Up, over the top, or down?
Population development in closed captive populations of wild ruminants

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Aim

- Applying principles of population biology to zoo animal collections
Methods

- Closed populations of captive wild ruminants
- Animal numbers at the end of a year
- Mortality = animals that died in one year in % of all animals that were alive/born in that year
Population development

Time
Population development
Population size and mortality
Population size and mortality
Population size and mortality
Population size and mortality
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Population size and mortality
‘Complete success’ - population increase with mortality decrease
‘Complete success’ - population increase with mortality decrease - *Dama gazelle*
‘Good success’ - population increase and stagnating mortality
‘Good success’ - population increase and stagnating mortality - *Idmi gazelle*
‘Moderate success’ - population increase and mortality increase
‘Moderate success’ - population increase and mortality increase - *Pelzeln’s gazelle*

[Graph showing population size over time with a fluctuating line.]

- **Population size**
  - Number alive throughout year: 100, 125, 150, 175, 200, 225

[Graph showing mortality with a circular trend.]

- **Mortality**
  - Number alive throughout year: 0, 50, 100, 150, 200, 250
‘Over the top’ - after population peak, mortality decreasing
‘Over the top’ - after population peak, mortality decreasing - *Beira antelope*
‘Over the top’ - after population peak, mortality decreasing - *Blackbuck*
‘Deterioration’ - population decrease and mortality in/decrease
‘Deterioration’ - population decrease and mortality in/decrease - *Soemmerring’s gaz.*
Overstocking right from the start?
Overstocking right from the start?

Initial stock size (when introduced to AWWP)

- 'complete success'
- 'good success'
- 'moderate success'
- 'over the top'
- 'deterioration'
Overstocking right from the start?

Initial stock size (when introduced to AWWP)

- 'complete success'
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Overstocking right from the start?

Initial stock size (when introduced to AWWP)

SCC=0.578
p=0.002
Catastrophe: Population decrease but no mortality decrease
Catastrophe: Population decrease but no mortality decrease - Speke’s gazelle

Graph showing population size over time with a decline in 2006. The graph also shows mortality and the number of animals alive throughout the year with a significant decrease in 2006.
Catastrophe: Population decrease but no mortality decrease - *Speke’s gazelle*
Catastrophe: Population decrease but no mortality decrease - *Speke’s gazelle*

Massive veterinary and management intervention
Perfect situation: Population increase with continuous low mortality
Perfect situation: Population increase with continuous low mortality - *Dikdik*
Perfect situation: Population increase with continuous low mortality - *Dikdik*

Constant removal to new enclosures
Discussion

- Principal population biology derived from free-ranging populations adequately describes the situation of closed captive situations ...
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- ... in the absence of nutritional constraints and predation
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- ... in the absence of nutritional constraints and predation

  => crowding/social stress and infectious diseases
How to manage a captive population

Population size
How to manage a captive population
How to manage a captive population

Remove surplus at this stage or expand enclosure for maximum productivity
How to manage a captive population

Remove surplus at this stage or expand enclosure for maximum productivity
How to manage a captive population

- Population size
- Mortality
- Remove surplus at this stage or expand enclosure for maximum productivity
- Fight crowding by removal or culling (or surgical/ hormonal/ management birth control)

Remove surplus at this stage or expand enclosure for maximum productivity
How to manage a captive population

Fight crowding by removal or culling (or surgical/ hormonal/ management birth control)

Remove surplus at this stage or expand enclosure for maximum productivity
How to manage a captive population

- Population size
- Mortality
- Remove surplus at this stage or expand enclosure for maximum productivity
- Fight crowding by removal or culling (or surgical/ hormonal/ management birth control)
- Risk of reduction by disease (epidemic?)

Remove surplus at this stage or expand enclosure for maximum productivity
How to manage a captive population

- Remove surplus at this stage or expand enclosure for maximum productivity.
- Fight crowding by removal or culling (or surgical/ hormonal/ management birth control).
- Risk of reduction by disease (epidemic?) could get ‘out of hand’.
How to manage a captive population

- Population size
- Mortality
- Remove surplus at this stage or expand enclosure for maximum productivity
- Fight crowding by removal or culling (or surgical/ hormonal/ management birth control)
- Risk of reduction by disease (epidemic?)

Remove surplus at this stage or expand enclosure for maximum productivity
How to manage a captive population

Veterinary care supporting mortality decline

Risk of reduction by disease (epidemic?)

Fight crowding by removal or culling (or surgical/hormonal/management birth control)

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Thank you for your attention