- **XIVth ISBC** ,Gdansk, Poland, 2 – 7 June 2006
- Conference of the International Society of Biocalorimetry

The Cat in the Bag – the Impact of Captivity on Physiological Parameters in Mammals and Birds

Schleucher, E. [1], **Hilmer**, S. [1,2], **Angus**, G.J. [2], **Algar**, D. [2], **Warnecke**, L.[3], and **Withers**, P.C.[4]

[1] Biological Sciences, Johann Wolfgang Goethe – University, Frankfurt am Main, Germany

[2] Department of Conservation and Land Management, Wildlife Research Centre, Woodvale WA, Australia

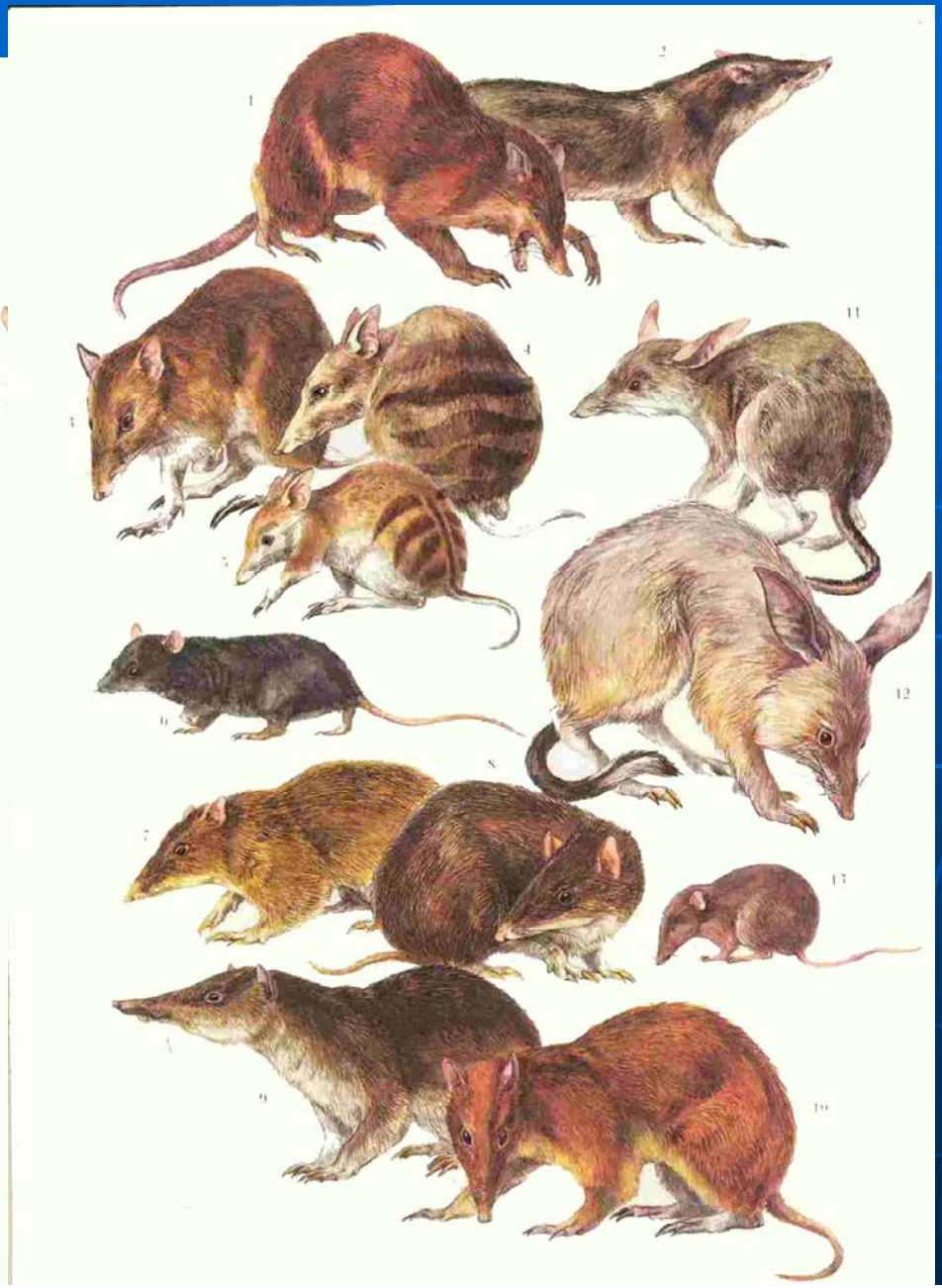
[3] Zoology, University of New England, Armidale NSW, Australia

[4] Zoology, School of Animal Biology, University of Western Australia, Nedlands WA, Australia

The Background.

Australia:
World record
extinction rate
in last 200 years

90 (!) %
of mammals
(< 5 kg)
are declining or
endangered



The Background.

Western Australia (1923): "The last Bilby I saw alive...- caught in a rabbit trap"

The reasons.


- Habitat degradation
- Introduced invasive species:
grazing livestock,
predators and competitors
1.
WILDLIFE ENEMIES
2.
3.
PROJECT
EDEN

The reasons.


Domestic cats → feral:
independent of human contact and support
THE FERAL CAT comes to AUSTRALIA
Soon after the white people came to Australia the rabbit arrived, eating all our food. Then came the cat and began to eat us.
Fierce and terrifying they are to we native creatures, killing and eating everything they can catch.
Starving because of the rabbit and eaten by the cat, soon so many species of Australian native creatures began to disappear completely, never to be seen again.

Questions & Methods.

Hypothesis:

Physiological capacities

→ patterns of
- invasion
- decline
- extinction
- coexistence of species in a given habitat.

↓

Fate of reintroduction and conservation programmes

Questions & Methods.

