Pinkeye: New Epidemics of an Old Disease

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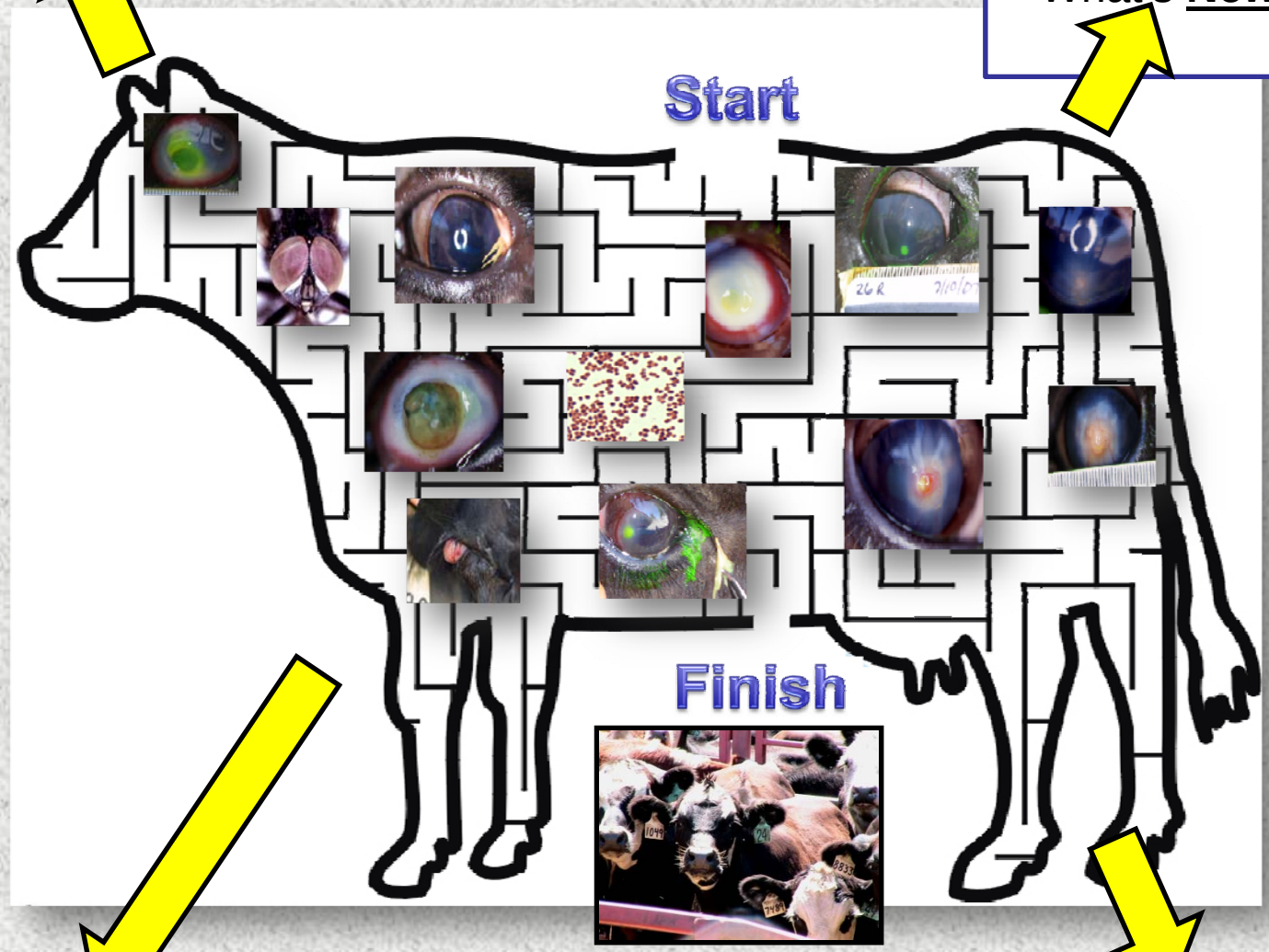
UCDAVIS
VETERINARY MEDICINE

