University of Zurich
Vetsuisse Faculty

Clinic
of Zoo Animals, Exotic Pets and Wildlife

‘The more the merrier’ or ‘Happy when alone’?

Hypothesis on stress susceptibility in captive individuals of solitary species

Marcus Clauss, Dennis Müller, Hanspeter Steinmetz, Jean-Michel Hatt

The concept of 'stress'

- Stress is known to cause disease susceptibility in humans and laboratory animals
- Little compelling evidence in zoo animals
- How to measure stress
  - faecal corticosteroids
  - disease incidence
  - mortality
  - longevity
  - abnormal behaviour
  - reproductive success

Management factors related to ‘stress’

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- Neighbour species?
- Special events (transport, introduction)

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- Keeper behaviour, husbandry routine
- Diet, diet presentation
- Behavioural enrichment
- Neighbour species?
- Special events (transport, introduction)
- Group size
- Medication

Animal factors related to ‘stress’

Stress factors
Comparative studies
Sociality
Examples
Practical approaches

Animal factors related to 'stress'

- Origin (wild born/captive born)

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- Rearing history (parent-reared/hand-reared)

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- Social rank

Species-specific approach

- Comparison of husbandry regimes ...
- Comparison of health status ...
- Comparison of rank ...

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- Comparison of husbandry regimes ...
- Comparison of health status ...
- Comparison of rank ...

... within individuals of a species

Comparative approach (between species)?

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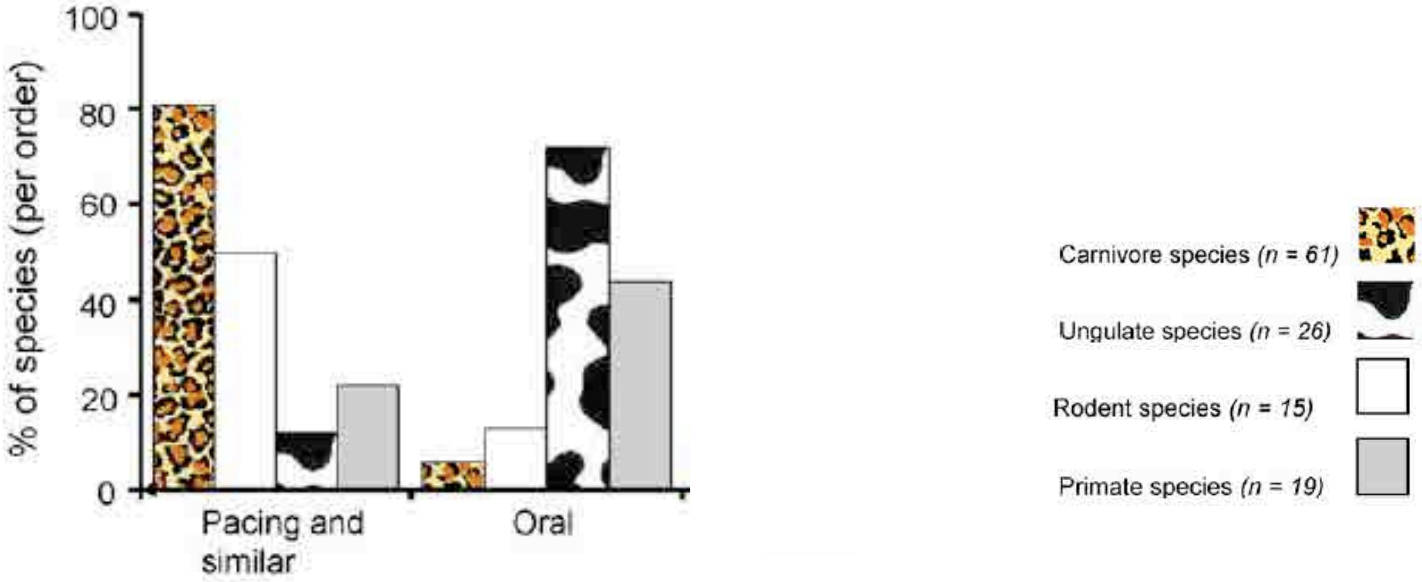
Why and how should we use environmental enrichment to tackle stereotypic behaviour?☆

