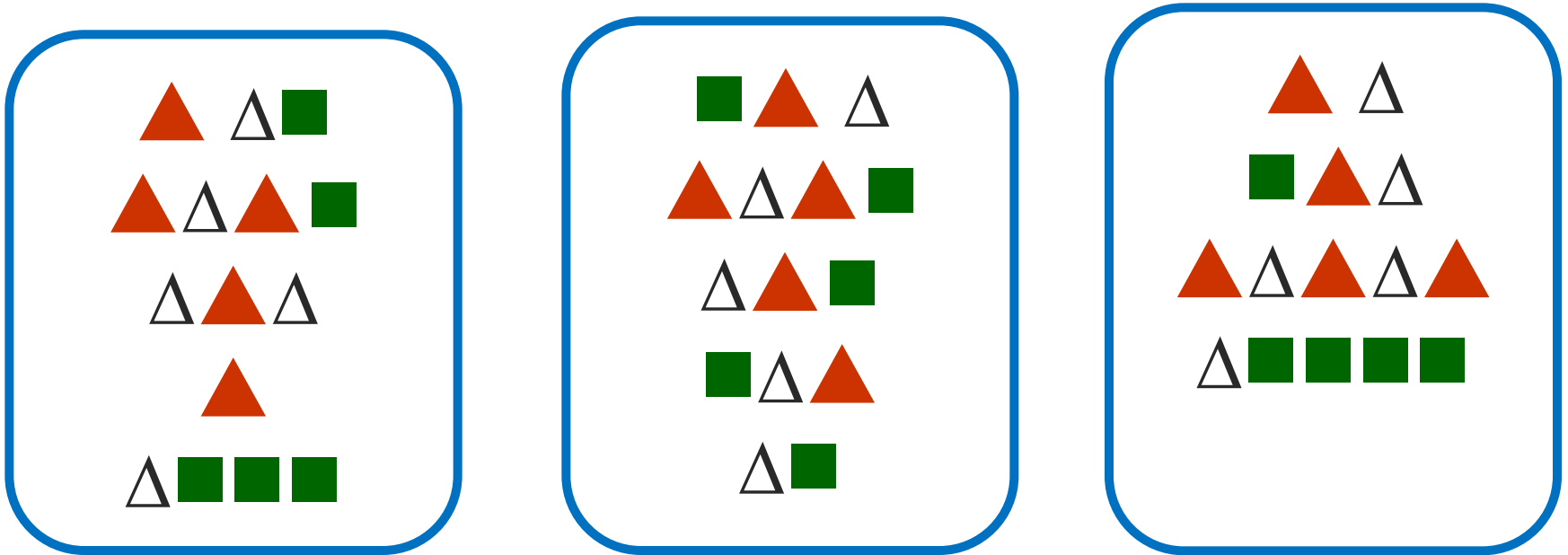


# Roodeplaat Farm (dry and wet seasons)



# Experimental Design

Each paddock was stocked with 15 indigenous female goats ( $\pm 1$  year old)



Every morning (07:30 to 08:00) 45 goats, 15 per treatment were orally dosed.

- 5 goats (▲) /paddock = dosed with 20g CT-powder
- 5 goats (△) /paddock = dosed with only water (control group)
- 5 goats (■) /paddock = dosed with 20g polyethylene glycol (PEG), a chemical that neutralizes CTs

