Conservation Medicine: Epidemics, Zoonoses and Euthanasia

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Why do Zoos Exist?

Recreation

Education

Conservation

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California Condor

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Environmental Change

Zoonoses

The Front Line

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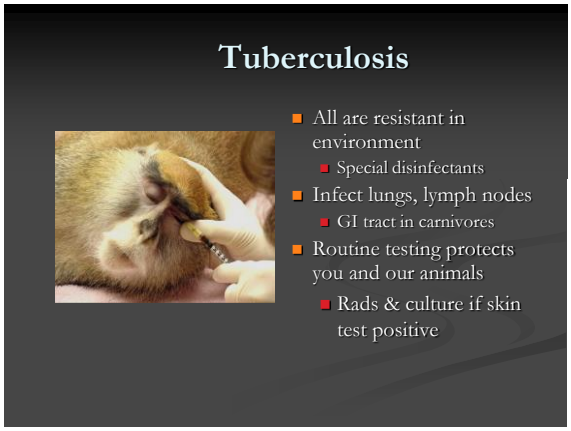
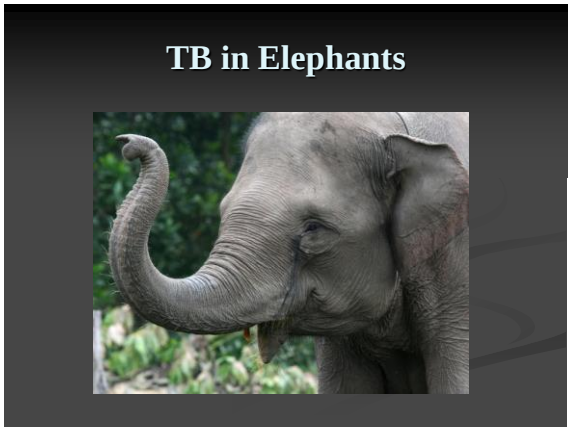
What diseases do we share?

- Rabies
- Herpes B
- Tuberculosis (TB)
- Psittacosis (Avian Chlamydiosis)
- Intestinal Parasites
- Salmonella
- Leptospirosis
- Many others… (over 200)


Some of the diseases animals get from you
Salmonella
Tuberculosis
Flu viruses
Shigella
Respiratory viruses


Tuberculosis
All are resistant in environment
Special disinfectants
Infect lungs, lymph nodes
GI tract in carnivores
Routine testing protects you and our animals
Rads & culture if skin test positive


TB in Elephants

Salmonella

- Cook your meat/eggs well
- **WASH HANDS**!!! Especially after handling reptiles
- Signs pass on their own after a few days to a week
- Rarely fatal unless immune compromised (children, elderly)

Baylisascaris

- Roundworm carried by raccoons (*B. procyonis*)
  - Asymptomatic, eggs shed in feces
- Migrates to other organs (CNS) when ingested by other animals
  - Birds, rodents, carnivores, primates
- Polar bears carry it as well (*B.transfuga*)

Personal Protective Equipment

Canine Distemper and Big Cats

Infectious Disease and Endangered Species

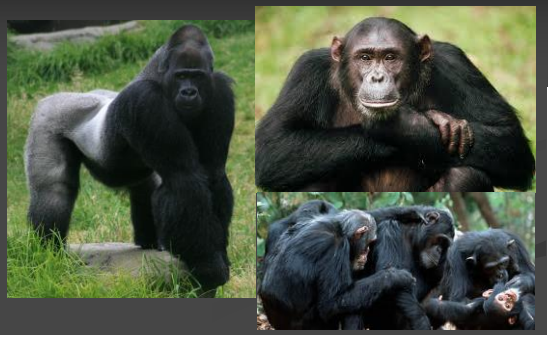
Pressures

- Habitat Loss
- Habitat Fragmentation
- Poaching/ Bushmeat
- Climate Change
- Loss of Genetic Diversity

Infectious Disease

Small fragmented populations are increasingly vulnerable to stochastic events that wipe them out- Including Disease

Ebola



Since 1976

- Roughly 12,000 human deaths- 0.0002%
- Roughly 120,000 Great Ape deaths- 30%

Saiga

127,000 dead

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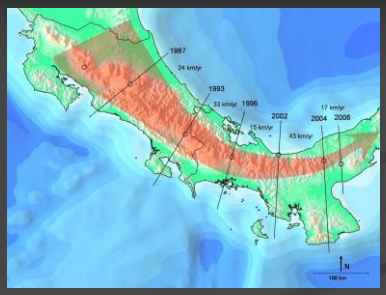
Amphibian Extinction Crisis

Batrachochytrium dendrobatidis

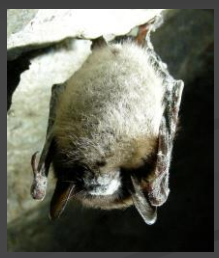
Chytrid



Lions and Tuberculosis

White Nose Syndrome

80%+ bat population reductions



Black footed ferret: Canine Distemper and Plague

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Black Footed Ferret

Fundamentally the Conservation of a Species is always about Genetic Viability

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Maximum Genetic Diversity in Small Populations is the Key in Conservation: Wild or Captive

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Conservation and Species Survival Plan Management

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Preserve Normal

Captive Population Conservation: A back up genetic pool

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Many species are going to require some combination of captive and wild conservation

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Captive Populations and SSPs

20 Wild Caught Founders will Capture about 95% of Genetic Diversity

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Expand population to 300 living individuals, with all founders equally represented

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90% of the wild population genetic diversity 100 years later

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Conflict between:

Space available in zoos

Number of species to conserve

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Managing Reproduction

Contraception
Separation
Vasectomies
Delayed Reproduction

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Sustaining reproductive function

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Early reproductive investment, senescence and lifetime reproductive success in female Asian elephants.