Pinkeye Basics

Pathogens

– How they cause disease

– What's **New?**

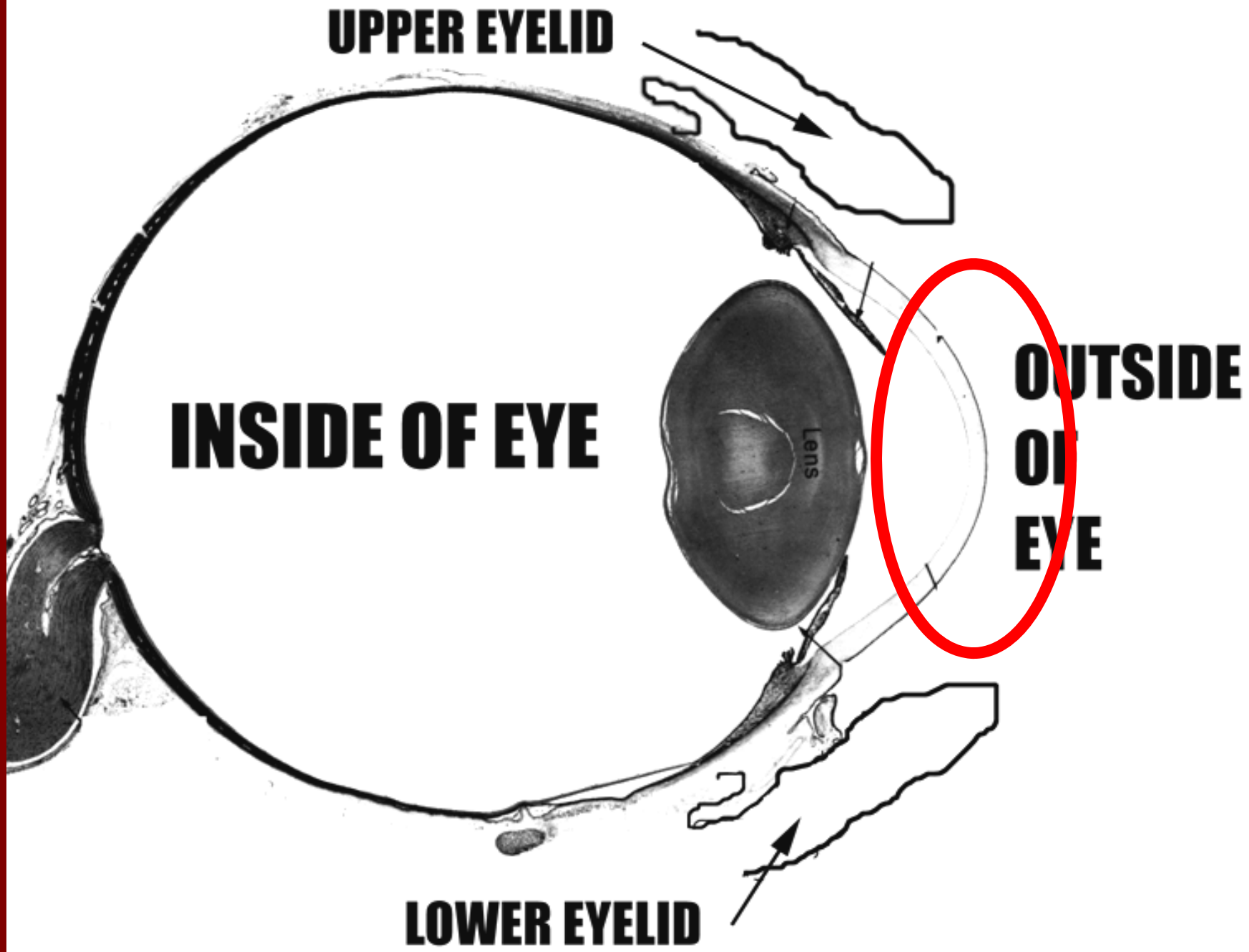


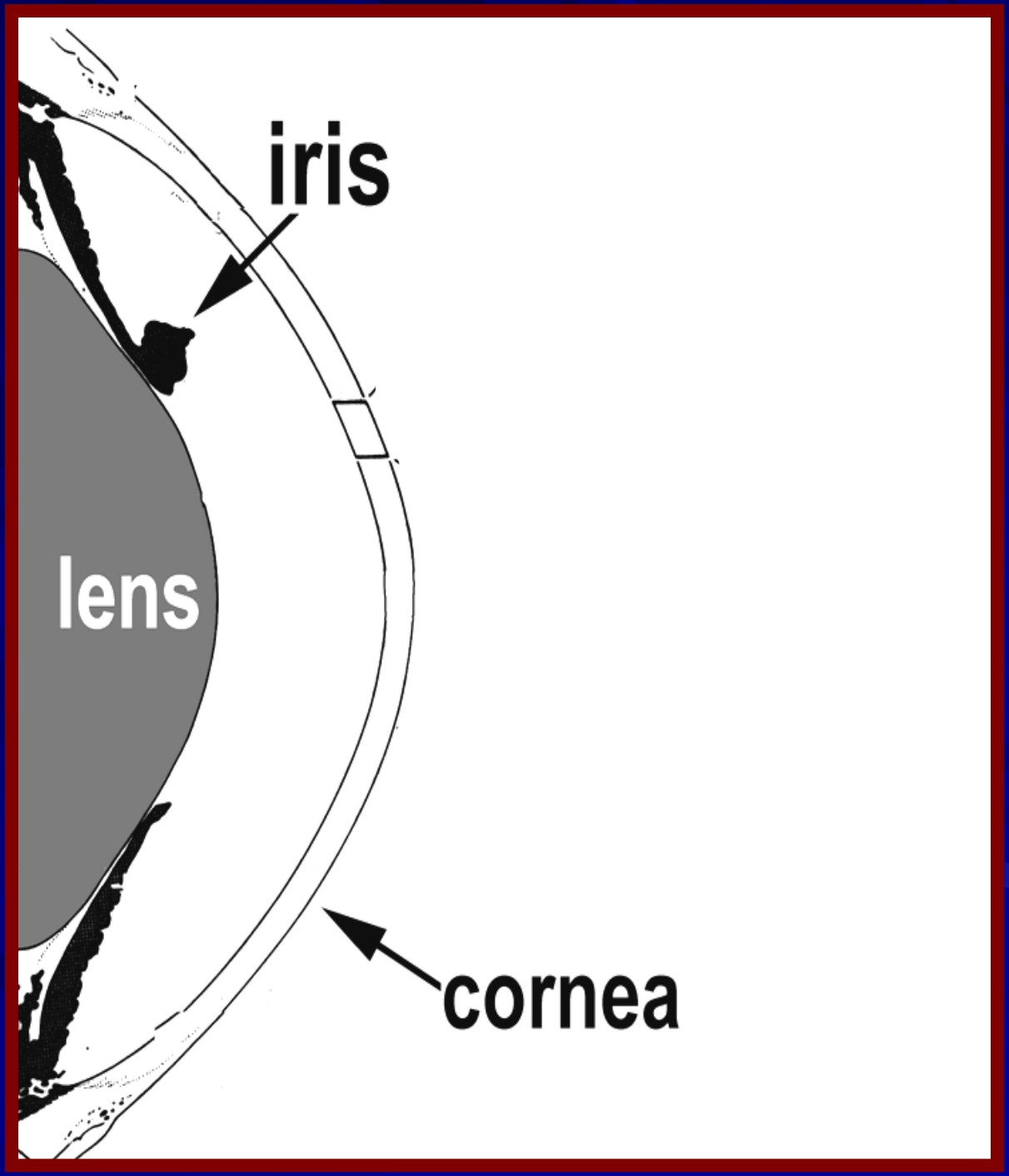
