# Diagnosing disease in live crocodiles and treatment guidelines






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# Outline of this presentation

**Disease of the hatchlings and young crocodiles have the biggest impact on the viability of crocodile farms, whether crocs are raised for business or for conservation.**

- **Disease can be detected through the observation of a number of symptoms and measured by variables that we will review to learn how to establish that a crocodile is not as healthy as it can be.**
- **Disease is closely linked farming practices. Farming practices must not favour disease and allow early recognition of disease.**
- **Common diseases and common symptoms are presented as well as treatment principles.**
- **We outline methods used to prevent disease. (nutrition, staff training, routines, welfare)**

# Recognizing disease

**Disease is an extreme deviation (change) from the normal state. What are the changes that you must pay attention to?**

# Recognizing disease

**Changes in food intake**

- **How to measure food intake?**
  - **Direct observation?**
  - **Weighing food in food out?**
  - **Assessing food left in water?**
  - **Assessing food left on land?**

**What may be the causes of reduced food intake?**

- **Disease**
- **Fear, stress**
- **Too much size difference between animals**

# Recognizing disease

**Changes in appearance:**

- shape
- color
- texture
- eyes
- limbs

**Changes in behavior:**

**Position**

- Looks dead
- Star gazing
- Uncomfortable
- Deformed
- Unusual place

**Movements**

- Weak
- Trembling or convulsing

# Recognizing disease



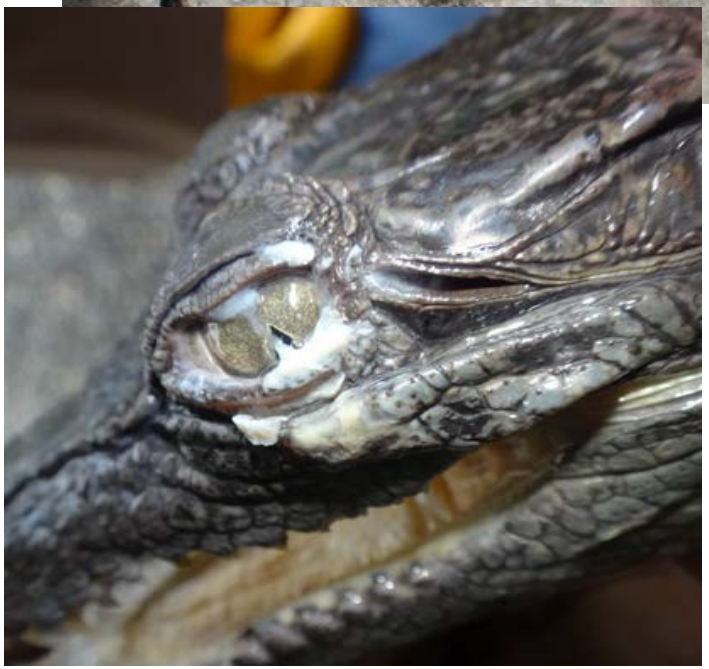




# Recognizing disease









# Recognizing disease

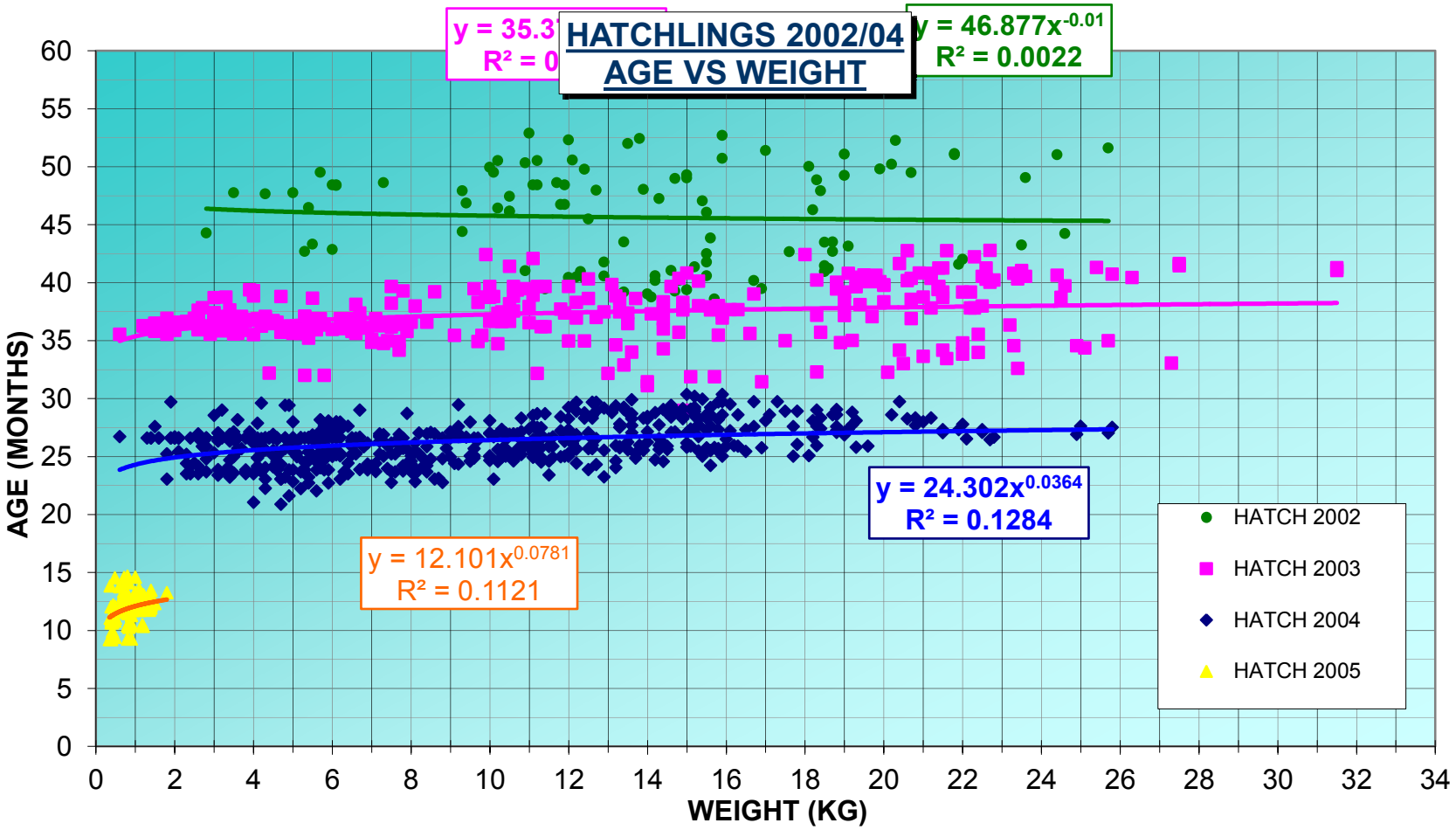


