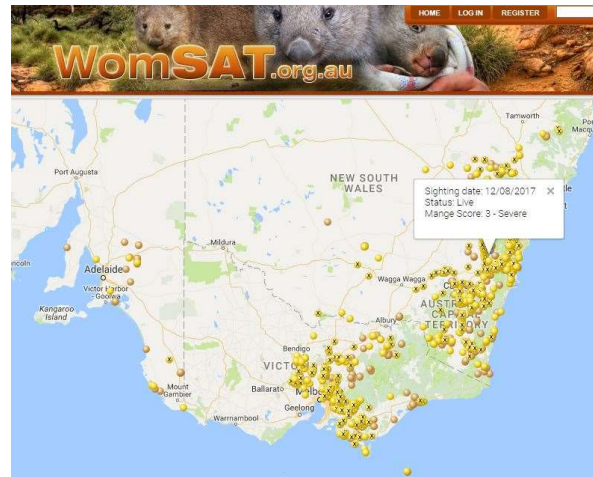


The effect of physiological stress and endoparasitic load on the incidence of sarcoptic mange in bare-nosed wombats (*Vombatus ursinus*)



Chandni Sengupta  
Julie M. Old

# Bare-nosed wombats are affected by a deadly disease - sarcoptic mange



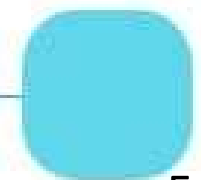
Sarcoptic mange is highly prevalent across the whole range of bare-nosed wombats

Disease causes significant morbidity and mortality

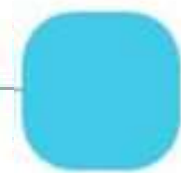
Disease is a threat to their local abundance

Significant population declines in Tasmania and New South Wales

  
Conduct a literature  
search



Experiments and data  
analysis



Optimisation  
experiments



## Literature search

### Gap 1

Present treatment regime is not always suitable in some areas of Australia

### Gap 2

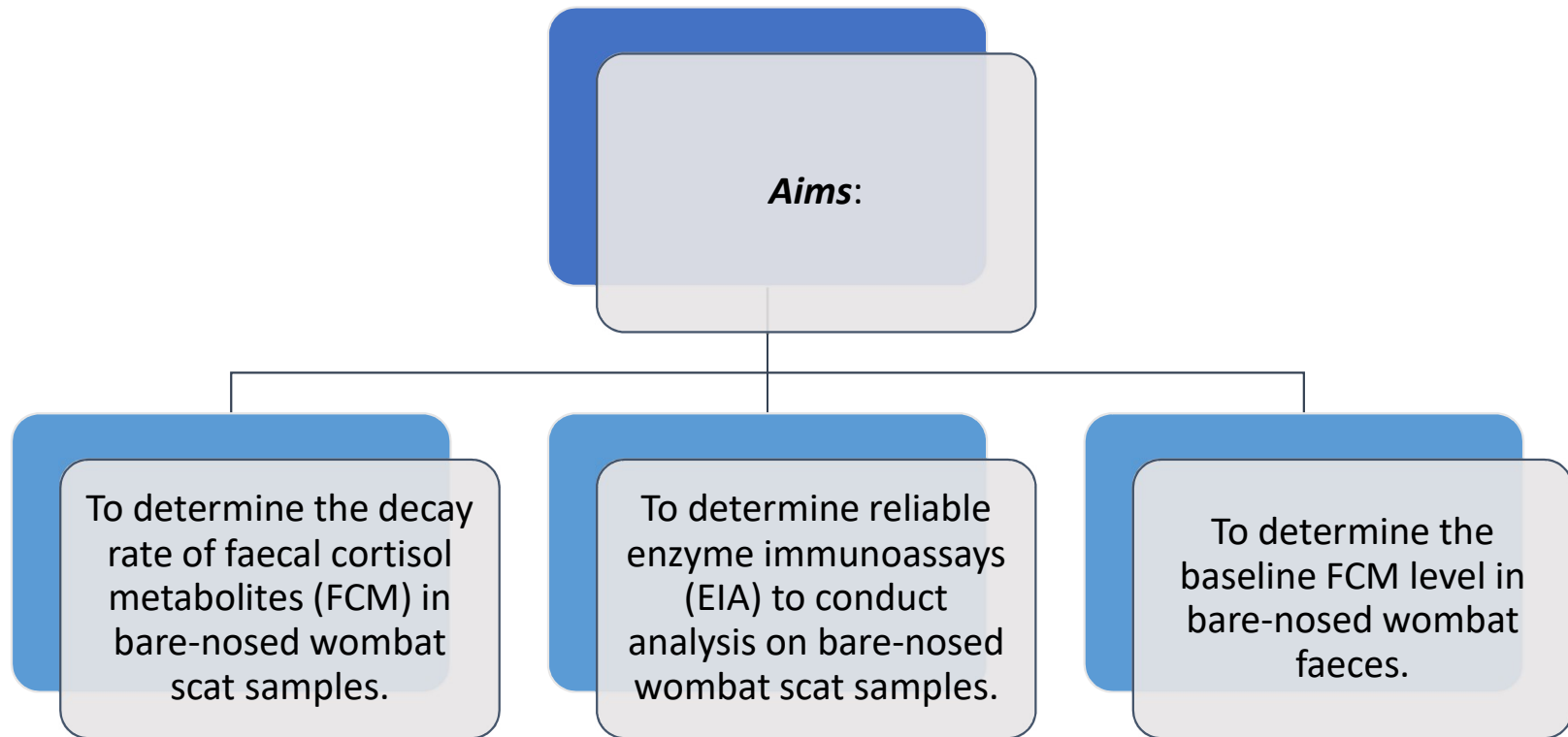
The current sarcoptic mange prevalence is unknown