Hypothesis:

Knowledge of physiological capacities will help understand:

- food requirements,
- temperature-dependent activity patterns,
- territory size, habitat preferences,
- abundance, colonisation, decline,

- bait uptake,
- dosage of drugs, anaesthetics

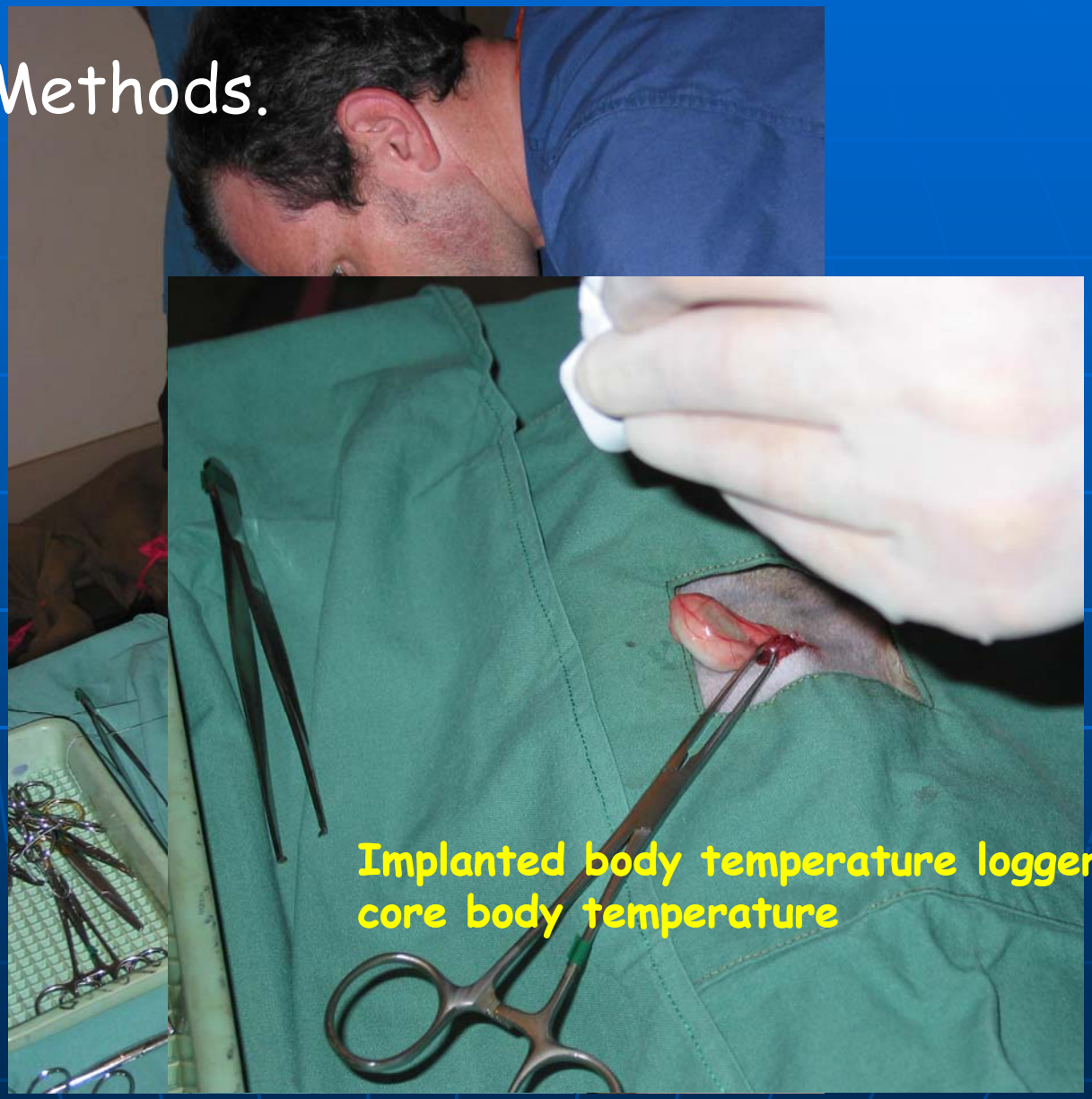
Questions & Methods.

Target animals	Aims	Parameters
 native species	•Definition of physiological requirements •Reasons for decline, choice of suitable habitats	•Metabolism •Temperature regulation
 invasive species	•Patterns of invasion and establishing in new habitat •Competition and predation •Identify potential future problems	•Patterns •Levels

Questions & Methods.

Portable indirect calorimetry system in field station

Questions & Methods.



Questions & Methods.

with remote telemetry tracking device –

Questions & Methods.

Insert :
Short description of keeping conditions: in general,
animals were kept under semi- natural conditions in
sheltered outdoor cages so that they were exposed to natural light and climate Conditions.
This generally applied to all species irrespective of mammal or bird

Results.

Metabolic rates and body temperature measurements on

Birds:
captive-bred and wild captured populations of:

- Native species from extreme arid zones
- Introduced species - expanding exponentially in numbers and range

Mammals:
free- ranging and captive populations of:

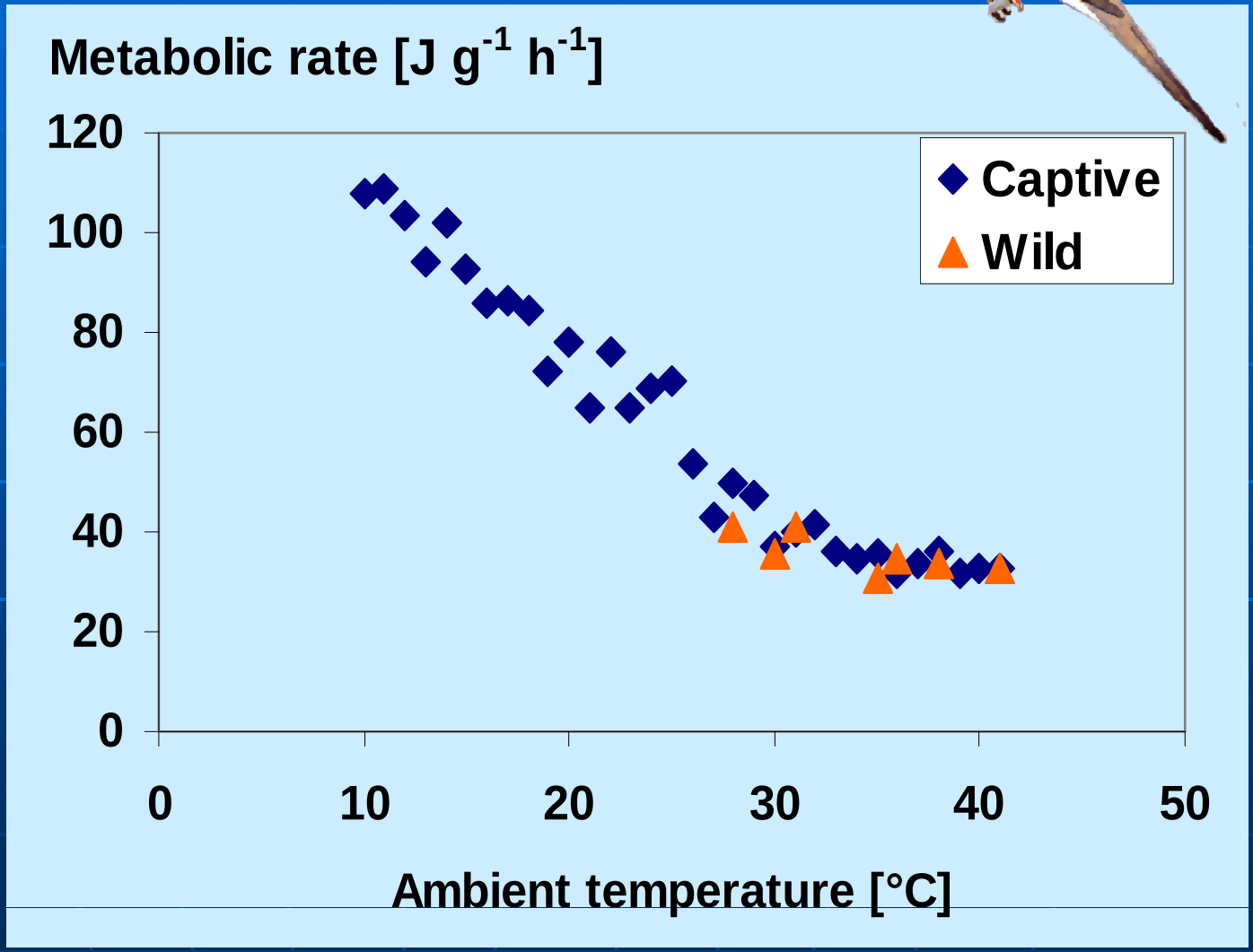
- Natives declining in abundance and range
- Introduced invasive species
  colonizing new habitats and establishing stable populations