# Selected diseases

**Malnutrition: Hatchlings must eat enough food of good quality.**

**Quantity: Hatchlings are shy and usually eat when nobody is around and things are quiet. The braver ones will eat more and grow faster intimidating the other who remain smaller. This leads to starvation, slow growth, too high production cost.**

**Prevention: Good food presentation, stress-free environments and sorting animals by size and weight regularly.**


HATCHLINGS 2002/04
AGE VS WEIGHT
y = 35.3
R² = 0
y = 46.877x^-0.01
R² = 0.0022
y = 24.302x^0.0364
R² = 0.1284
y = 12.101x^0.0781
R² = 0.1121
HATCH 2002
HATCH 2003
HATCH 2004
HATCH 2005
AGE (MONTHS)
WEIGHT (KG)
0
5
10
15
20
25
30
35
40
45
50
55
60
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34

# Selected diseases

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Quantity: Hatchlings are shy and usually eat when nobody is around and things are quiet. The braver ones will eat more and grow faster intimidating the other who remain smaller. This leads to starvation, slow growth, too high production cost.

Prevention: Good food presentation, stress-free environments and sorting animals by size and weight regularly.

**Quality:**

**Food must be of a good consistency that can be picked up easily and does not get trampled or washed away easily.**

**The food must have the right amount of elements including protein, fats, Calcium and vitamins.**

**Hatchlings will prefer food with high proportion of fresh food.**

# Common Nutritional diseases




## Starvation





# Selected diseases “rubber jaw”

**Causes: lack of calcium in diet typically due to feeding red meat or wrong formulation of pellets.**

**Signs: weakness, tremors, seizures, rubbery bones, deformities, death.**

**Cure and prevention: correct diets. Diet must contain 1.5 to 3% calcium and ratio of Ca:P 1.5-3:1**

# Common Nutritional diseases

## Calcium deficiency



# Vitamin B1 deficiency

- **Associated with frozen fish or meats**
- **Seizures, star gazing**
- **Progressive paralysis**
- **Cure: Vit B1 injection 5-10 mg/kg weekly.**
- **Prevention: diet 15 mg/kg food**