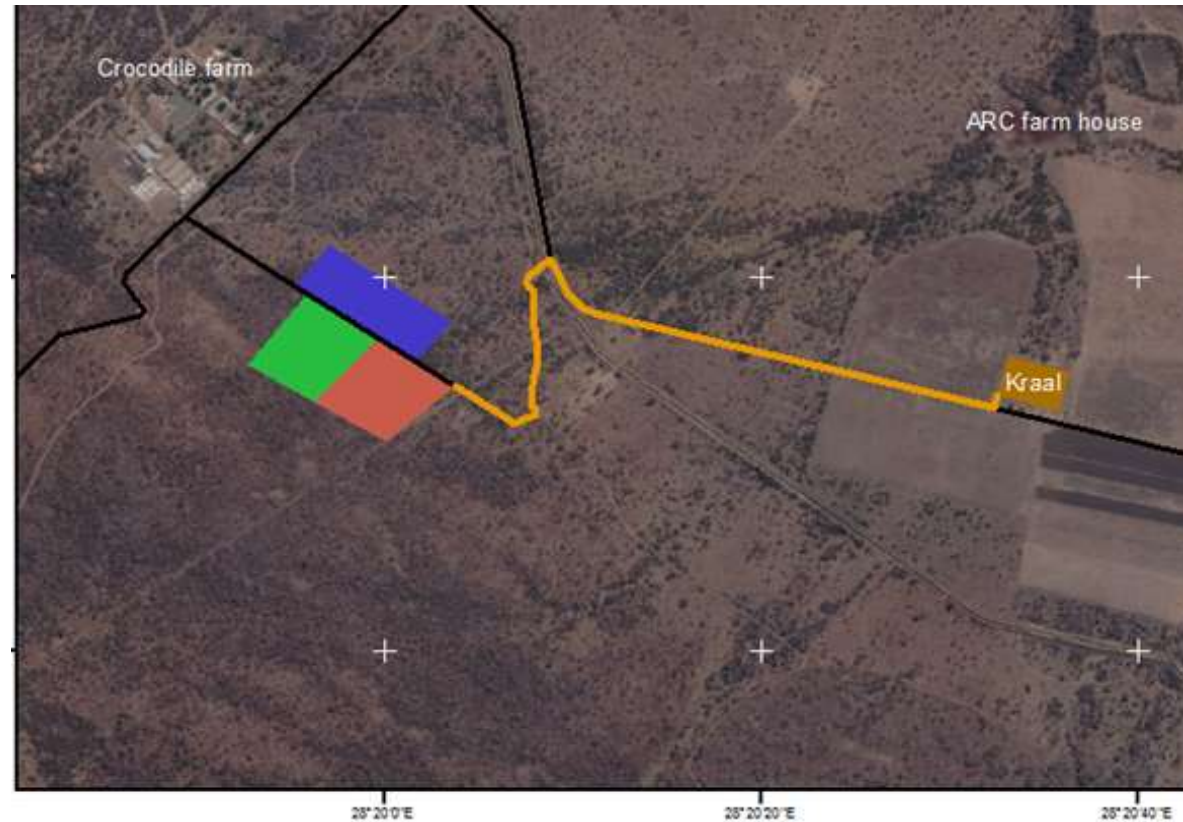
# Data collection

For 45 days in dry (June to August 2012) and 65 days in wet (January to April 2013) seasons.






## Standard Procedures

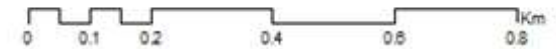
- Body weights
- Faecal Nitrogen
- Blood Metabolites