Treatment

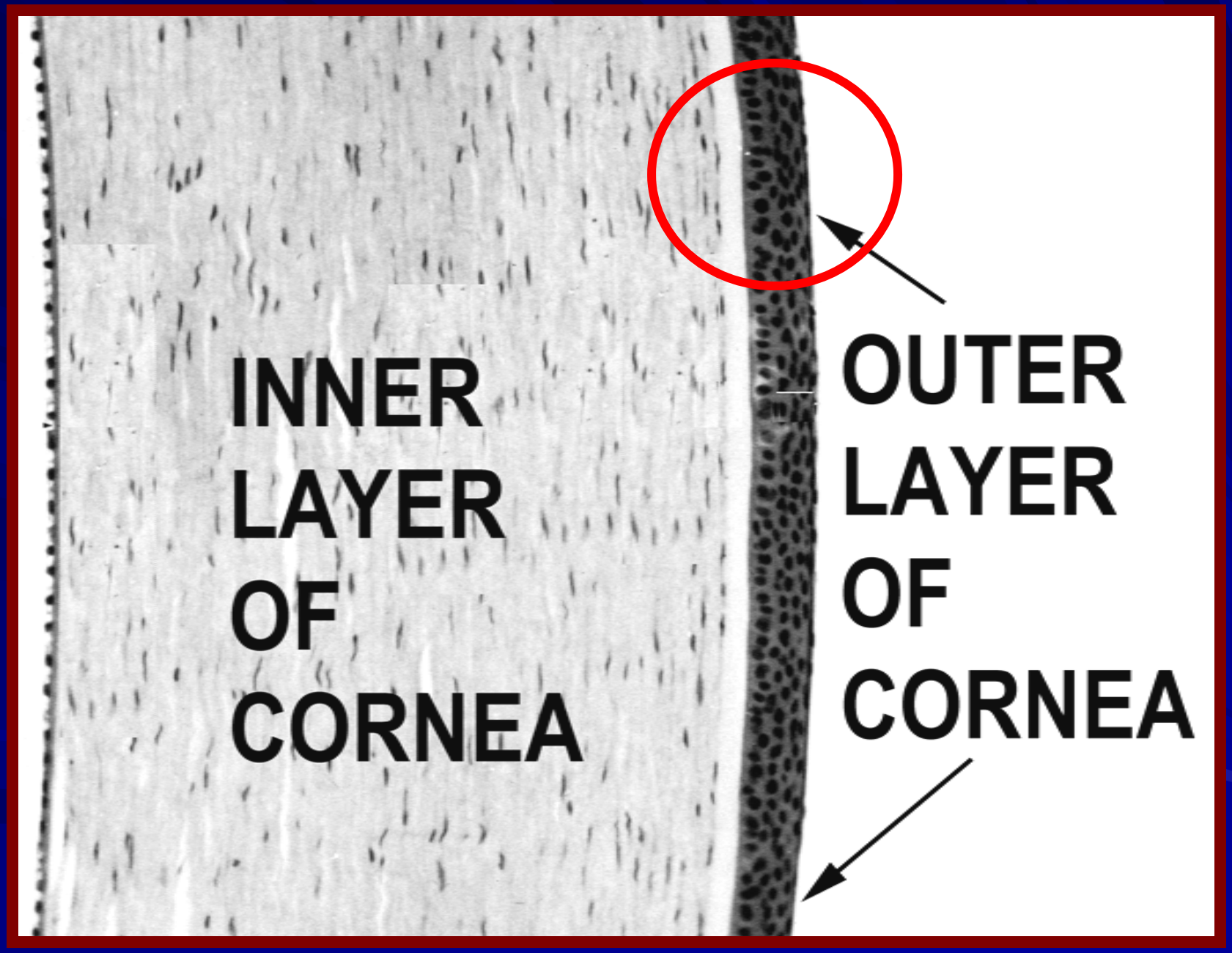
Prevention

- Vaccination

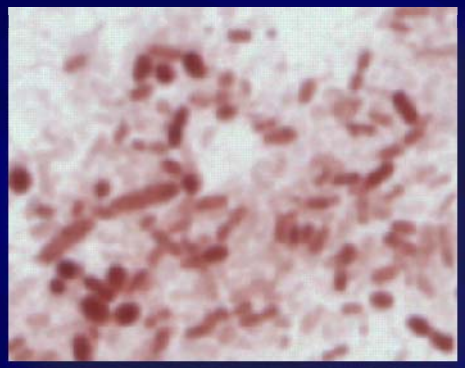

Is anything wrong with this calf's eye?