# Vitamin E deficiency

**Disease of the fat, ‘white muscle disease’, slow growth**

**Usually not in hatchlings but yearlings and older, including adults**

**Treatment: not always possible, prevention: diet with sufficient Vit.E (120mg/kg food)**

# Steatitis

**Disease of the fat, fat becomes hard**

**Associated with diets of fatty fish and fish that is not fresh.**

**Signs: Sluggish, clumsy stiff movements,**

**There is No treatment**

**prevention: keep fish portion minimal, choose lean fish, use fish that is fresh.**





**Nutritional diseases with different causes can look similar and require more investigations to tell them apart.**

**Prevention: good diet, good feeding practices**

**Cure: correct diets. some not treatable**

**Huge impact on economic viability**

# Common diseases

**Infections:**

**Some infections are transmissible between animals but others are not although they may appear at the same time**

**Usually infections will be more common in rainy season or in the cold season**

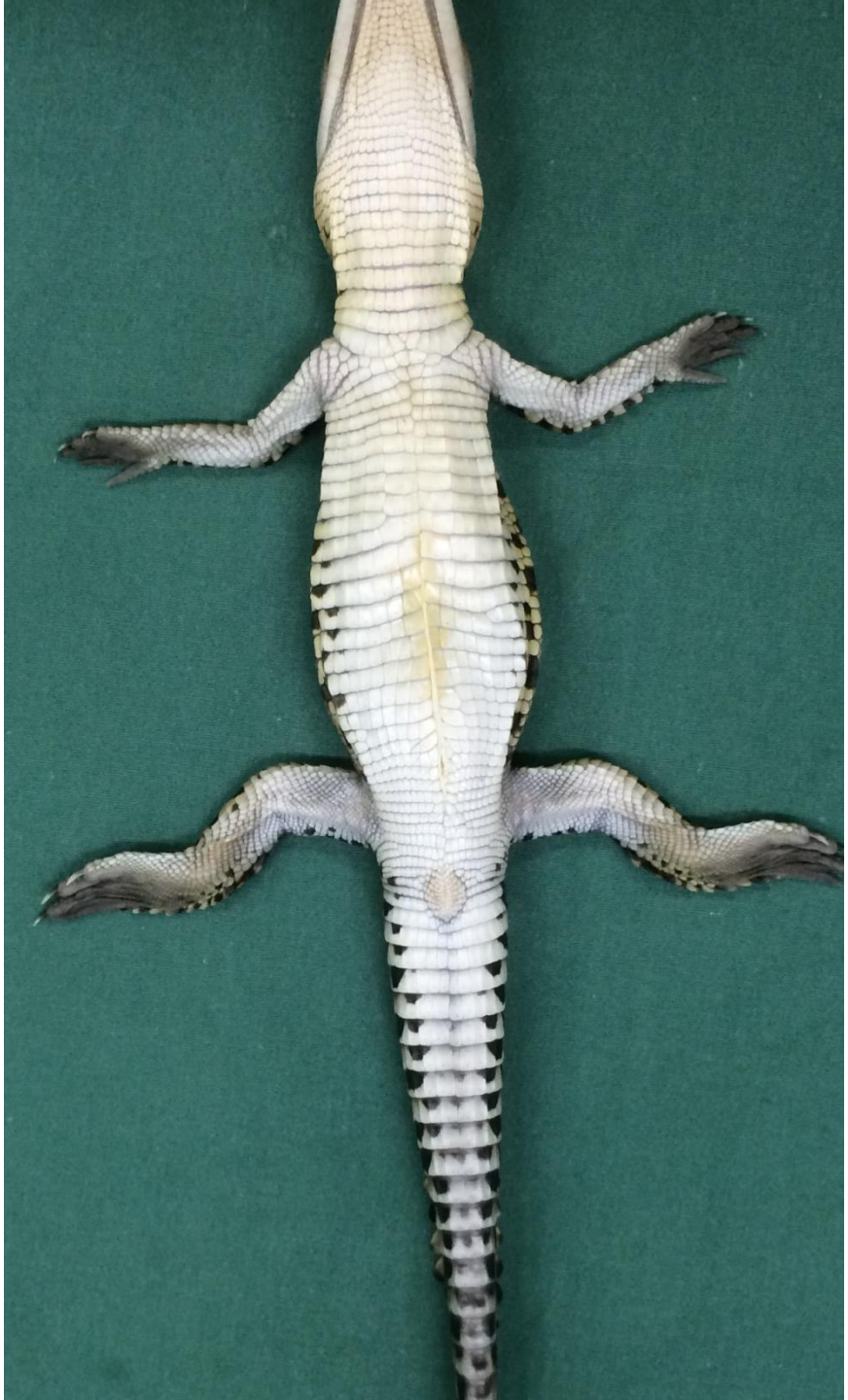
**Most diseases of farmed crocodiles are multifactorial: Caused by bacterial, viral or fungal action in a crocodile weakened by the combined effects of bad environment and high stress**