### Gap 3

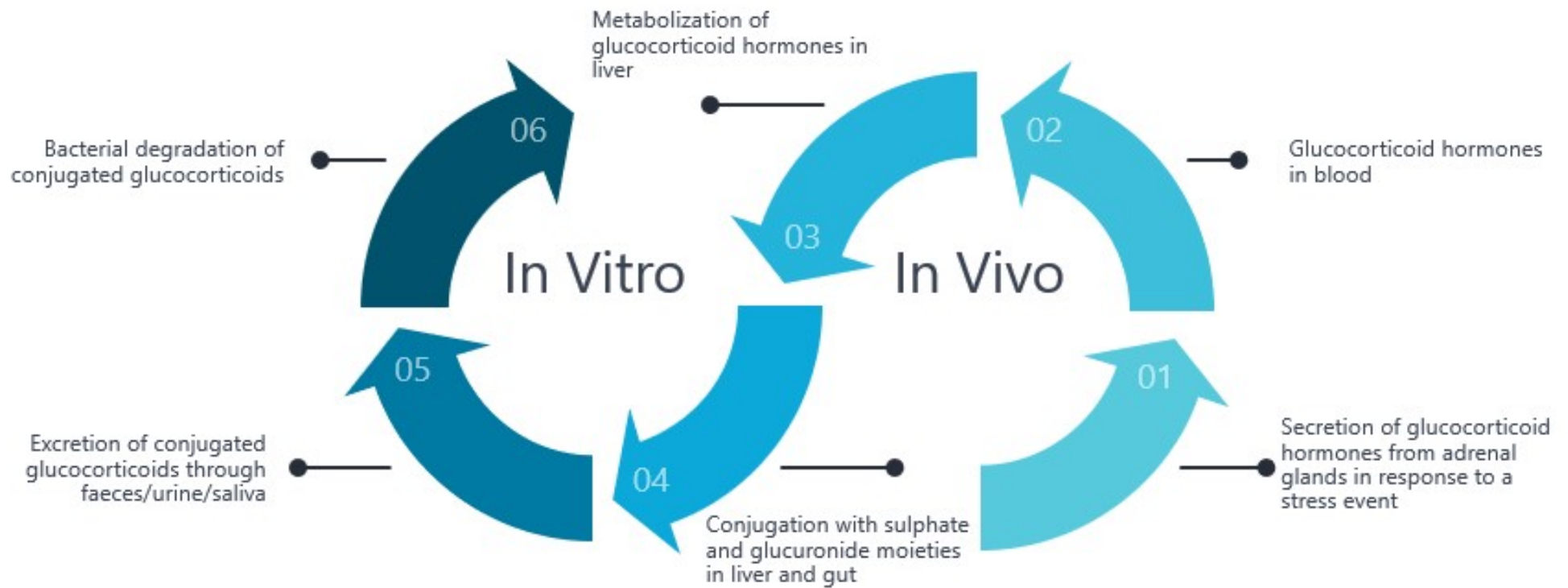
Could endo-parasitic load and increased stress level in bare-nosed wombats increase the chances of sarcoptic mange susceptibility?