G. Mason *, R. Clubb, N. Latham, S. Vickery



Sole/most common form of abnormal repetitive behaviour

Comparative approach (between species)

Captivity effects on wide-ranging carnivores

Ros Clubb, Georgia Mason

NATURE | VOL 425 | 2 OCTOBER 2003

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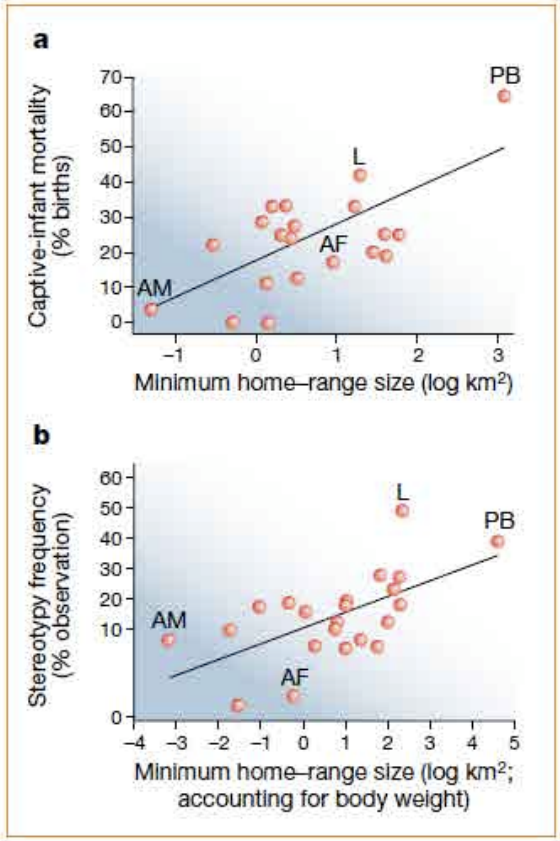

Comparative approach (between species)

Relevance of management and feeding regimens on life expectancy in captive deer

Dennis W. H. Müller, DVM; Laurie Bingaman Lackey, MA; W. Jürgen Streich, Dr rer nat; Jean-Michel Hatt, Prof Dr med vet; Marcus Clauss, PD, Dr med vet

AJVR, Vol 71, No. 3, March 2010

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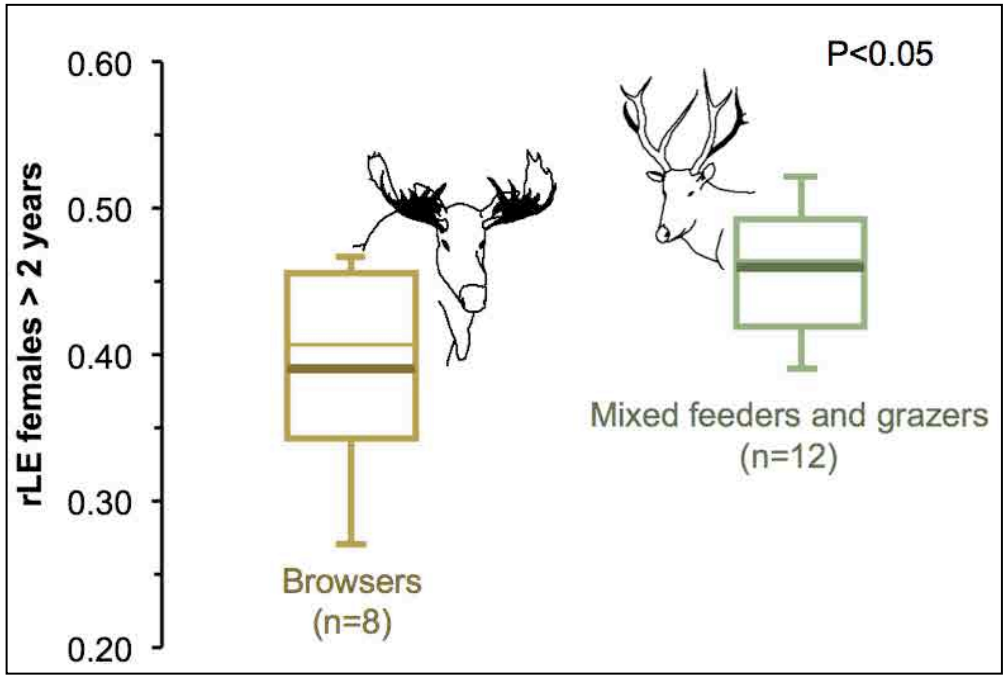