# Yolk Sac infection

**A frequent diseases of hatchlings in the first weeks of life are yolk sac infections**

**Infection of the yolk sac can take several weeks or months to cause death and will not always kill the animal but slow their growth or make it weak.**

**Yolk sac infections can be avoided by keeping the hatchlings in clean water, without feeding, for the first 4 to 7 days while waiting for the umbilicus to close completely.**













# Generalized infection

**Most common cause of death is infection of the blood by bacteria from the intestines that then infect many internal organs and lead to death.**

**Typical multifactorial disease: Closely associated with stress such as cold periods (weather or water change), construction (noise, movements), bad hygiene, etc.**

**These conditions allow bacteria from the intestines to enter the blood and spread.**

**Signs: loss of appetite, redness of oral cavity or skin, bloated abdomen, dead, skinny or normal depending on how fast the infection kills,**

**Treatment: multifactorial including antibiotics**

**Prevention: multifactorial**







# red eyes, white eyes, swollen eyes

Red eyes are a common symptom that can be have many causes. Often red eyes are associated with mass mortalities of hatchlings.

**TRANSMISSIBLE**
























Eyes closed, red, swollen, white



- **Swollen eyes**









# What causes ‘red eyes’?

**Herpes?**

**Chlamydia?**

**Mycoplasma?**

**Fecal bacteria in dirty water?**

**High Ammonia in the air?**

**Cold water?**

**All of the above?**

# How to treat ‘red eyes’

**Different results in different places. Always important:**

- **Water temperatures stable**
- **Clean water**
- **Reduce stocking densities**
- **Separate sick ones / do not mix sick ones**
- **Good sorting of stock: do not leave runts behind.**