Approved by Animal Ethics  
Committed of the ARC:  
**APIEC11/039**



## Legend

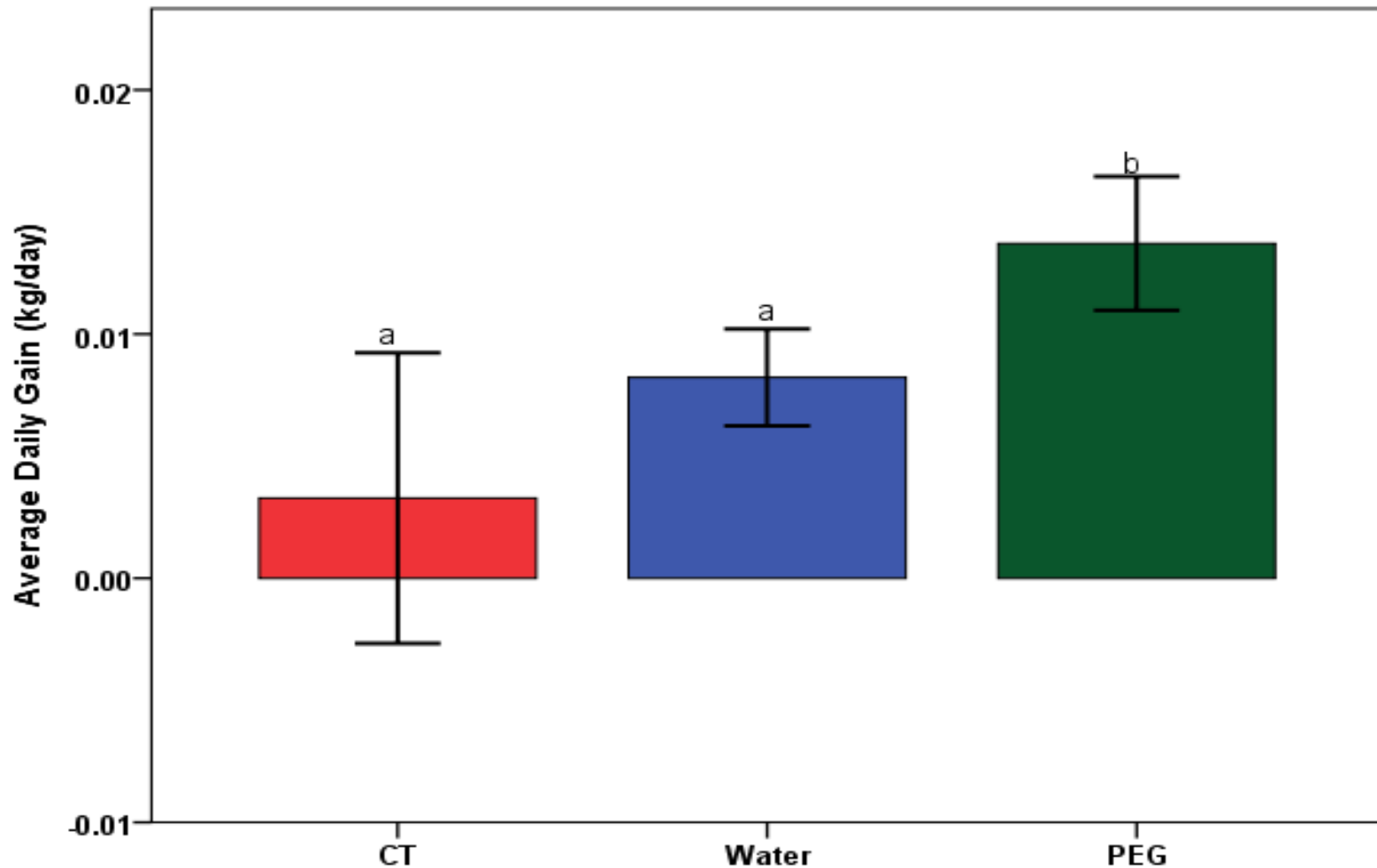
-  Camp 01
-  Camp 02
-  Camp 03
-  Path from kraal to camps
-  Road near study area



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earth  
Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, I  
KIP Swisston, and the GIS User Community