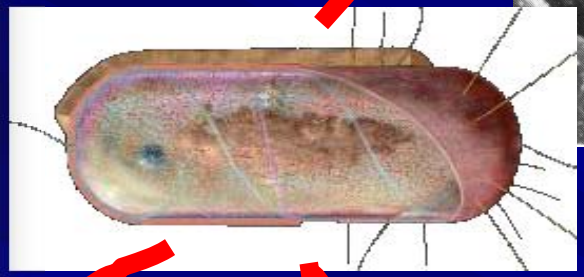

UPPER EYELID
INSIDE OF EYE
Lens
OUTSIDE
OF
EYE
LOWER EYELID

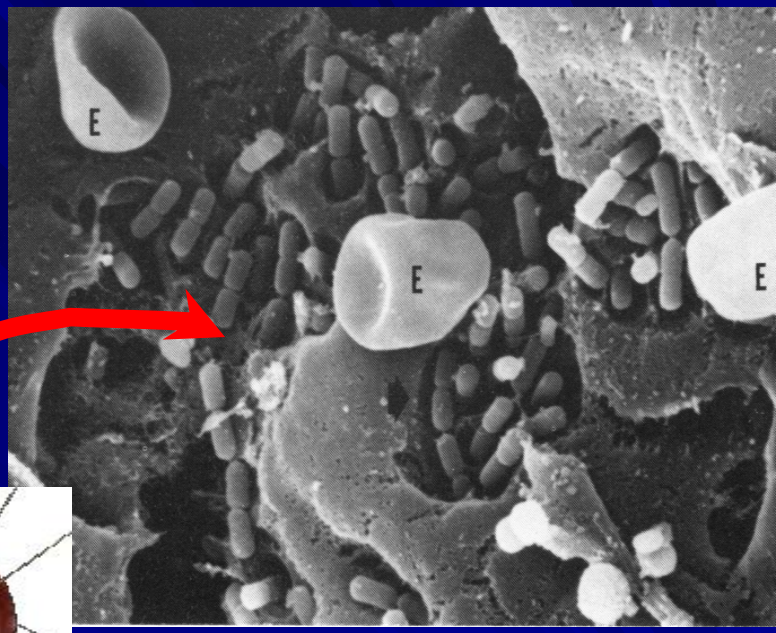

iris
lens
cornea

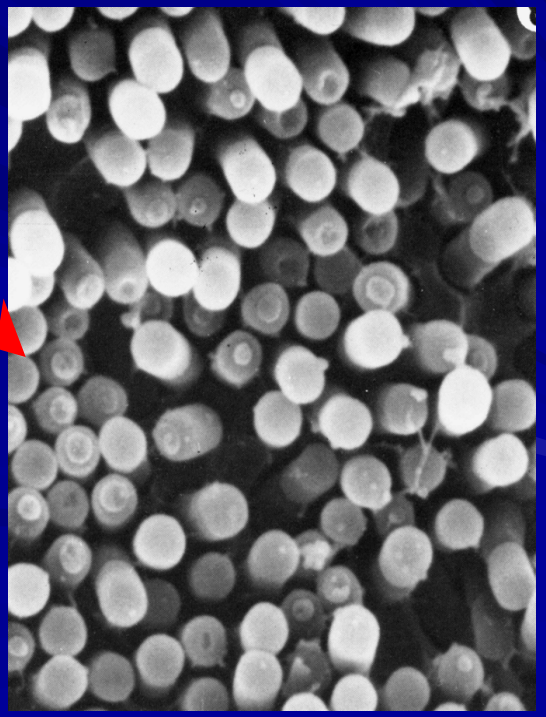

INNER
LAYER
OF
CORNEA
OUTER
LAYER
OF
CORNEA

Infection of the eye with ***Moraxella bovis*** causes Pinkeye....