## Optimisation experiments

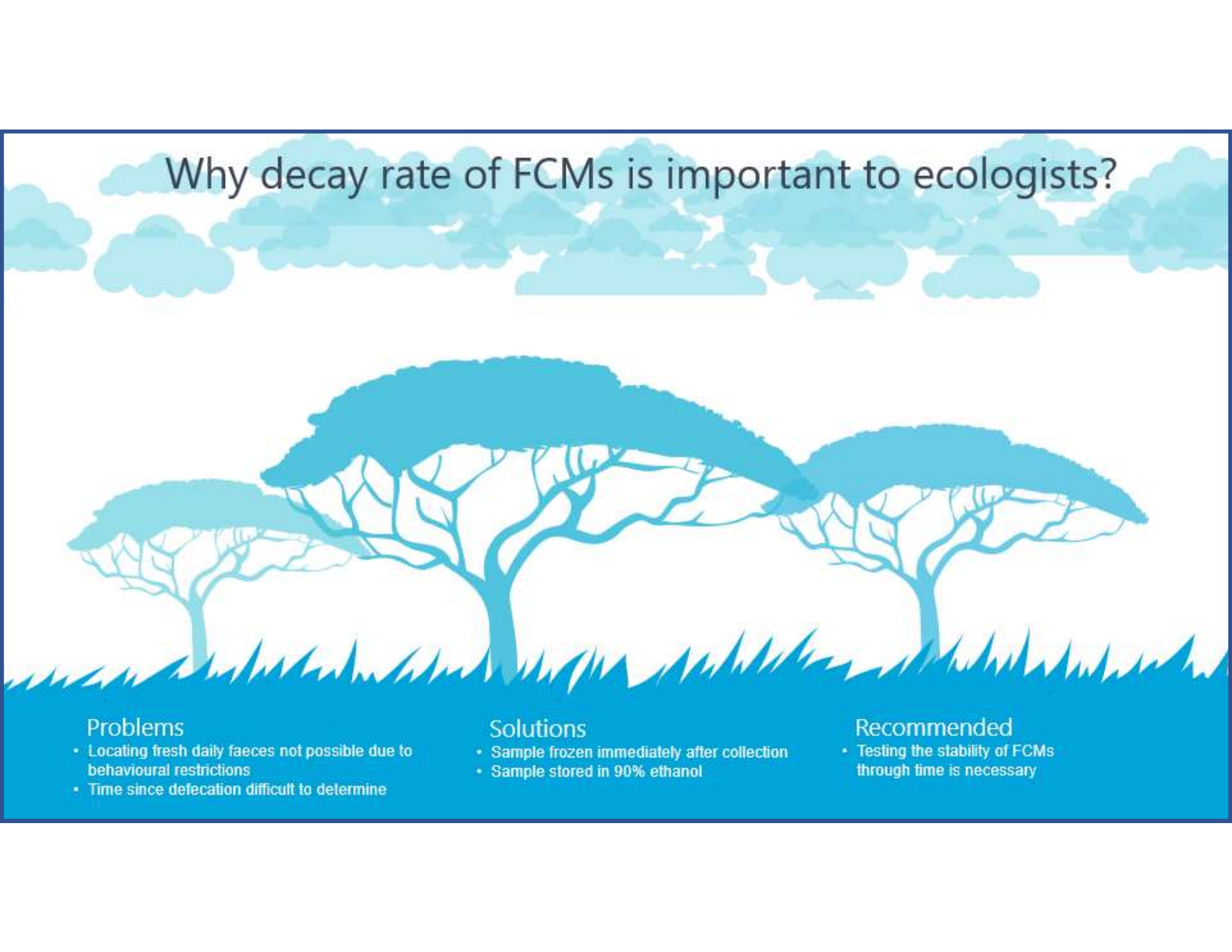


## What are faecal glucocorticoid metabolites (stress hormone metabolites)?





# Why decay rate of FCMs is important to ecologists?



## Problems

- Locating fresh daily faeces not possible due to behavioural restrictions
- Time since defecation difficult to determine

## Solutions

- Sample frozen immediately after collection
- Sample stored in 90% ethanol

## Recommended

- Testing the stability of FCMs through time is necessary



## Optimisation experiments

*Methods used:*

Day 0

- Sample collection (<12h old faeces); Freezing First Aliquots (-20°C)

Day 1-5

- Freezing Subsequent Aliquots (-20°C)

Lab analysis

- FCM extraction; EIA – in-house & commercial kit

Data Analysis





## Optimisation experiments

### *Results:*

- The mean FCM level remained stable for at least 5 days in samples collected during autumn.
- Validation tests disclosed that an inhouse EIA and a commercially available kit EIA can be successfully used to quantify FCM levels in bare-nosed wombats.