Results.

I. Birds – *Levels*

Natives:
Diamond Dove
Geopelia cuneata

captive bred, Germany
wild-caught, Australia

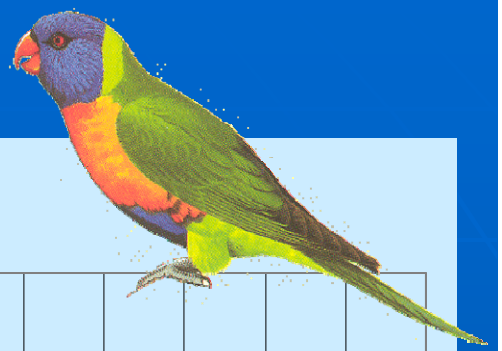


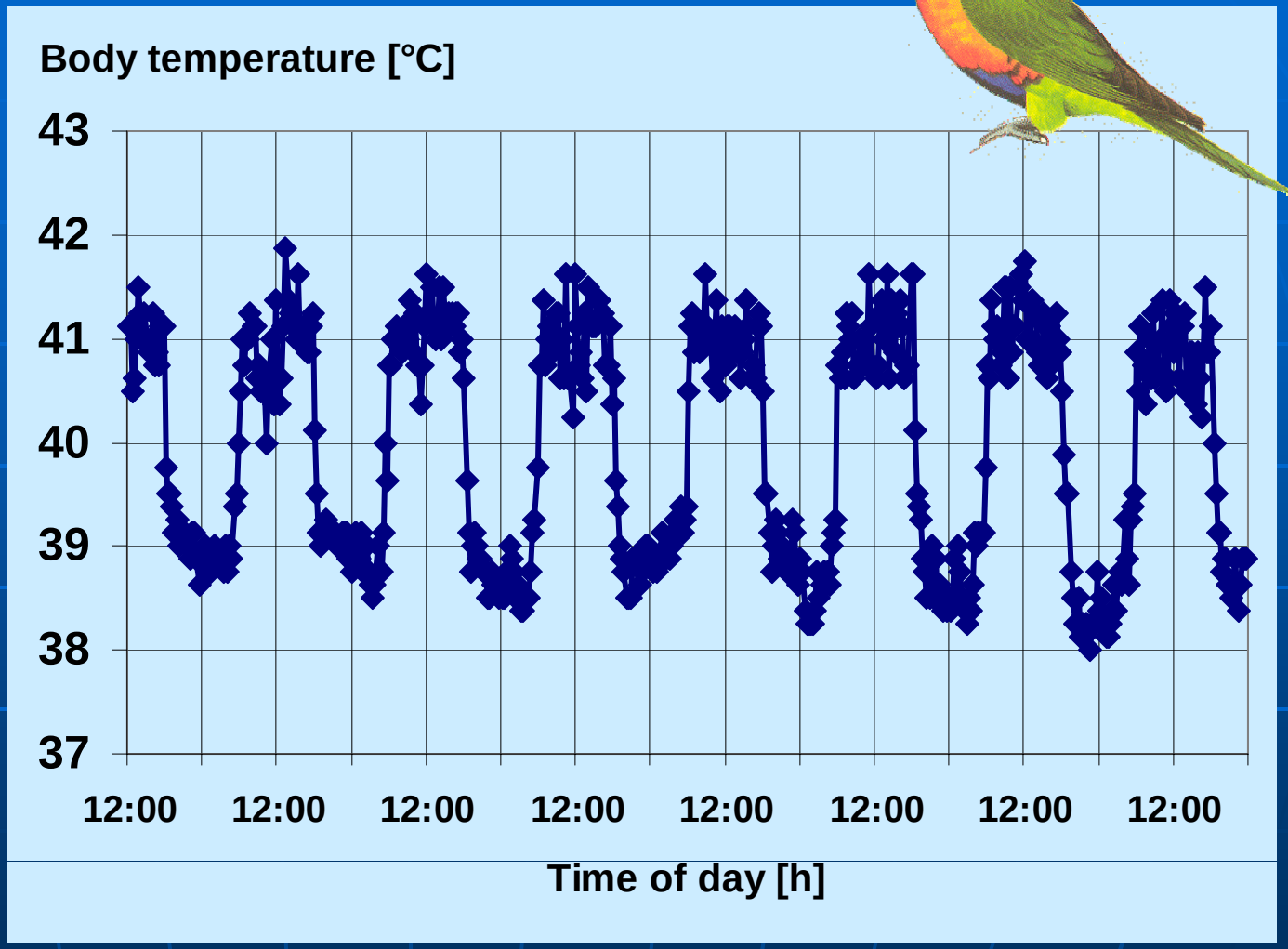
Results.