Hayward, A.D., Mar, K.U., Lahdenpera, M. and V. Lummaa,
J. of Evolutionary Biology, 2014

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Euthanasia for Conservation

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Rational Animal Management versus Emotional Animal Management

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Euthanasia

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Euthanasia to enhance quality of life and sustain reproductive ability

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Animals deserve to have normal physiologic and social life events

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Marius the Giraffe

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Science based decision carried out humanely

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Decision Making in Clinical Cases

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Some are Clear Cut

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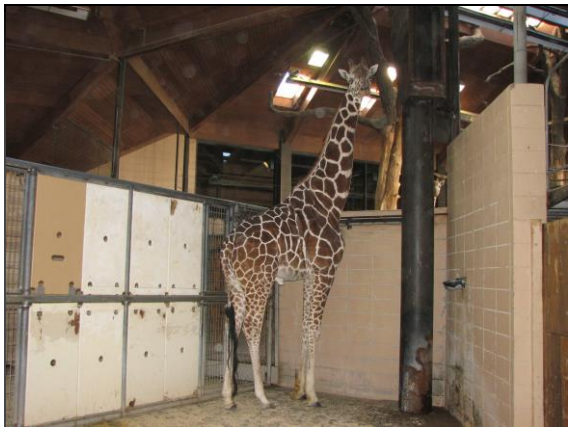

Most Require Decision Making about Priorities and Allocation of Resources

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Responsibility to protect animals from emotional decision making versus rational decision making

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Are we painfully prolonging the life of an animal to meet the emotional needs of the keeper/owner?

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Prioritizing risk to animals, risk to keepers

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Macaques and Herpes B

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How to utilize available resources:

People, Time, Money, Facilities

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Omaha's gorillas

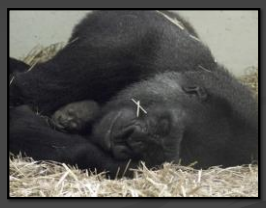
- 11 males, 3 females, ages 2 to 37 yr
- 4 groups
- 3 outside yards, 2 indoor exhibits 1 to 2 stories in height
- Multiple inside holding areas 1 to 3 stories in height

Medicine versus Behavior

Fights and Bites

- Treat every wound and injury

Cardiac Disease in Gorillas



Diagnoses

- ↓Ejection fraction (EF)
- Left ventricular hypertrophy (LVH)
- Mitral valve regurgitation
- Left atrial and ventricular dilatation
- Enlarged aortic arch
- Mild fibrosing cardiomyopathy

Cardiac cases at Omaha

- 6 out of 10 males on medication
- 3 after the first echo
- 2 additional after first follow-up
- 1 addition after second follow-up

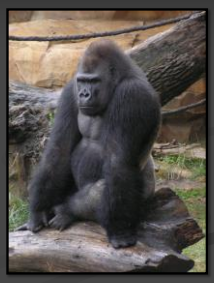
Treatment protocol

- Graduating levels of medication, increasing by 20 mg every 2 weeks
- Coreg® (carvedilol phosphate), 120 mg PO s.i.d., beta/alpha one adrenergic blocker
- Lisinopril, 60 mg PO s.i.d., ace inhibitor
- Changing to generic for carvedilol phosphate, 37 mg PO b.i.d.

Cost is about $4,000 per animal per year for medication
and the cost of an echocardiogram every 18 months

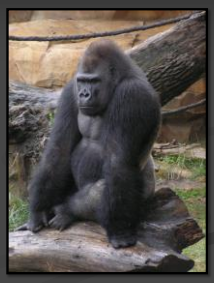
"Gerry"

- DOB 20 May 93
- 191 kg
- Diagnosed 21 Aug 07, 14 yr old
- EF of 31%
- LVH, left atrial and ventricular dilatation, fibrosing cardiomyopathy
- Standard carvedilol and lisinopril regimen



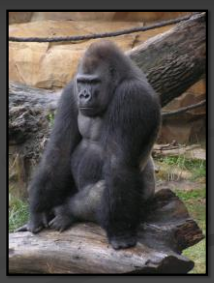
"Gerry"

- February of 2011- wet productive cough, treated successfully over 8 days, furosemide
- EF from 31% to 41%



"Gerry"

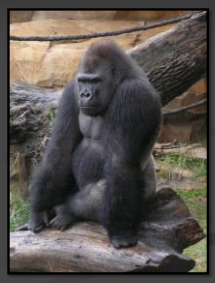
- August, 2011- animal became agitated with enclosure mate
- Infarct LV, ↑BP, EF 30%
- Asprin, digoxin, Plavix, furosemide



"Gerry"

Options:

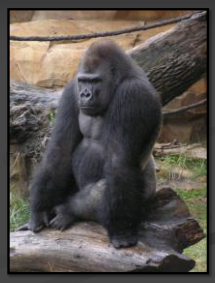
Stent for infarct- $10,000 for stent placement plus support $20- 30,000



"Gerry"

Options:

- Artificial heart- $500,000 to $1,000,000



Free ranging Wildlife Management and Problem Animals

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Problem Animal Options

Kill

Capture

Translocate

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