Stress factors
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Differences in sociality

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- Social species usually kept in groups

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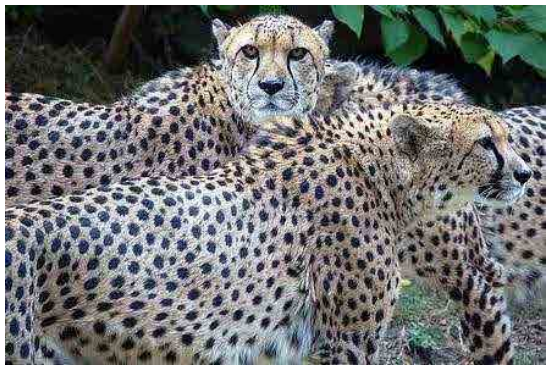

Differences in sociality

- Social species usually kept in groups
- Solitary species usually kept in ...

... pairs

Differences in sociality

- Social species usually kept in groups
- Solitary species usually kept in ...

... pairs

... or as individuals ...

Keeping animals ‘individually’

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... or as individuals ***in close vicinity to a conspecific***

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➡ Higher exposure to conspecifics in captive vs. free-ranging individuals of solitary species.

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Examples

Example 1: Brocket deer *(Mazama gouazoubira)*

Influence of husbandry systems on physiological stress reactions of captive brown brocket (*Mazama gouazoubira*) and marsh deer (*Blastocerus dichotomus*)—noninvasive analysis of fecal cortisol metabolites

Eur J Wildl Res

Maurício Durante Christofoletti ·
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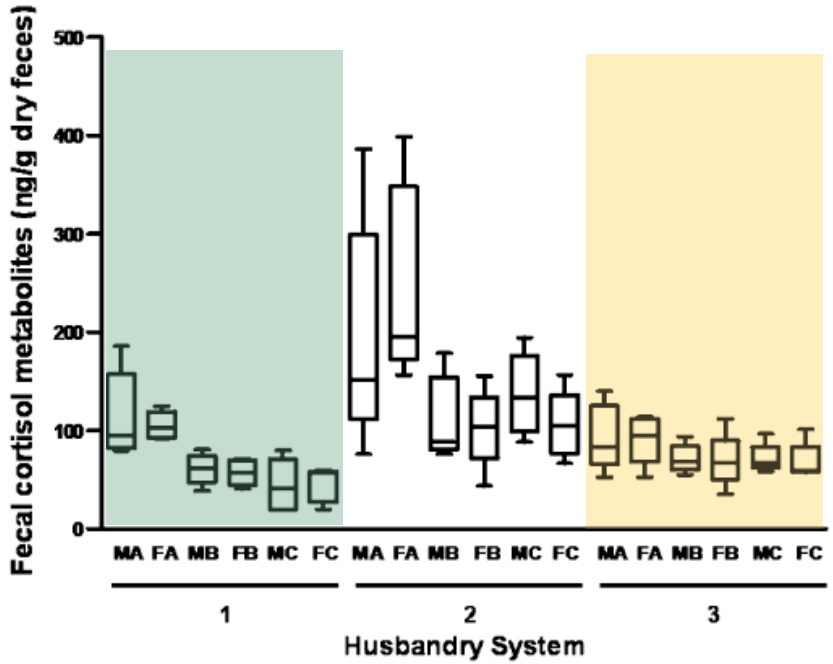
kept individually, indoors