I. Birds – *Patterns*

Introduced:
Rainbow Lorikeet
Trichoglossus haematodus moluccanus

captive bred, Australia



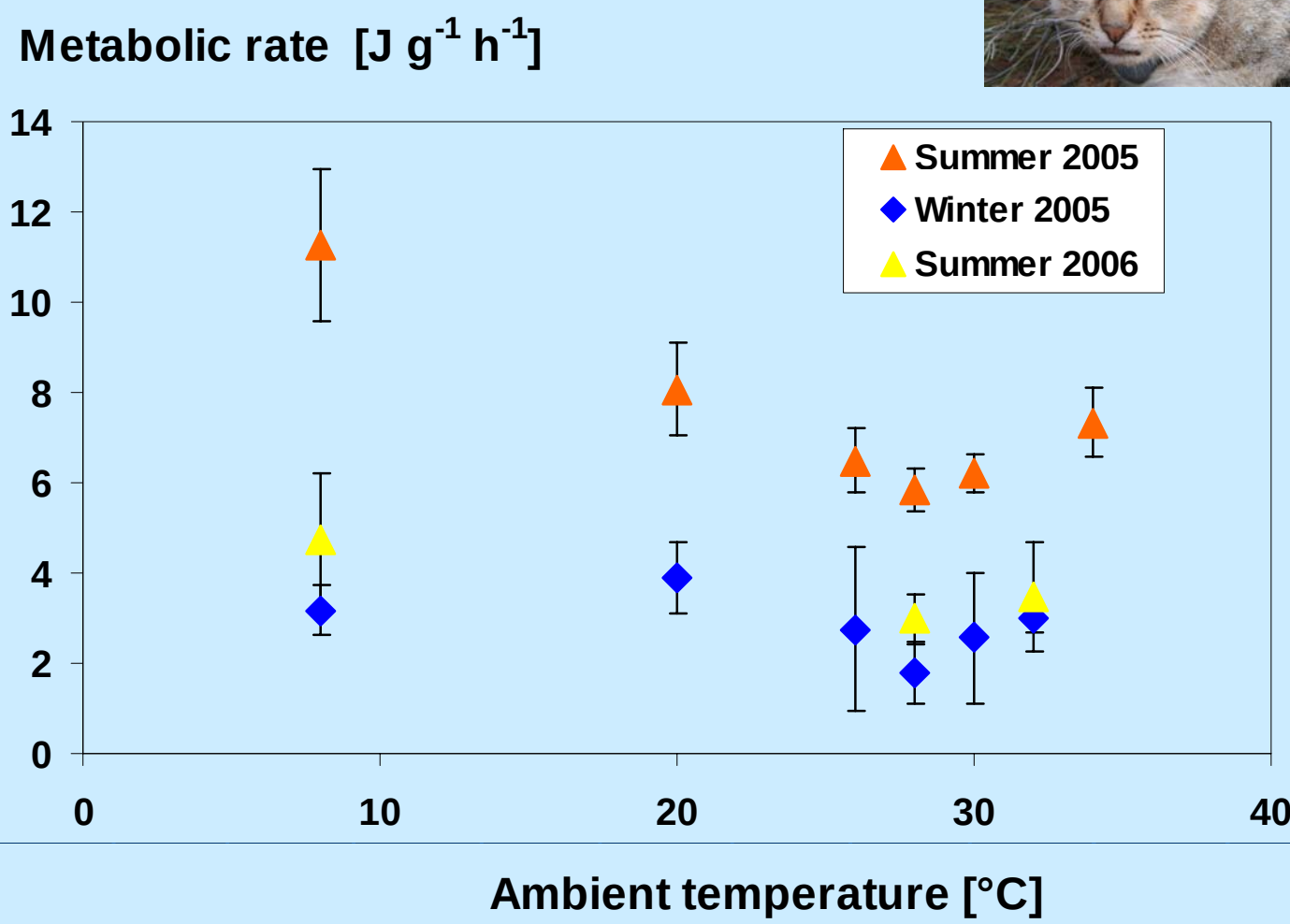


Impact of captivity on physiological parameters

II. Mammals – *Levels*

Introduced:
Feral cat
Felis catus

wild -caught,
Australia

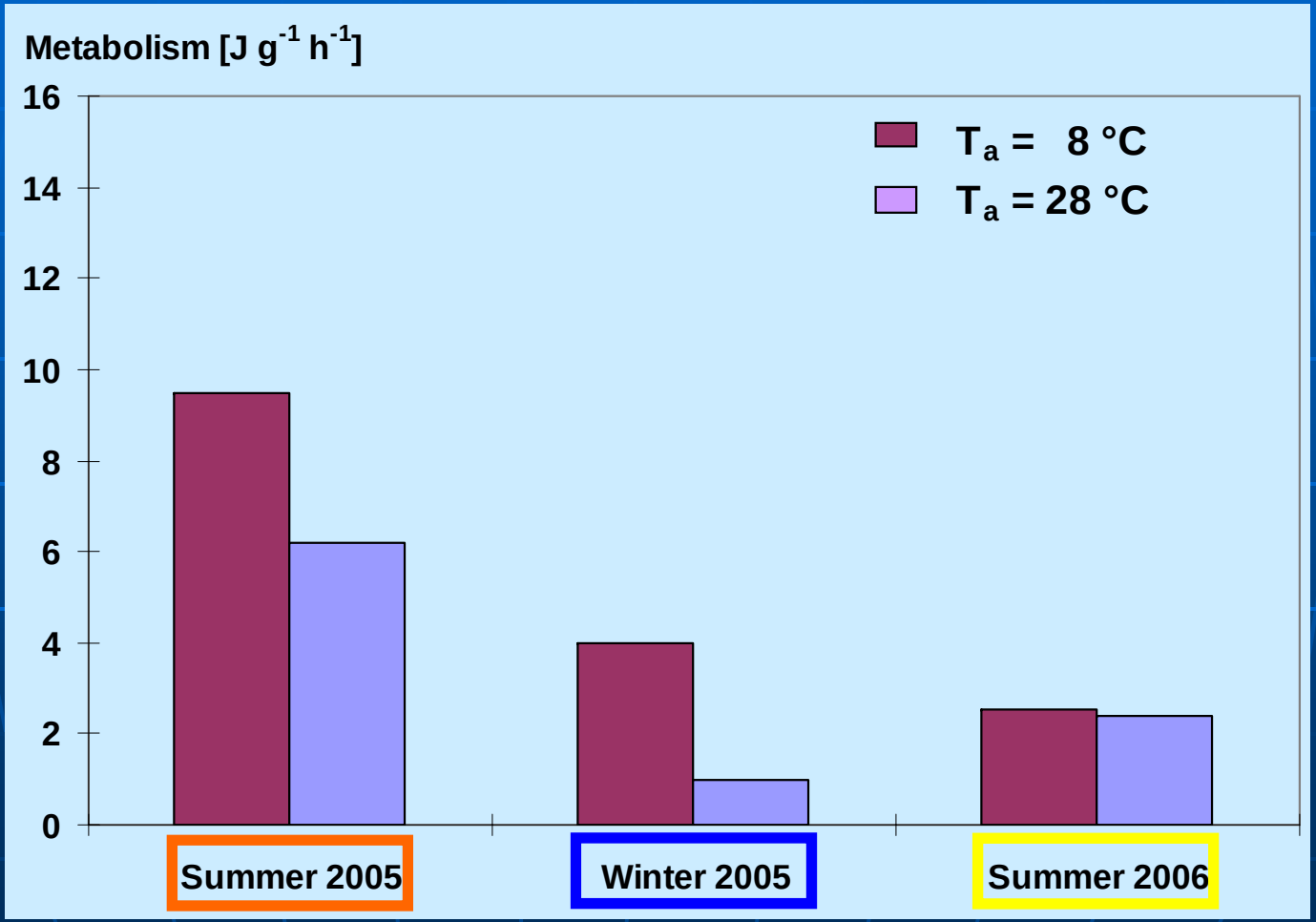


Impact of captivity on physiological parameters

II. Mammals – *Levels*

Feral cat
Felis catus

in Australia

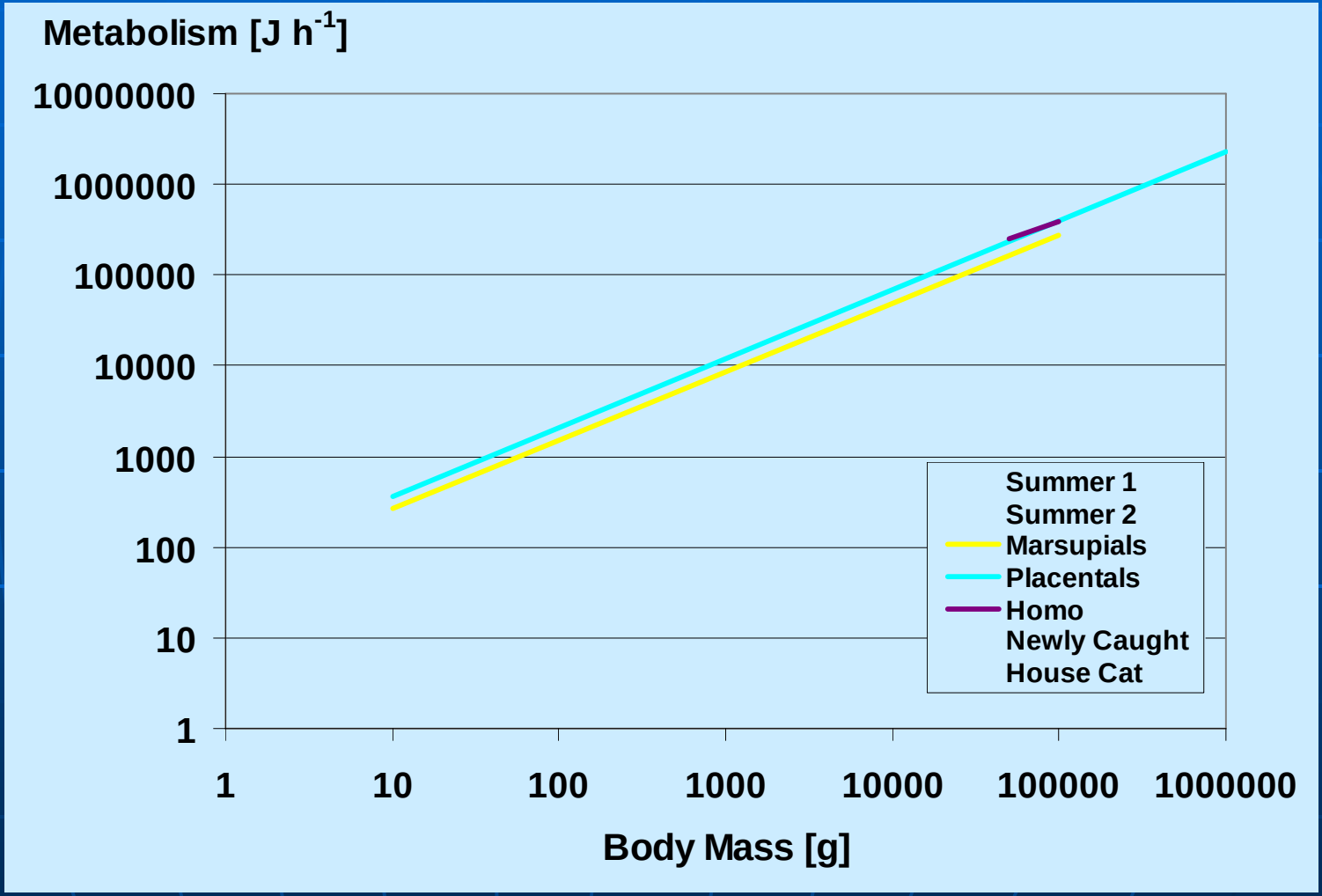


Results.