# Results

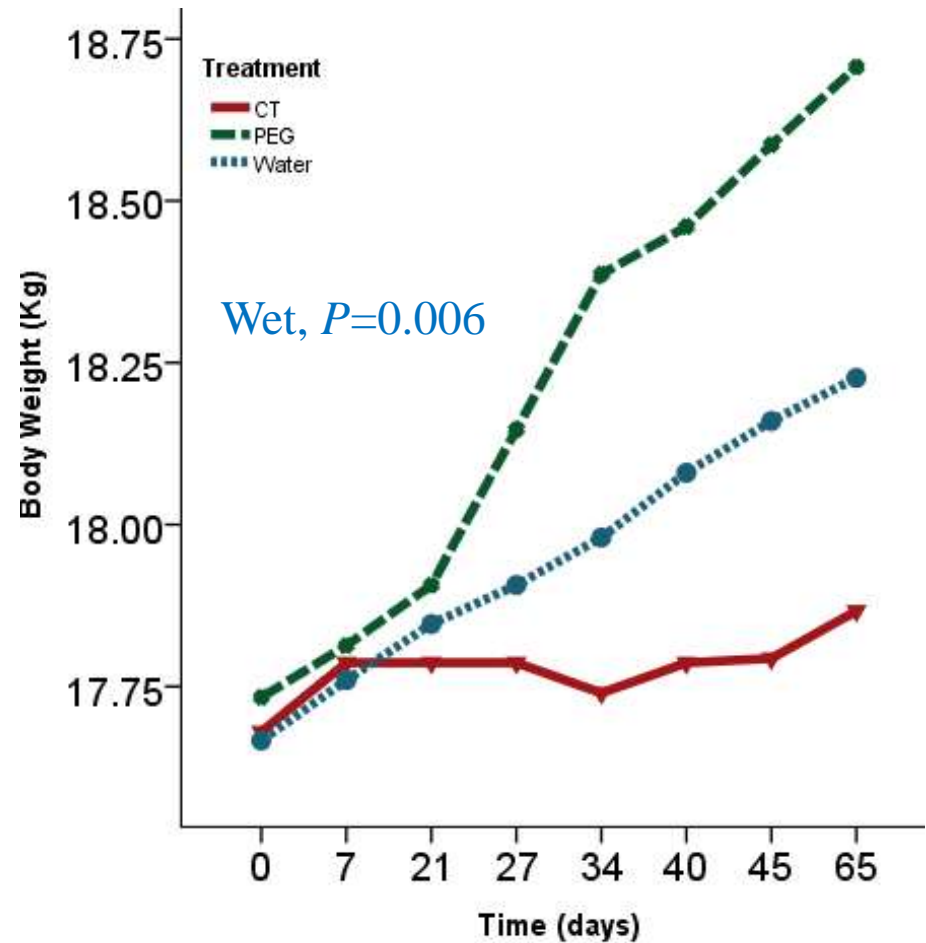
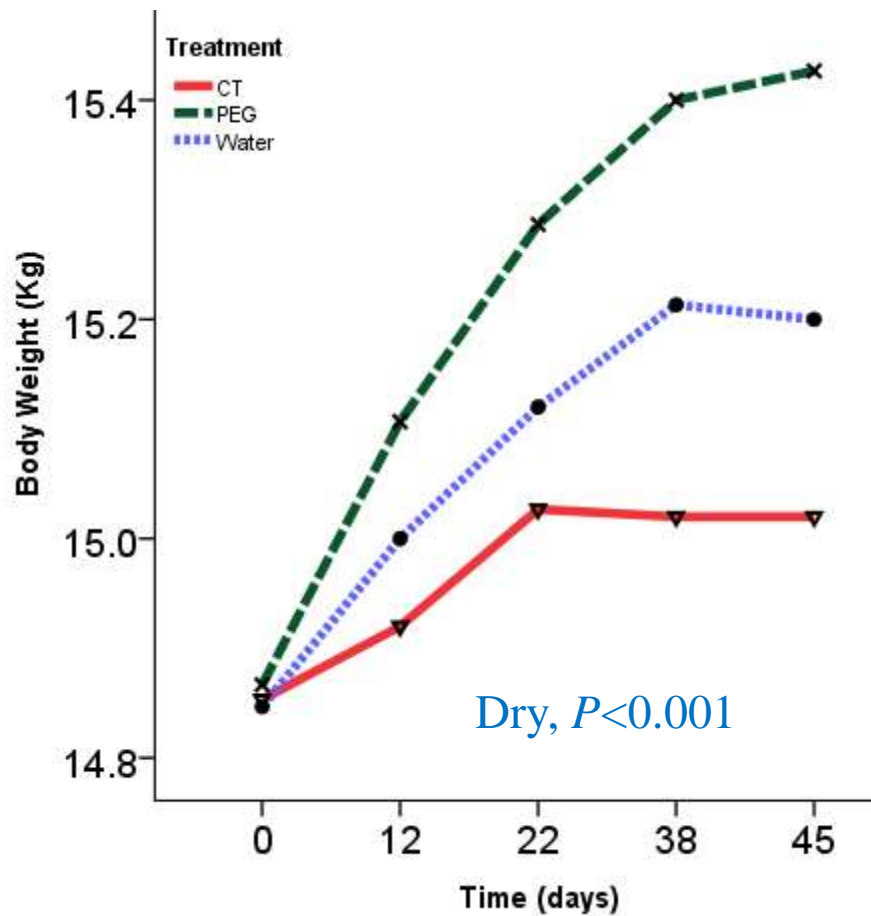
## Effects of tannins on growth performance