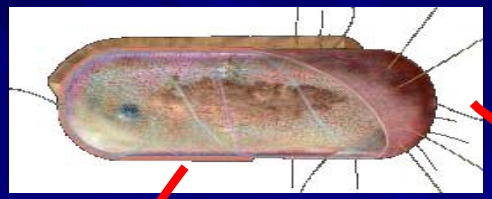


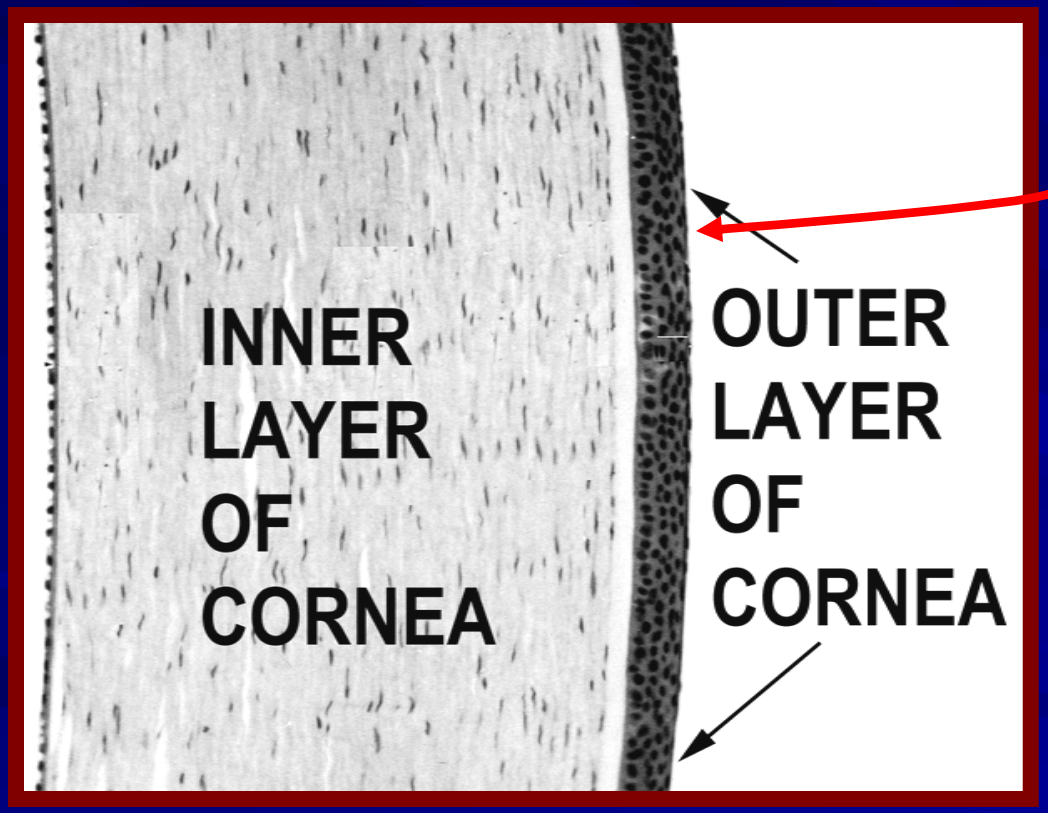


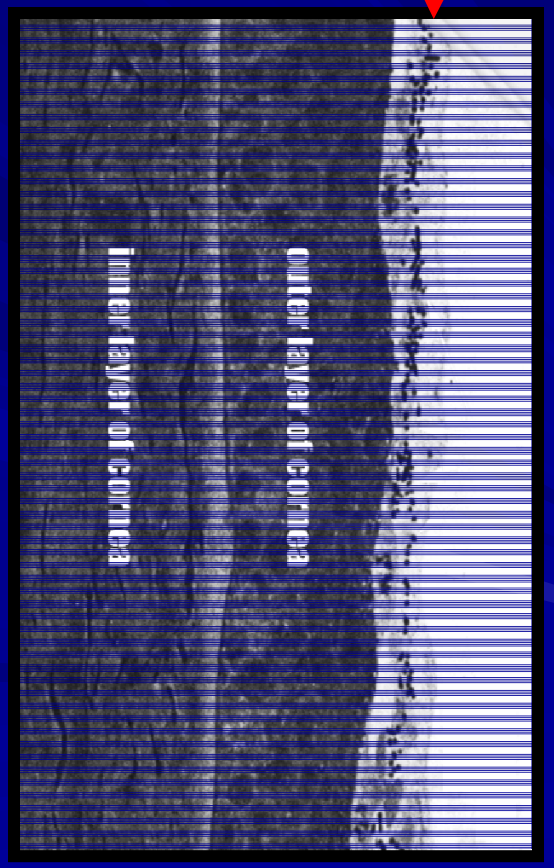




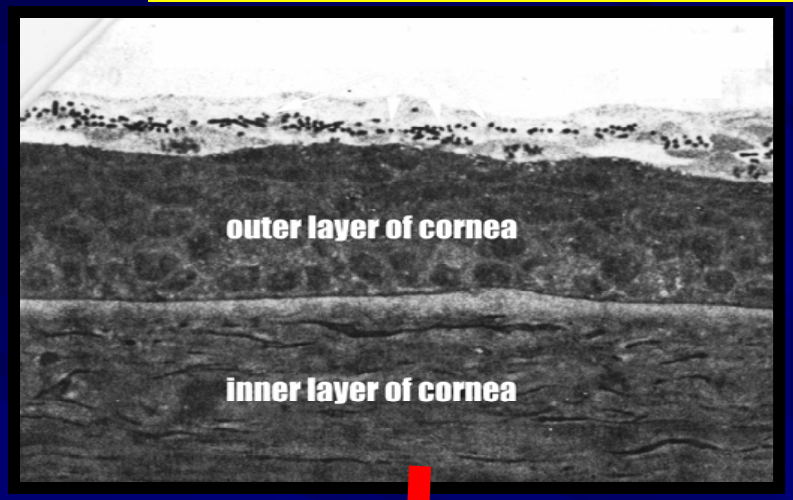
Infection starts on eye surface…



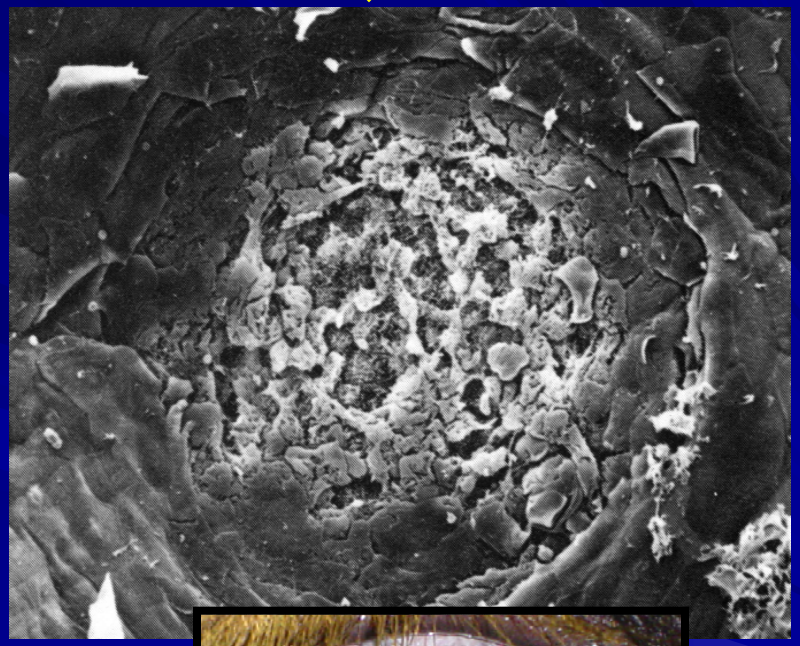


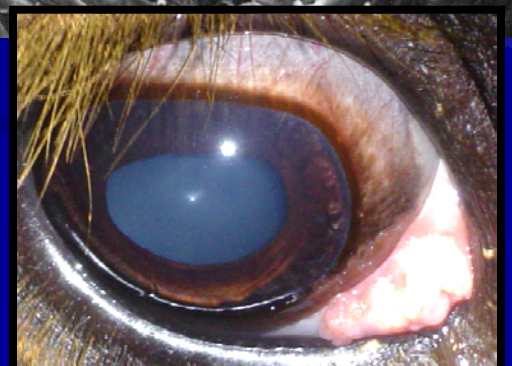


then goes deeper…

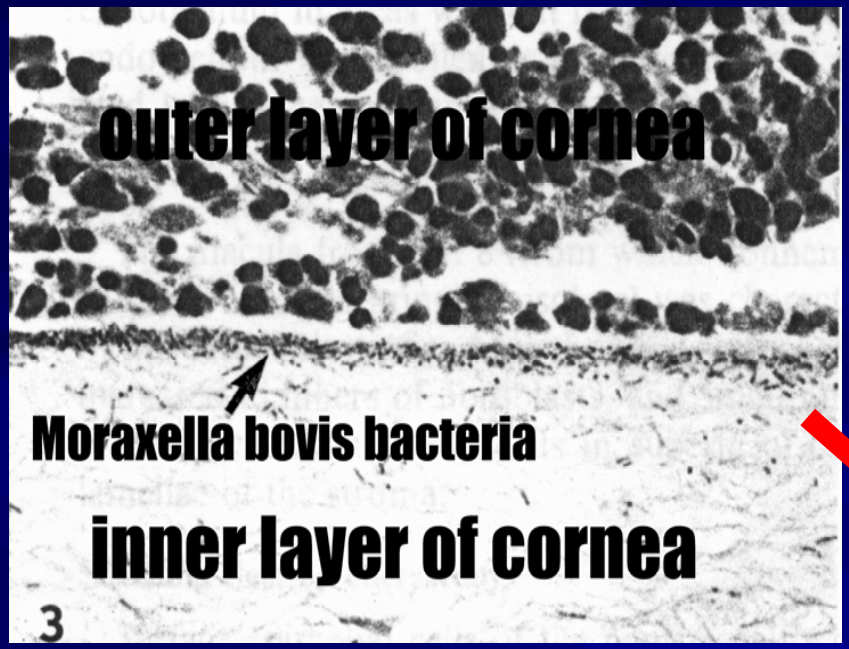


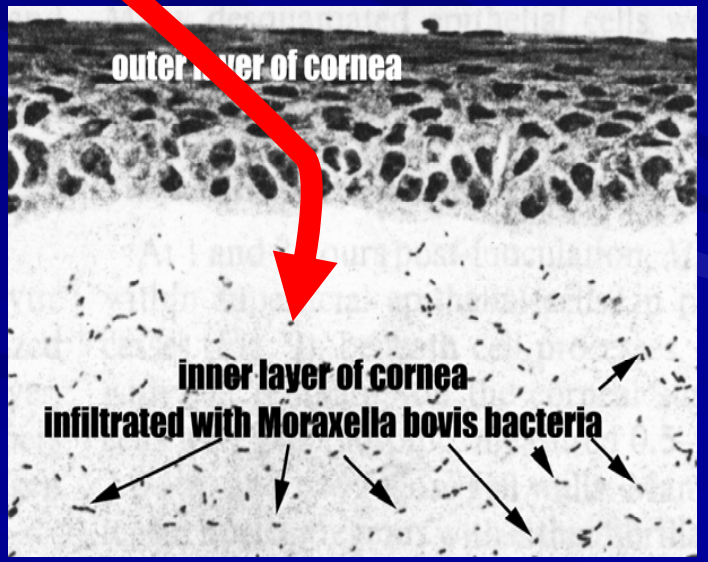
Bird’s eye view of ulcer