pair outd. / indiv. indoors



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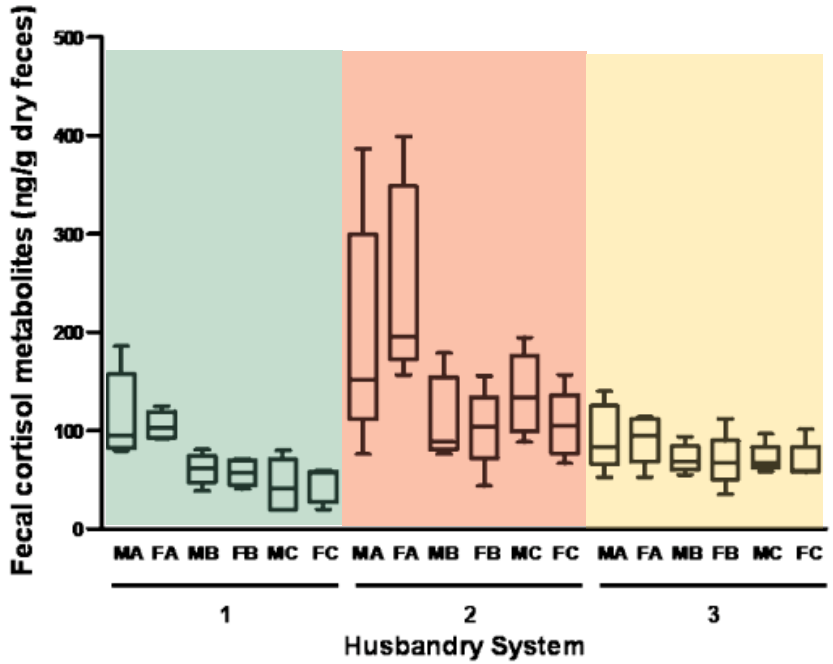
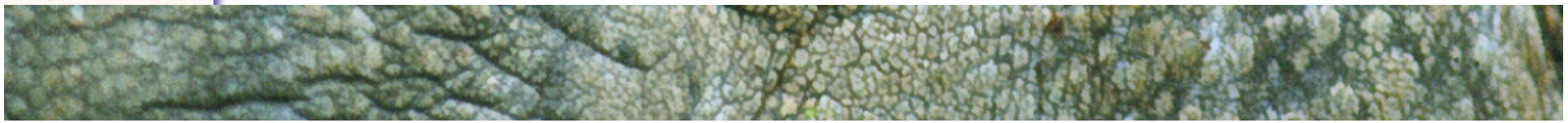


Example 2: Black rhino *(Diceros bicornis)*

Relationships Between Patterns of Fecal Corticoid Excretion and Behavior, Reproduction, and Environmental Factors in Captive Black (*Diceros bicornis*) and White (*Ceratotherium simum*) Rhinoceros

Kathy Carlstead[1*] and Janine L. Brown[2]

Zoo Biology 24:215–232 (2005)



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Black rhino pairs that were kept separated exhibited lower corticoid variability and less fighting activity when they were introduced during female estrous periods compared to pairs that were kept together every day.

Example 3: Orang utans *(Pongo* spp.*)*

Sumatran *(P. abelii)*

Bornean *(P. pygmaeus)*

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Sumatran *(P. abelii)*

Males solitary
Females in family groups

Bornean *(P. pygmaeus)*

Males solitary
Females solitary

Example 4: Cheetah *(Acinonyx jubatus)*

Impact of social management on reproductive, adrenal and behavioural activity in the cheetah (*Acinonyx jubatus*)

Nadja C. Wielebnowski[1], Karen Ziegler[2], David E. Wildt[1], John Lukas[2] and Janine L. Brown[1]

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Although generally solitary in the wild, zoos frequently house cheetahs in pairs or groups.