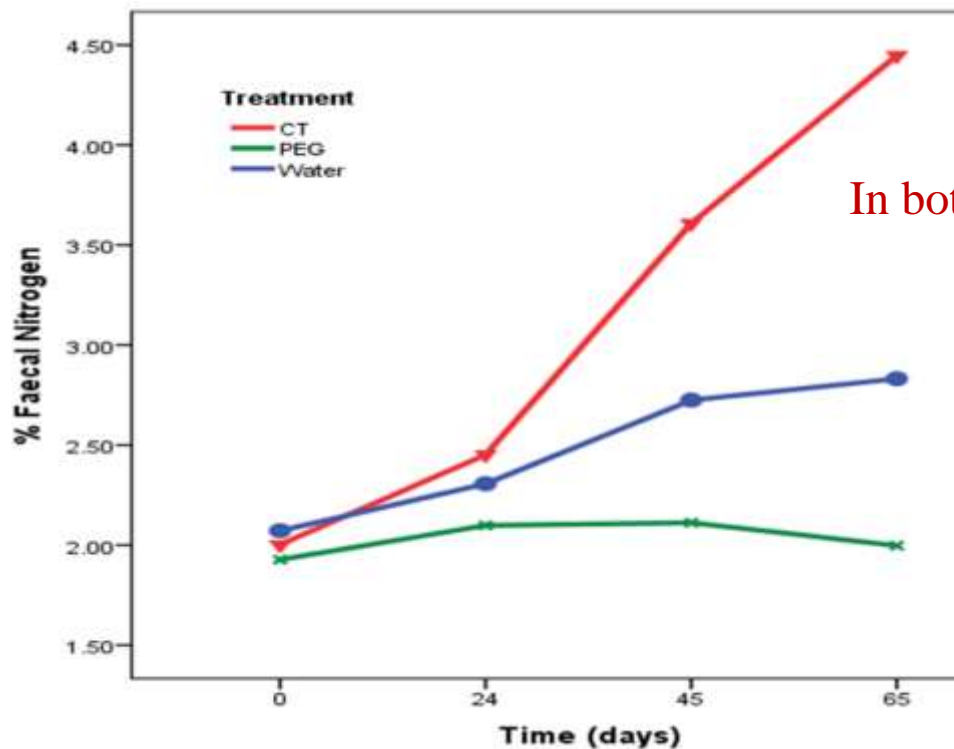
# Results

Repeated measurements of body weights in dry and wet seasons



# Results

At high [CT]s irreversible protein-CT bonds are formed in ways that probably reduce digestion and absorption of proteins.