II. Mammals – *Levels*

Feral cat
Felis catus

in Australia

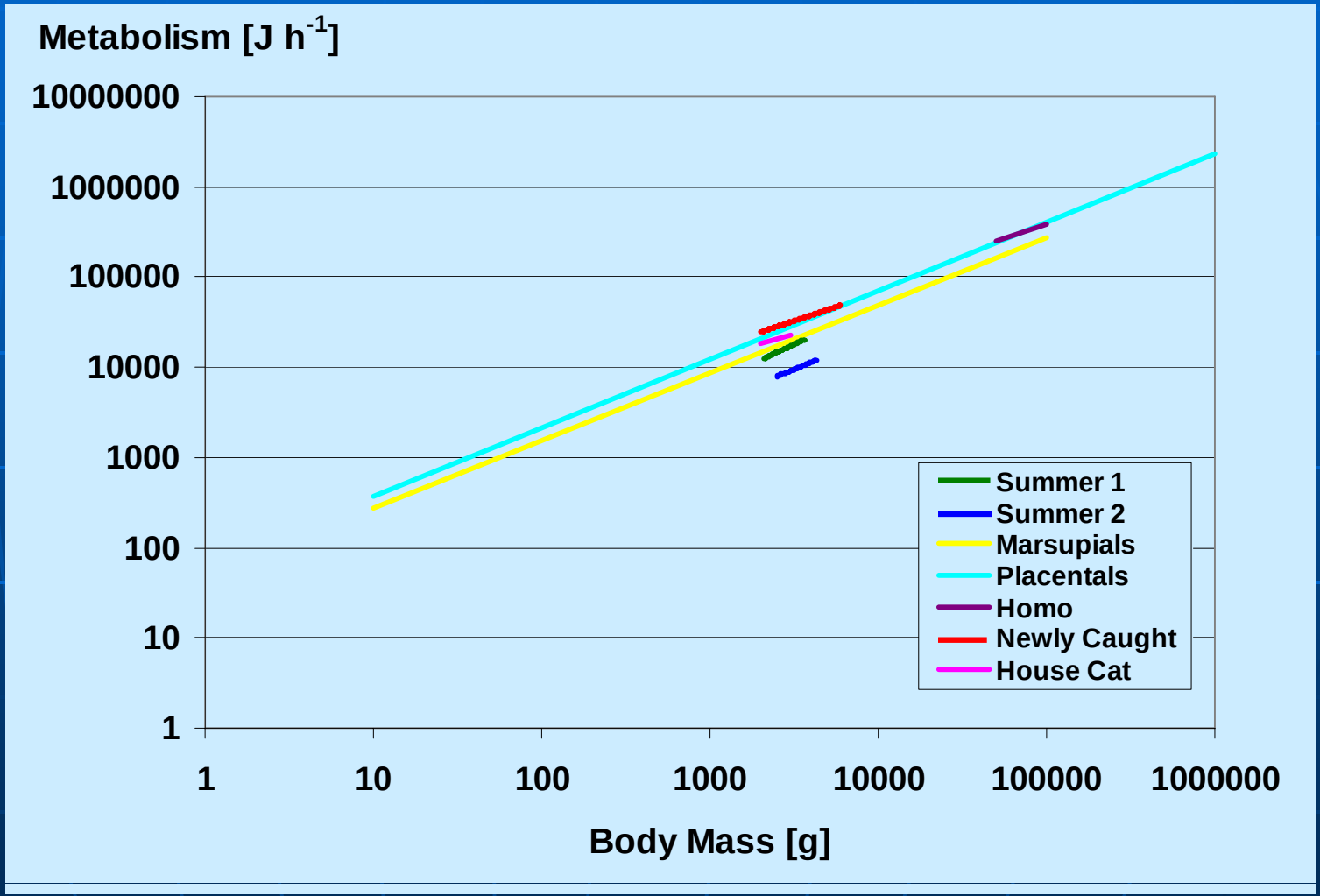


Results.

II. Mammals – *Levels*

Feral cat *Felis catus*

in Australia

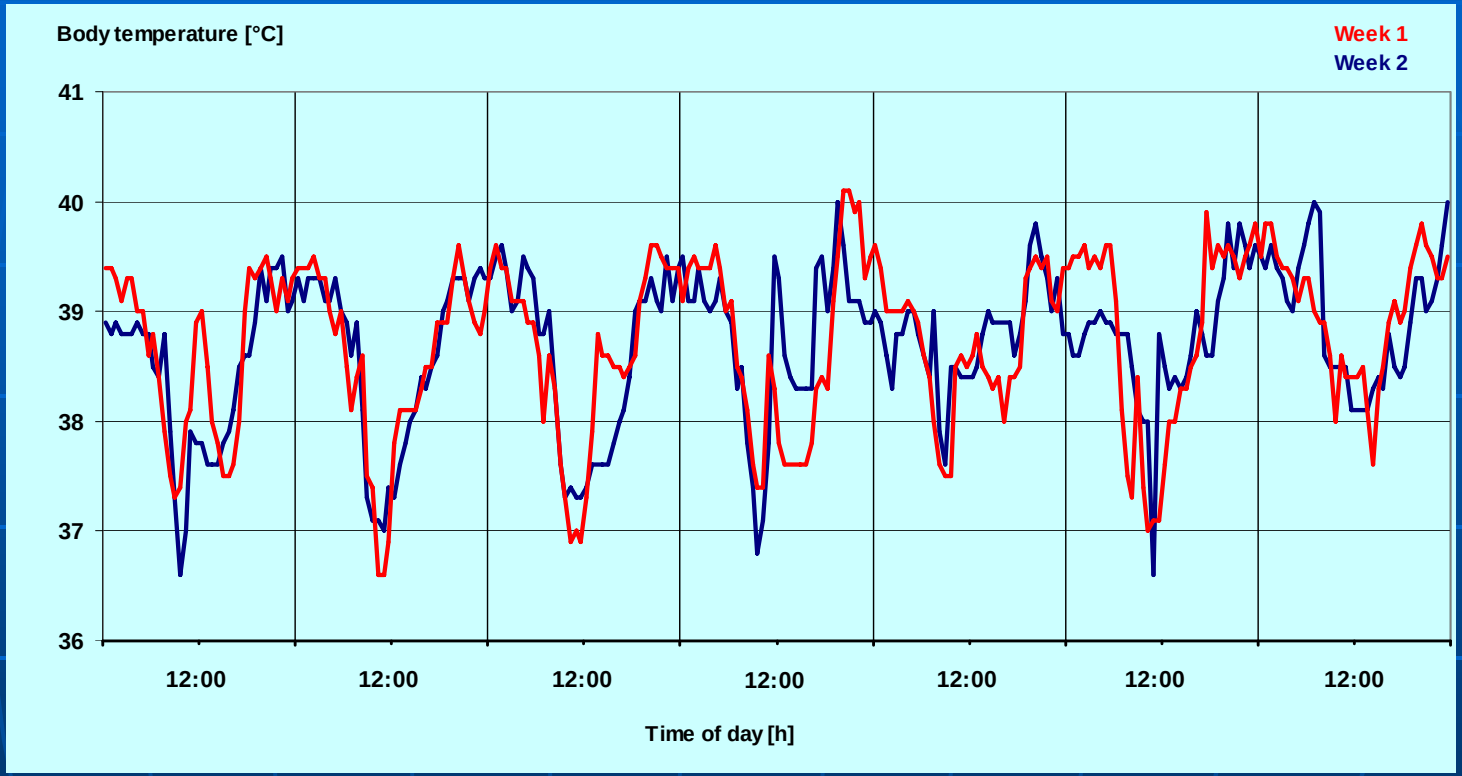


Results.