## Experiments and Data Analysis

*Aims:*

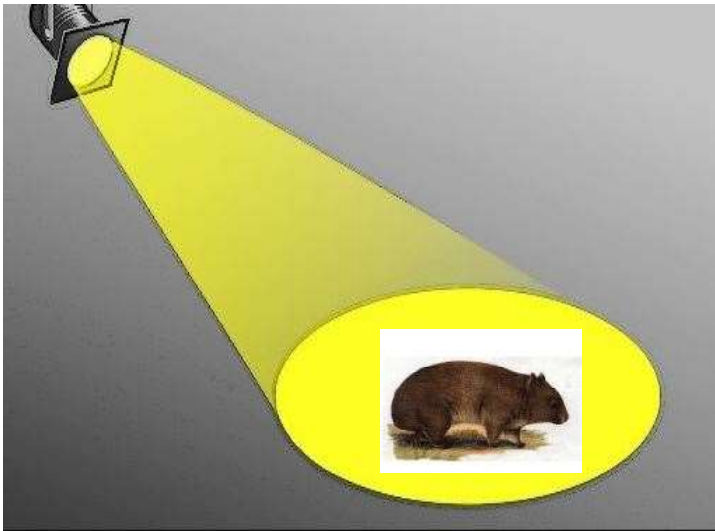
To determine the current sarcoptic mange incidence, stress level and endoparasitic load in bare-nosed wombats on the 5 study sites in NSW, Australia.

To determine if there is any causal relationship between sarcoptic mange incidence, stress level and endoparasitic load in bare-nosed wombats on the 5 study sites in NSW, Australia.



## Experiments and Data Analysis

**Methods used:** Spotlighting and Mange score (estimation of current sarcoptic mange incidence)

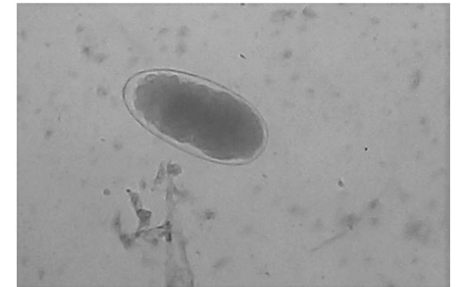
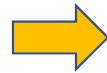
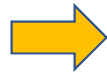


Mange Score	Description
1	<ul style="list-style-type: none"><li>Visible Signs</li></ul>
2	<ul style="list-style-type: none"><li>Ears and eyes free of mange</li><li>Small, sparse patches of hair loss; skin appears slightly crusty in these spots, usually on the side of the body</li></ul>
3	<ul style="list-style-type: none"><li>Most of the hair is retained and appears normal.</li><li>Ears appear normal.</li><li>Area around eyes is begin to appear crusty.</li><li>Large portions of hair loss on the sides of the body, skin appears crusty in these regions. Mange is starting to spread to the limbs. Small lesions may be present.</li></ul>
4	<ul style="list-style-type: none"><li>Slightly emaciated</li><li>Ears are thick and crusty, appearing 'cauli-flowered'</li><li>Eyes are crusty and closed</li><li>Most of the hair on the sides, limbs and face is lost; skin is very thick and starting to appear blue/grey, lesions likely to be present</li><li>Still has hair on the top of the body</li><li>May be approached, slightly deaf and blind</li></ul>
5	<ul style="list-style-type: none"><li>Extremely emaciated</li><li>Ears are thickened and crusty, extensively 'cauliflowered'</li><li>Hair is still present on the head</li><li>Almost all of the hair is gone, skin is very crusty and appears blue/grey, and lesions are present</li><li>Eyes are very crusty and cannot open or close</li><li>May be completely deaf and blind, easily approached.</li></ul>