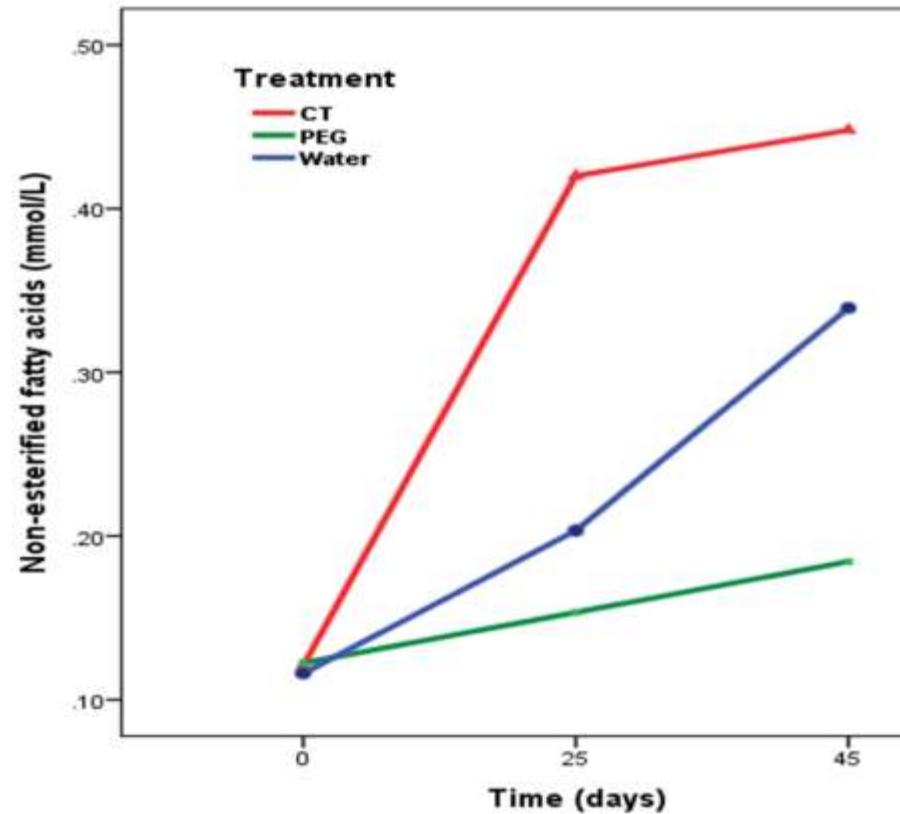
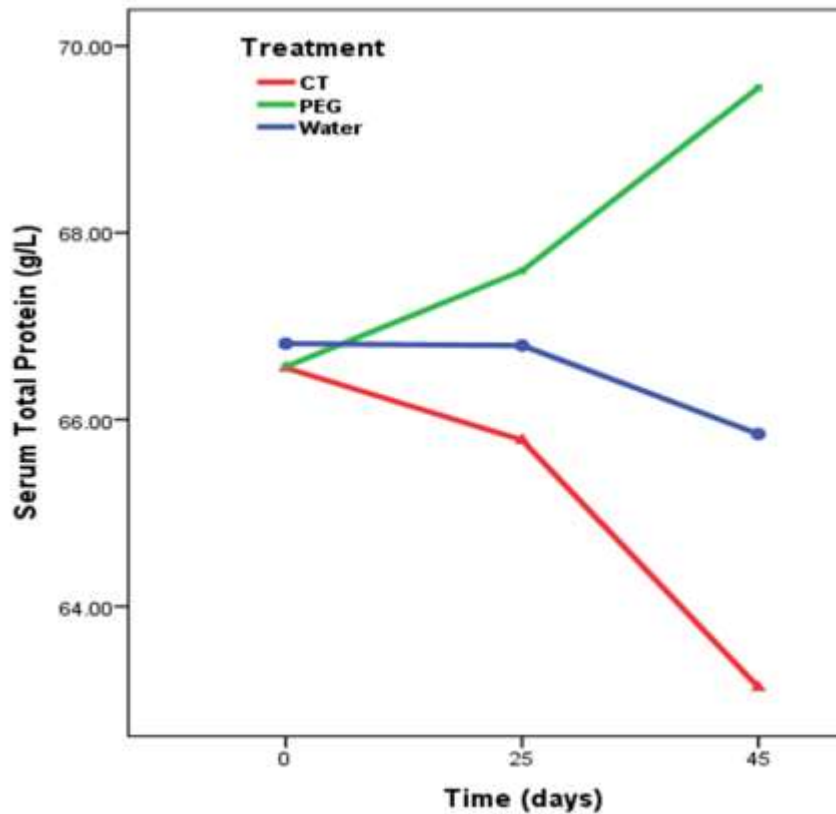