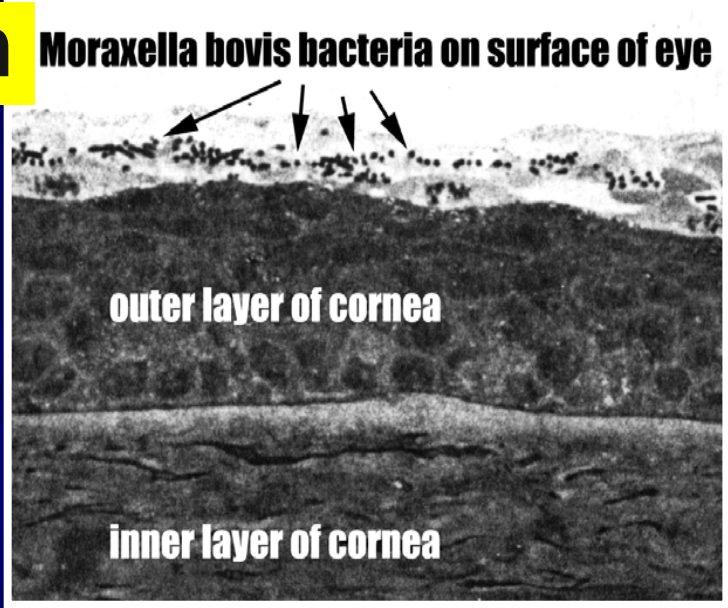
and deeper…


outer layer of cornea
Moraxella bovis bacteria
inner layer of cornea
3

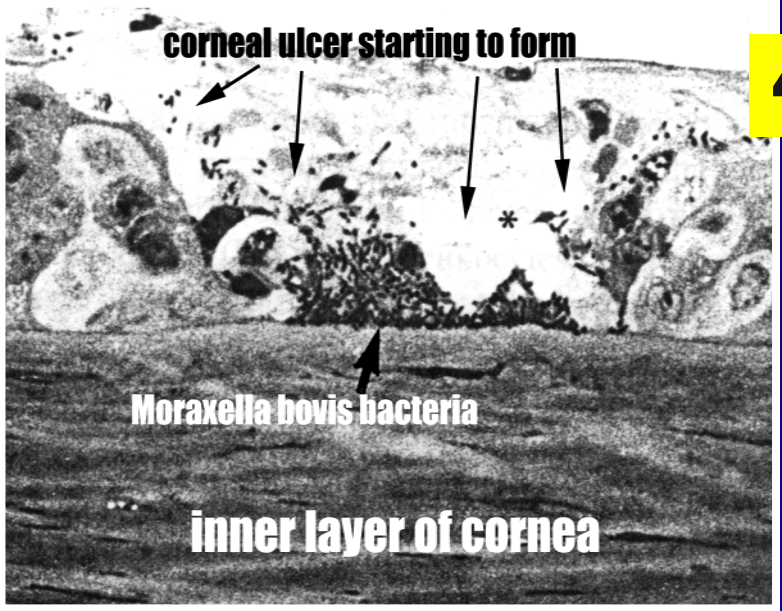

inner layer of cornea
infiltrated with Moraxella bovis bacteria

How fast does this happen?

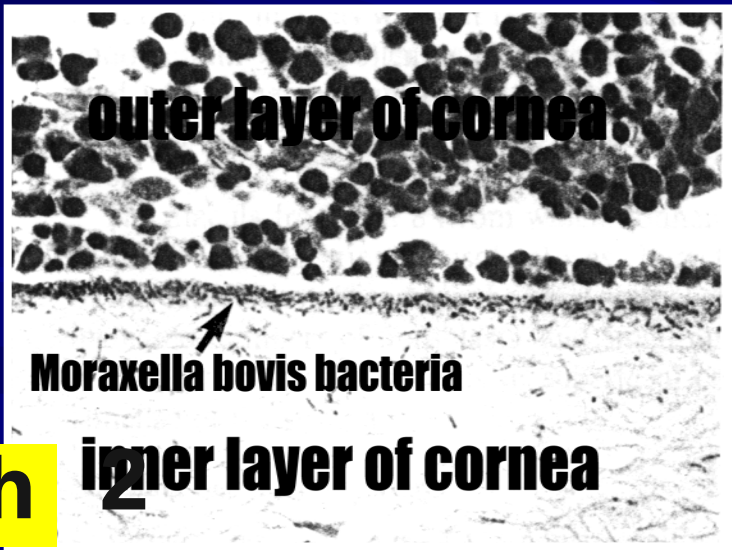
2 h



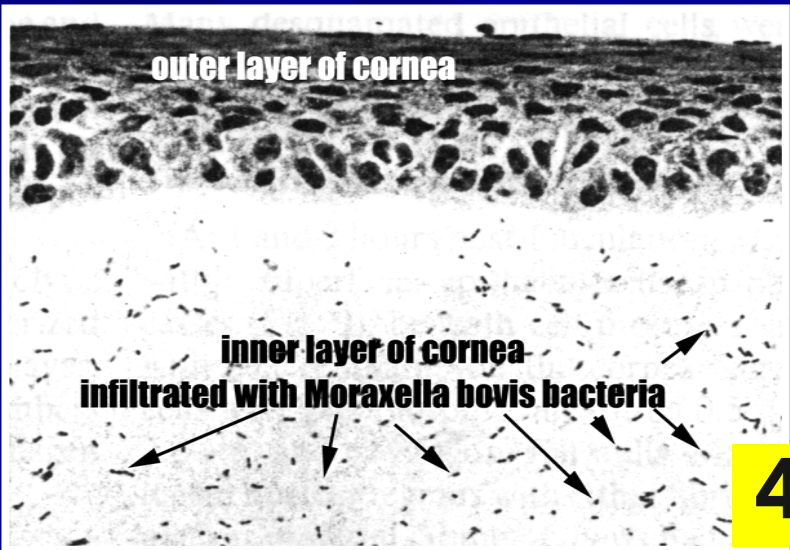
4 h



24 h



45 h



Rogers et al. *Vet Path* 1987

Quiz:
How many bacteria do you think are in this calf's eye fluids running down the face?

Wear gloves when working these calves!!

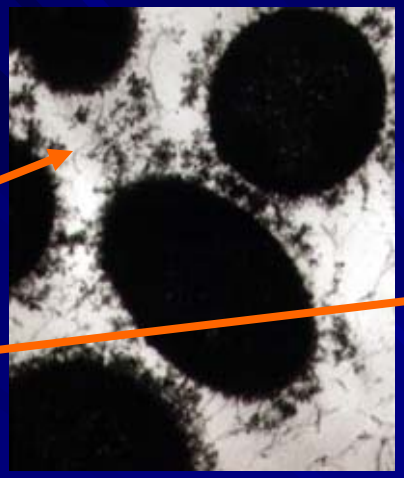
Don’t be a big face fly!!

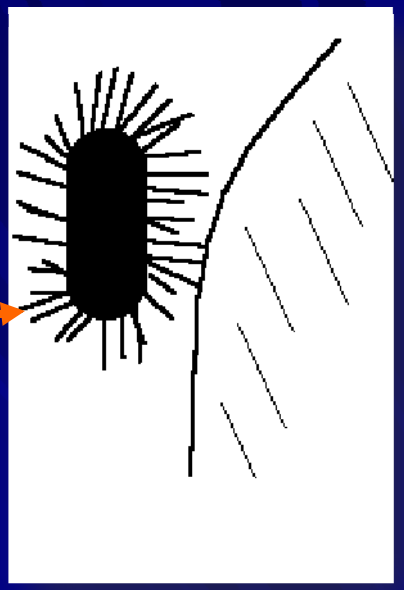
- **WEAR GLOVES (& APRONS) WHEN TREATING!**
- Disinfect between calves
  - **Chlorhexidine; dilute bleach**
- Commingling and concentrating calves may spread the disease

What must *M. bovis* do to survive?