II. Mammals – Patterns

Feral cat
Felis catus

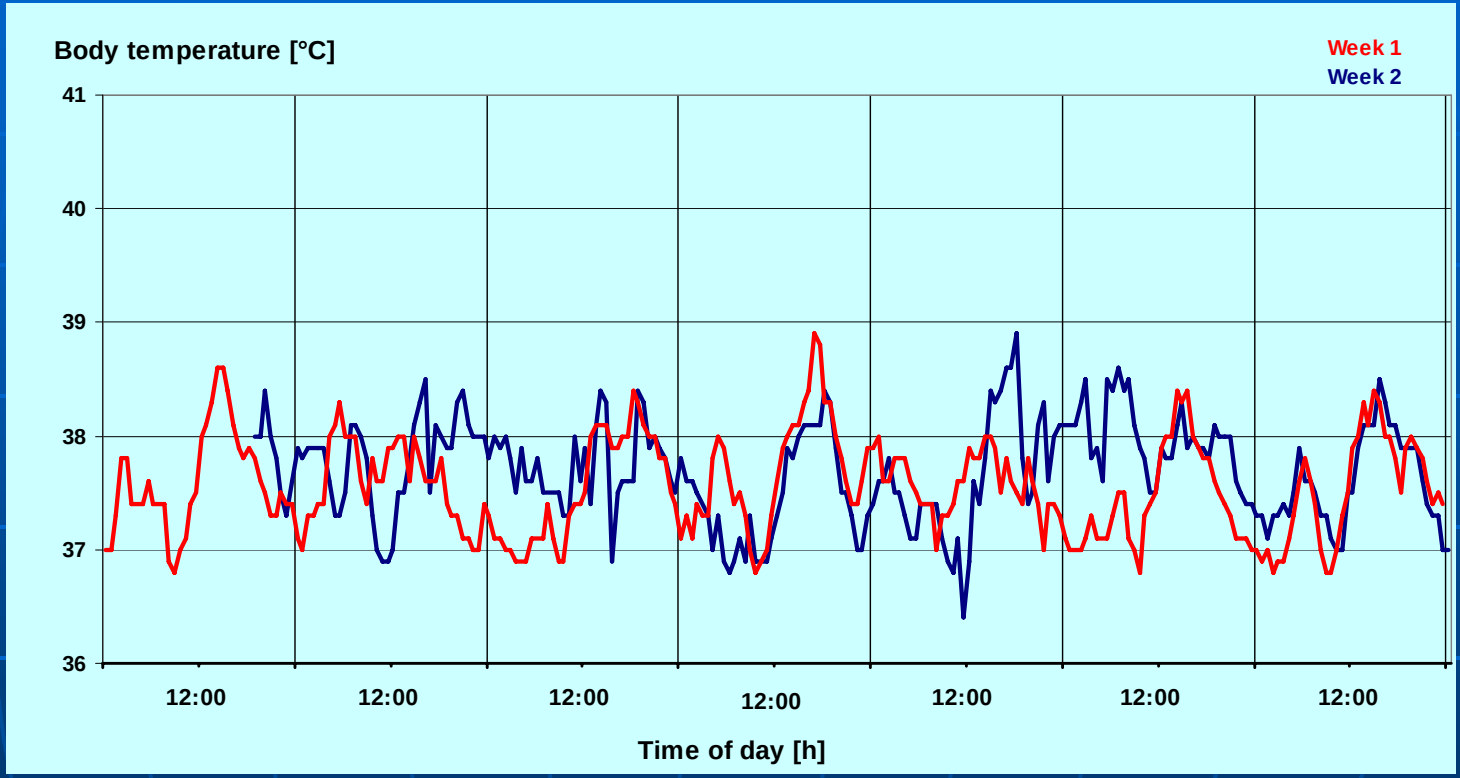
in Australia



Free-ranging

Results.

II. Mammals – Patterns



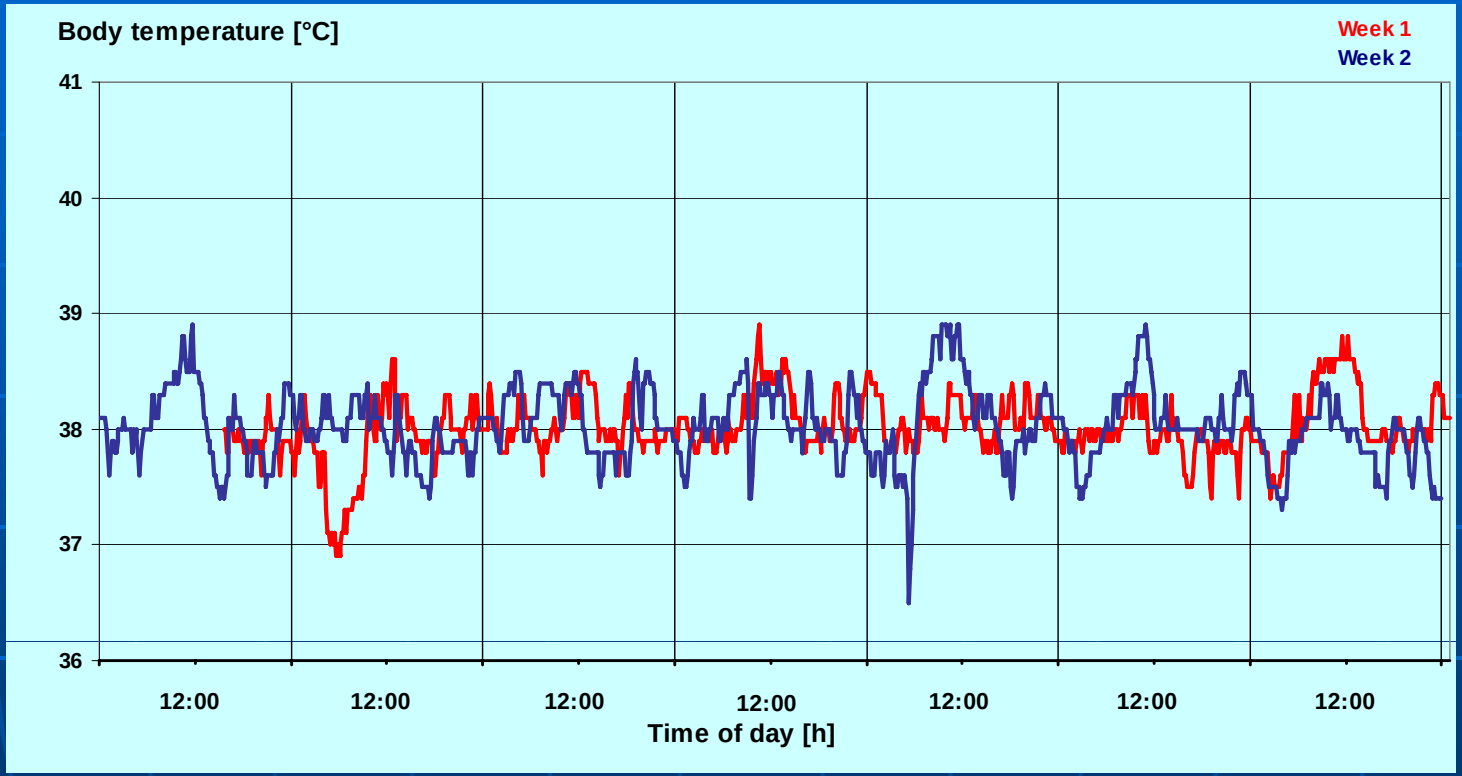
Feral cat
Felis catus

in Australia

6 months captivity

Results.