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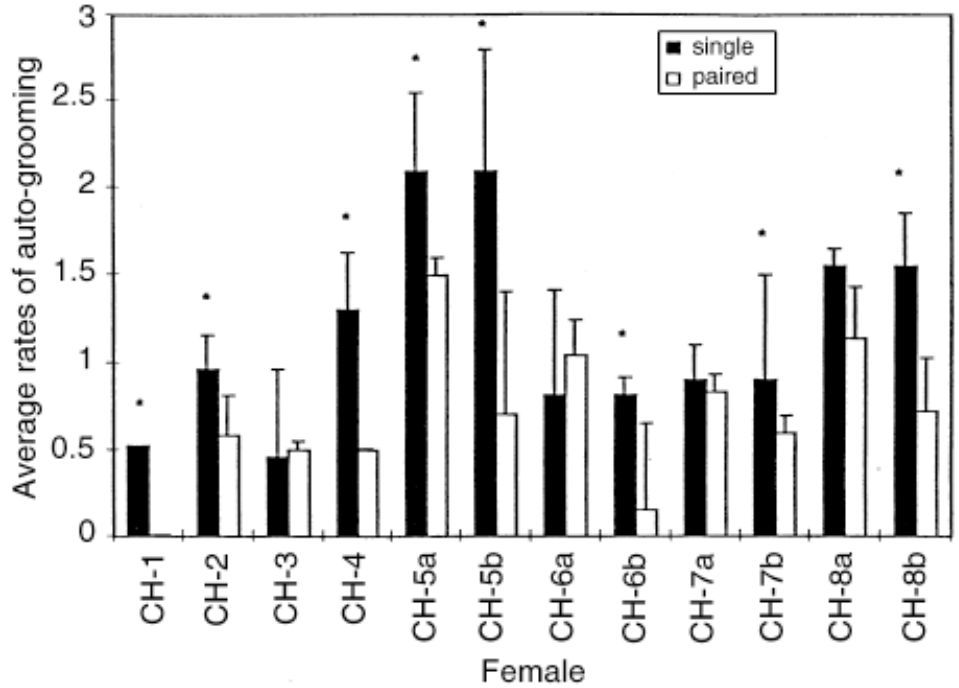

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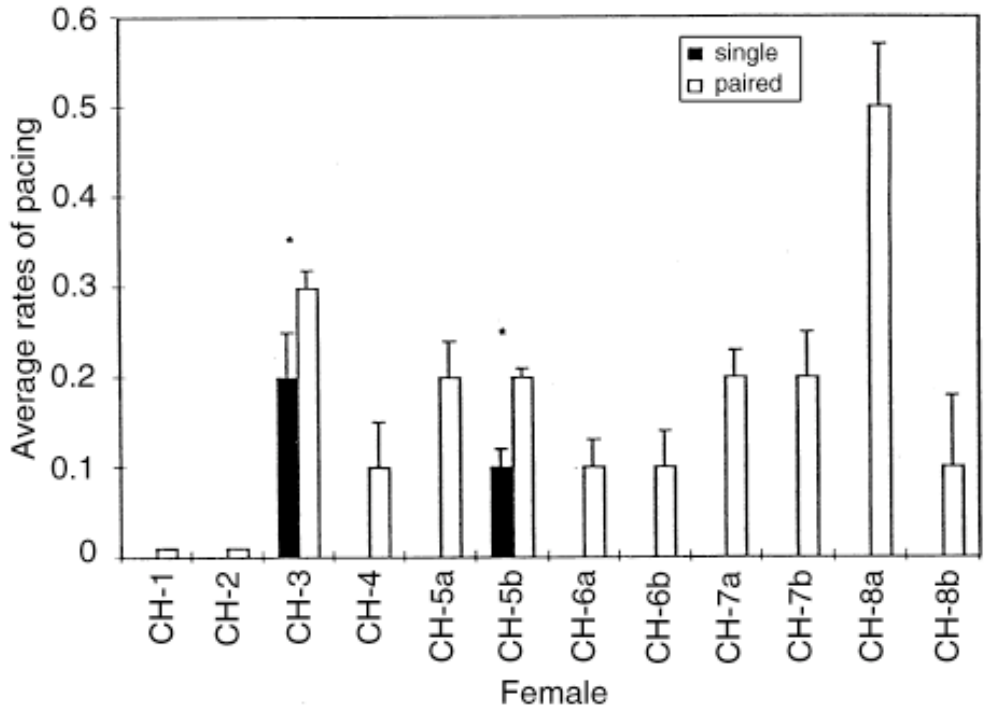