# Skin disease

**Easier to recognize**

**Some are transmissible**

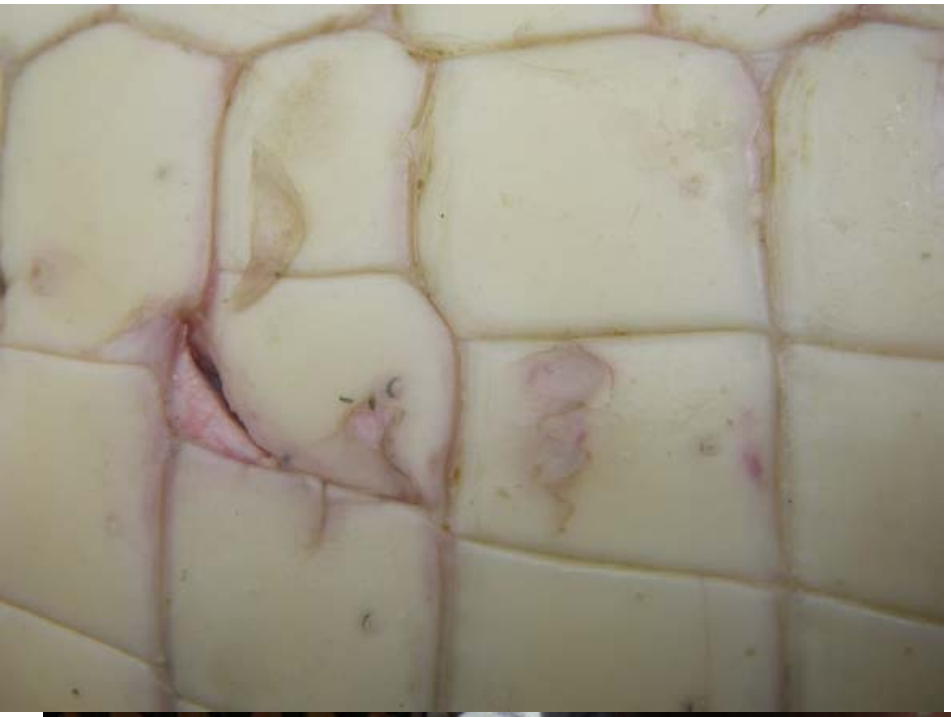
**Big economic  impact**

# Wounds

**Wounds can get infected and damage skins permanently .**







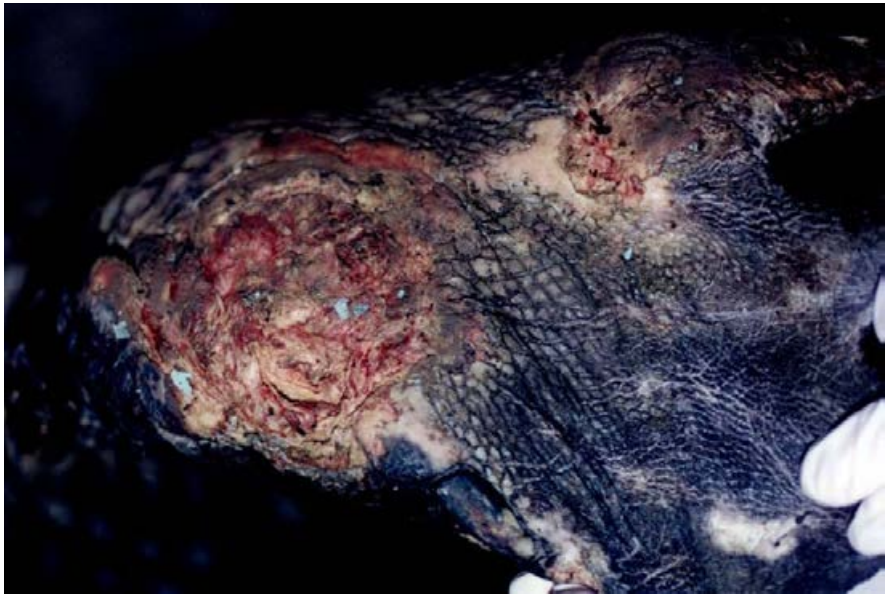








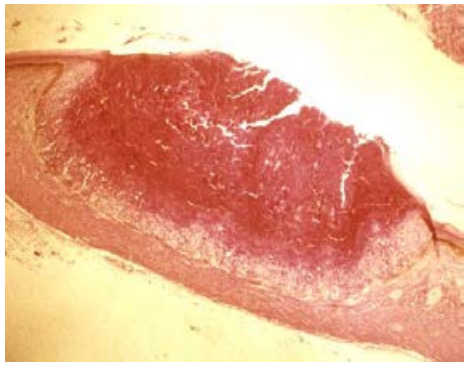




# Viral skin diseases

## Pox



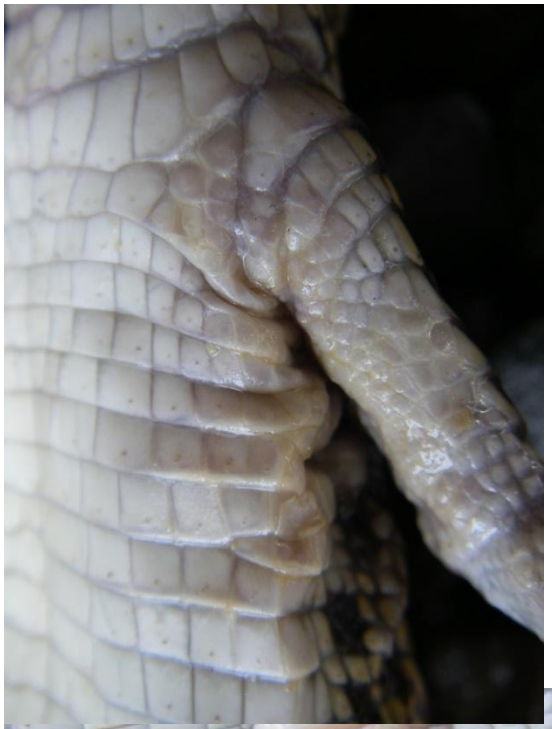




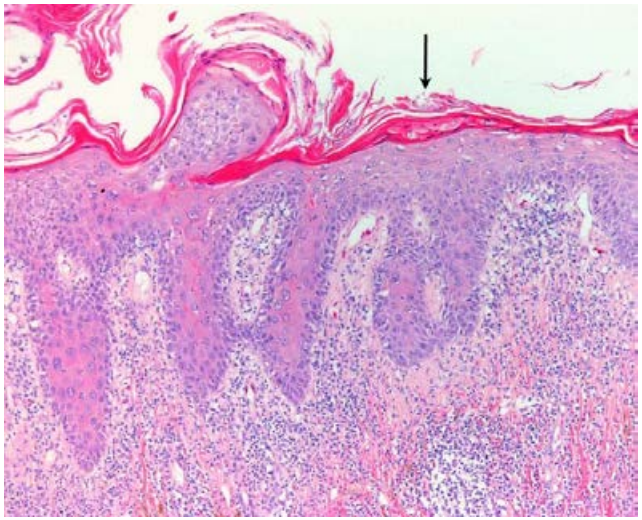
# Viral skin diseases

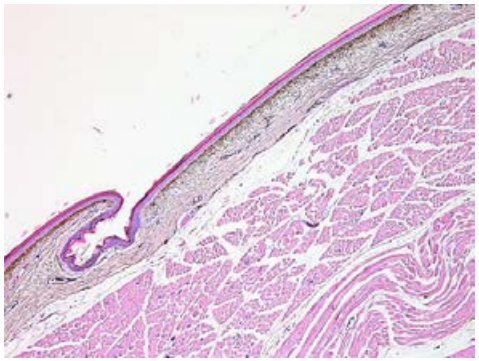
Parapox

















# Mixed skin infections

**Typically associated with cold or rain or stress**

- **Brown spots**
- **Wet sores**
- **Ulcers**
- **Greasy thick skin**
- **Stress dermatitis**
- **White nose disease**













# Treatment of Mixed skin infections

- Vitamin A
- Clean water: change daily and add 0.5 to 1 ppm Chlorine (0.5 to 1 mg/liter)
- Clean the animals with disinfectants like F10 1:250 (4 ml/liter)
- Antibiotics orally or injectable
- Reduce stocking density

# Joint swelling

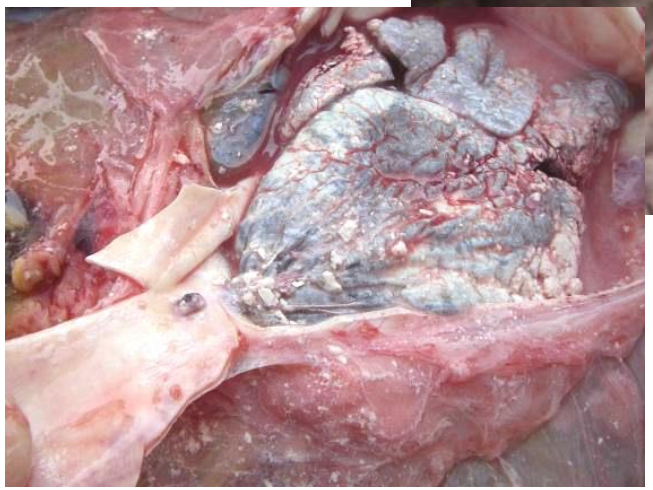
- **Mycoplasma: contagious, also more common in cold or rainy season**
- **Gout: Nutritional, temperature, kidney disease**
- **Infected wound**



# Joint swelling







# Lung Infections

- Common finding
- Usually not diagnosed on the live crocodile
- Usually given too much importance by vets
- A sign of other problems, typically stress or cold

# Lung infections







# ‘Why is my crocodile sick?’

**Be careful to ask the right question!**

**The right questions are:**

**“Can this crocodile disease affect the other crocodiles?’**

**‘what can I learn from this sick crocodile to protect my other crocodiles?”**

# Multifactorial diseases

**Most diseases of farmed crocodiles are multifactorial**

**Early detection is important**

**When investigating disease, if you follow just one factor (bacteria, virus, fungus) you will spend a lot of money and time and not solve the problem. You must look at the whole picture.**

# Multifaceted treatments

**Reducing stress**

**Protecting from cold**

**Feeding good food**

**Treating the right disease**

**Do not use drugs randomly**

**Demand diagnosis, develop relationship with vet**