## Experiments and Data Analysis

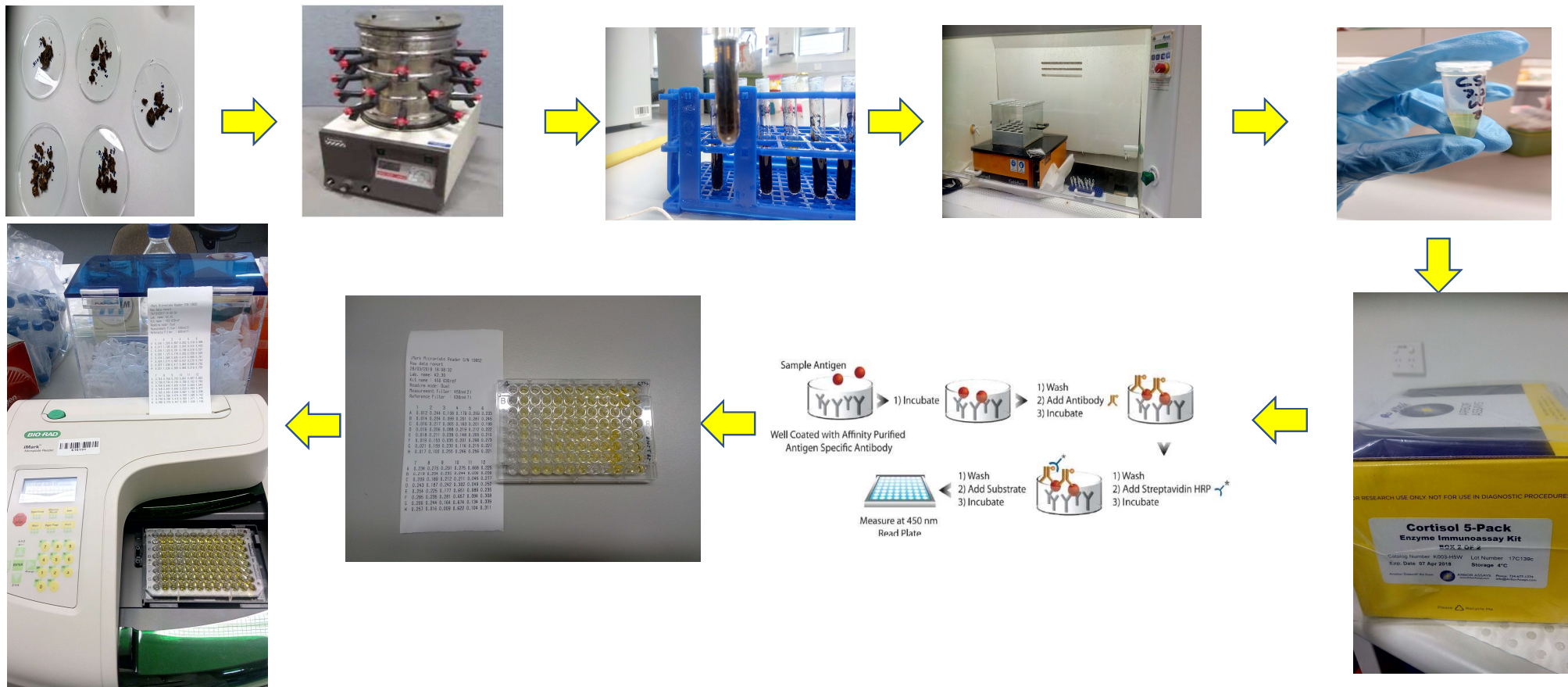
**Methods used:** McMaster faecal egg counting method (estimation of current endoparasitic load)





# Experiments and Data Analysis

*Methods used:* FCM extraction and analysis through kit EIA (estimation of current stress level)





## Experiments and Data Analysis

**Method:** To determine if there is any causal relationship between sarcoptic mange incidence, stress level and endoparasitic load in bare-nosed wombats on the 5 study sites in NSW, Australia, a nonparametric one-way ANOVA or Spearman rank correlation was used (Statistical tool pack IBM® SPSS® (ver. 25)).





## Experiments and Data Analysis

### *Results:*

- A difference in mean FCM and mean FEC was noted between the five study sites.
- A strong positive correlation was observed between mean sarcoptic mange prevalence and mean FCM.
- A statistically significant relationship between mean sarcoptic mange prevalence and mean FEC was not found.

## Overall Conclusions:



- Wild samples (>12h up to 120h) usable for FCM EIA – to be frozen on site
- Two EIAs can be used to monitor the adreno-cortical activity of the bare-nosed wombats
- The current stress level, endoparasitic level and sarcoptic mange prevalence of bare-nosed wombats in the five study sites in NSW, Australia were estimated
- Prolonged exposure to maladaptive stress can increase the chances of sarcoptic mange incidence in bare-nosed wombats

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