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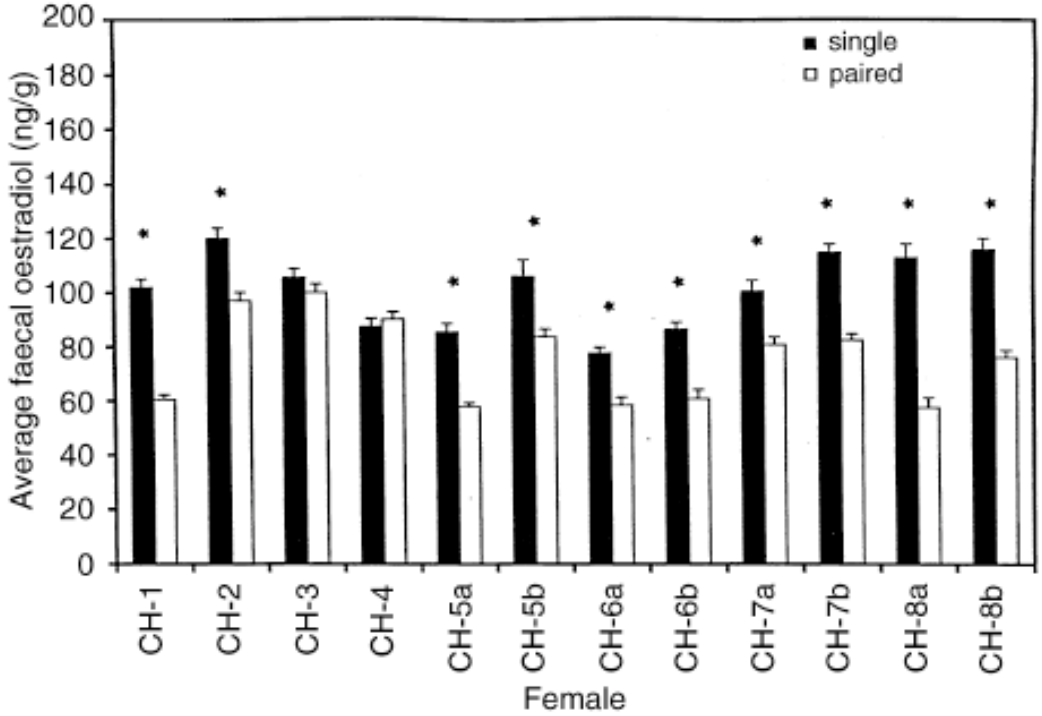

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H. Steinmetz (pers. obs.)

Lick dermatitis in a private-owned captive cheetah that healed when the wire mesh fence that separated the individual from the other cheetah of this owner was replaced by a plywood wall.

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What does 'solitary husbandry' really imply?

What other species could benefit from 'solitary confinement' ?

- Ungulates (okapi)?

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- Bears (giant panda)?

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- Ungulates (okapi)?
- Bears (giant panda)?
- Tigers and other felids?

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Food for thought

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