In both seasons, same pattern:  $P < 0.001$

PEG reduces faecal N in ways that subsequently improved average daily gain

# Results

## Effects of CT exposure on blood metabolites



**Tannins may trigger nutrient body reserve depletion and thus negatively influence growth performance.**

# Conclusions

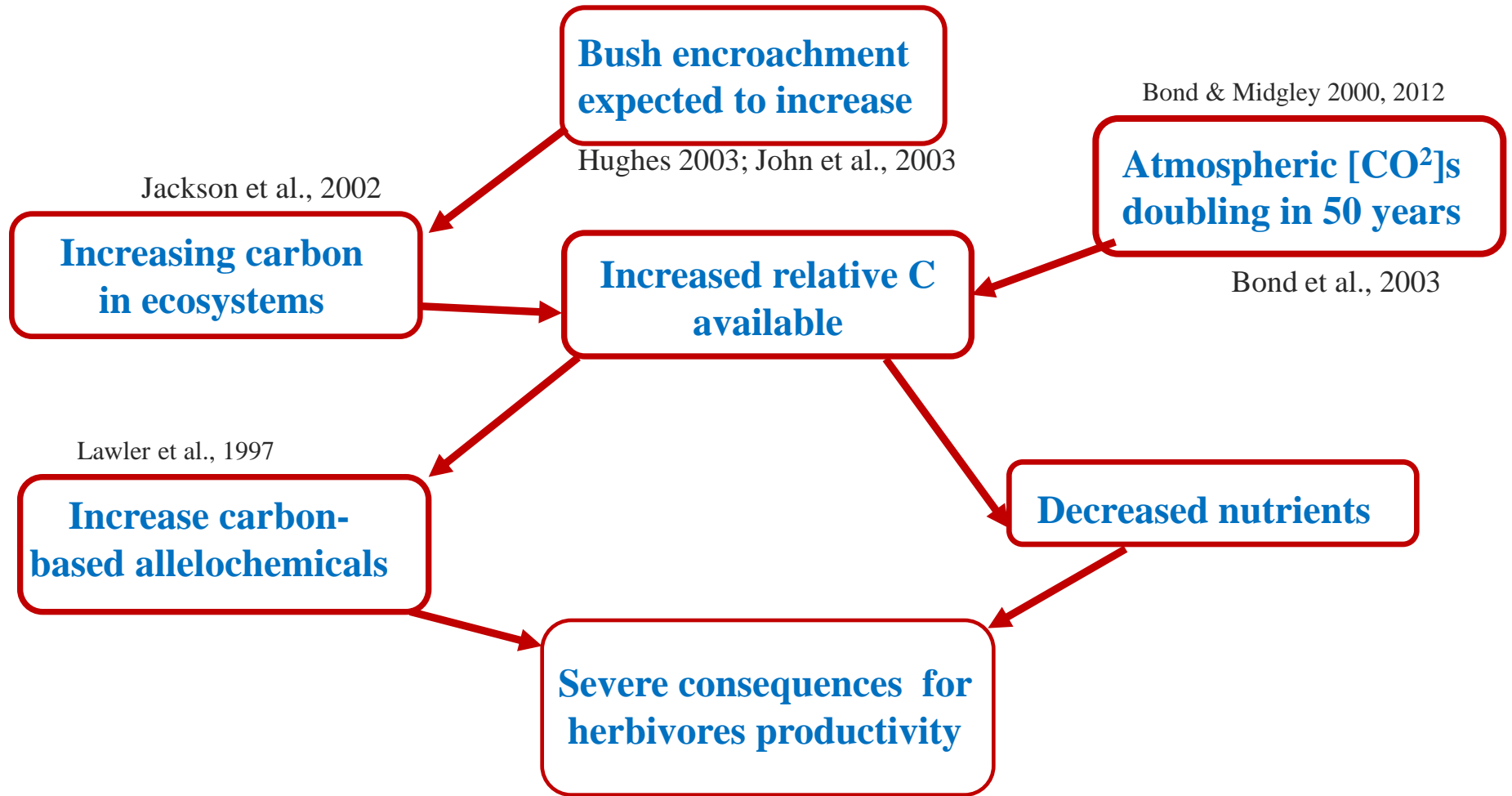
- CTs increased N and affected blood metabolites in ways that suppressed average daily gain and body weights of goats.
- The fact that study animals were still growing probably mitigated the negative effects of CTs.
- The availability of variety in goats' diet might have mitigated the negative effects of CTs (please visit my posters!!)
- CTs limit growth performance, and PEG can be used to improve performance of mixed-feeders foraging in tannin-rich rangelands.



**Thank you!**



# Future of tannins



**The future will favour animals that are well adapted to woody forages**