II. Mammals – Patterns



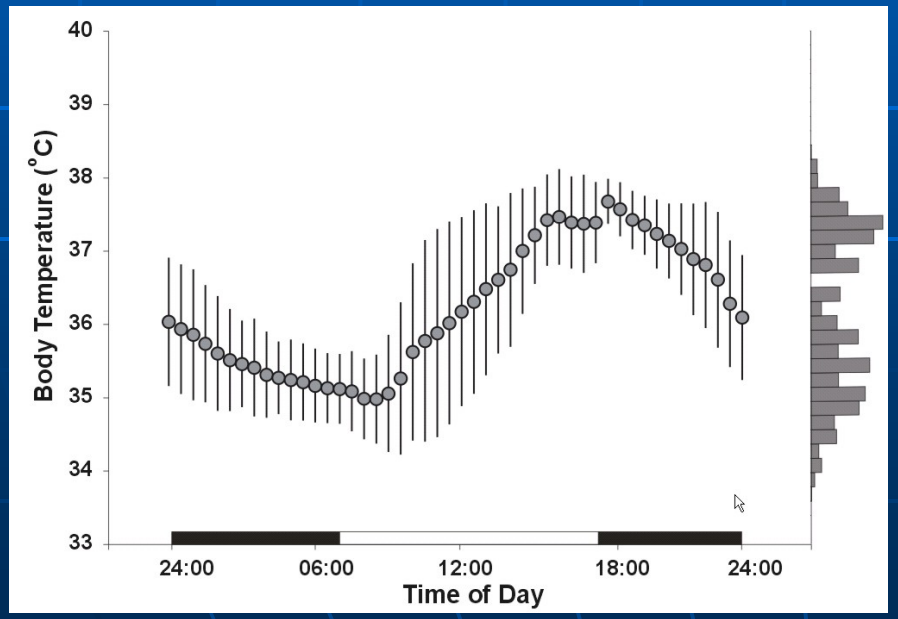
Feral cat
Felis catus

in Australia

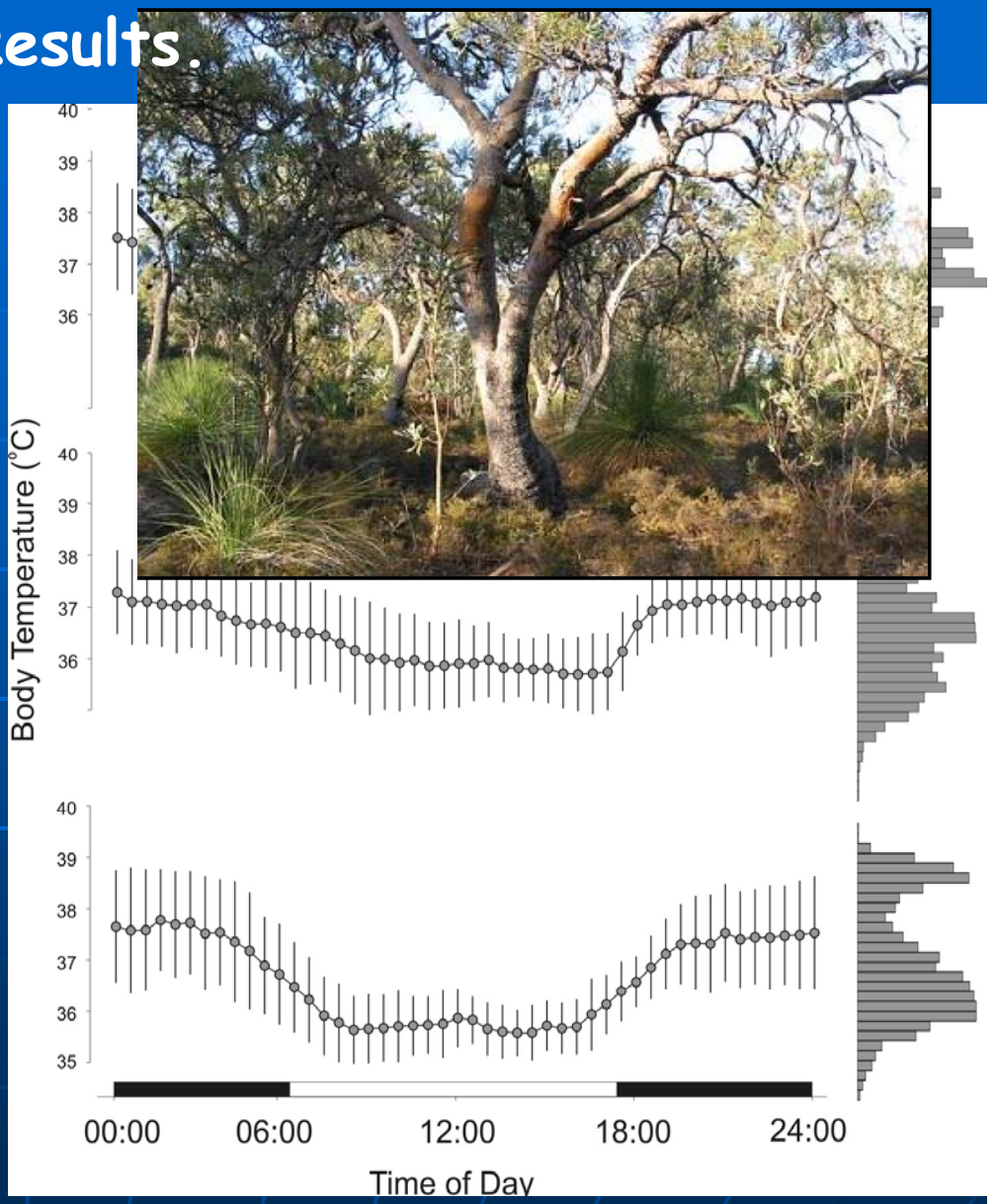
12 months captivity

Impact of captivity on physiological parameters

Results.



free-ranging



captive

Conclusions and outlook:

Insert here:
Species being subjected to changes in keeping conditions (Wild/ captive/ Wild / captive bred etc.)
With artificial food sources, the birds maintain an obvoius cycle but
The mammals respond with strong shifts….

Conclusions and outlook:

Captivity significantly alters physiology with regard to
- Patterns
- Levels
  of various parameters

Isn't this intuitively obvious?

FMR studies provided valuable data on gross energy consumption

BUT:
New remote sensing techniques &
portable metabolic systems allow:

- insight into underlying patterns and mechanisms
- observation of individual, intra – and interspecific variation
- quantification of impact of artificial conditions

ALERT: Caution must be exercised in interpretation of captive data
(> 90% of information available to date!)

Future dreams:

Apply physiological data to
improve nature conservation strategies
and management protocols
for the protection and reintroduction of
endangered native species