- Stick to eye surface
- Kill eye cells/white blood cells

How does it stick?



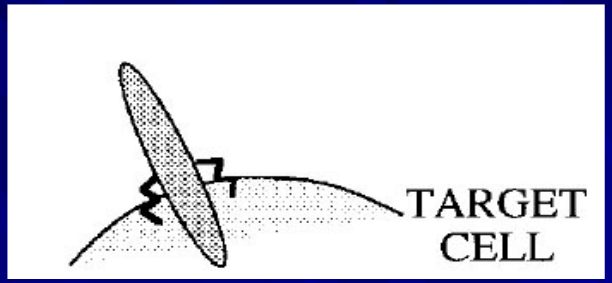


1) Pili

- Bacteria can stick to eye and not get washed away

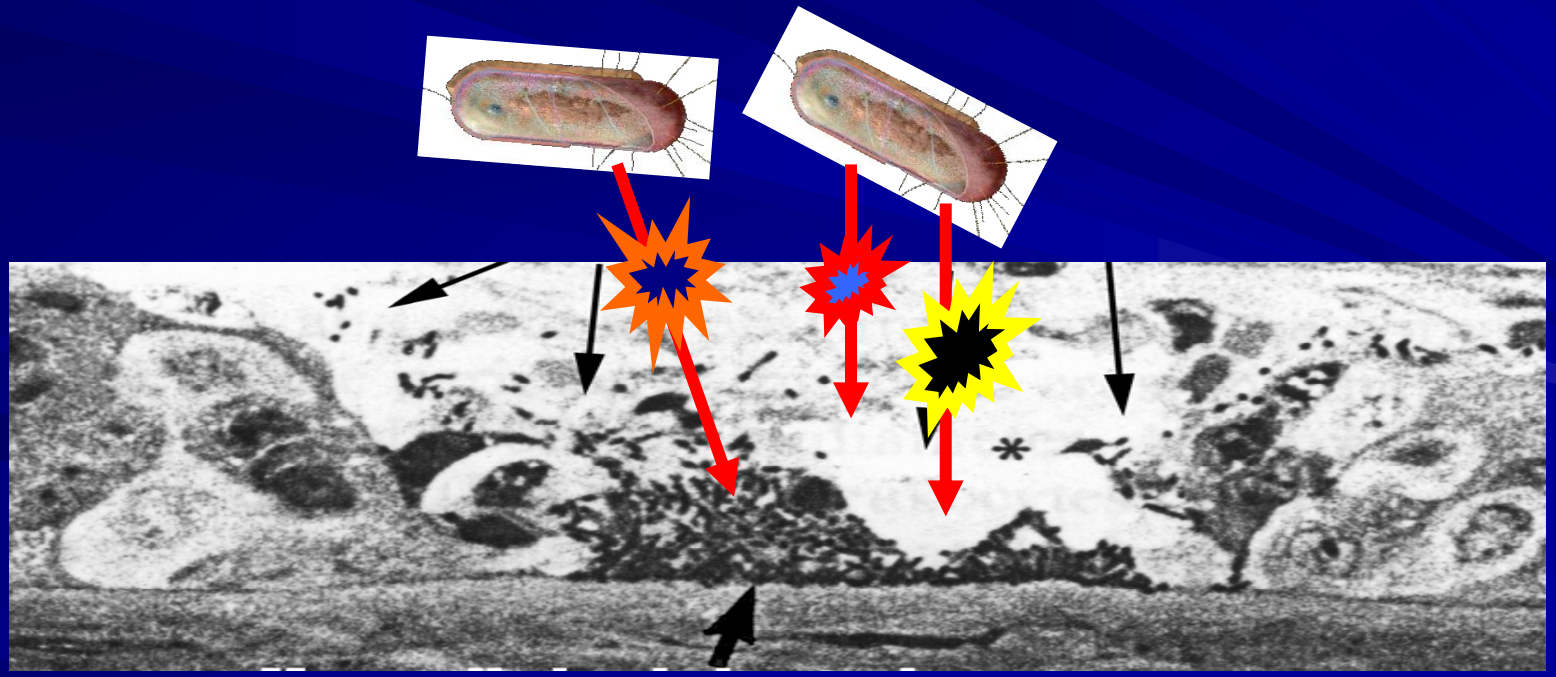
- **<u>At least</u>** 7 different types

How does it kill cells?



2) Cytotoxin

- Highly conserved
- Nearly identical in geographically diverse *M. bovis*



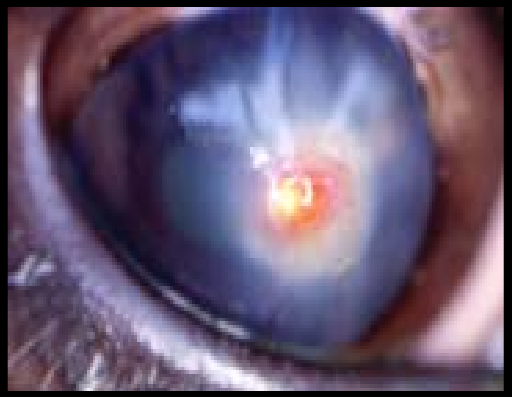
Ulcer first seen

7 days

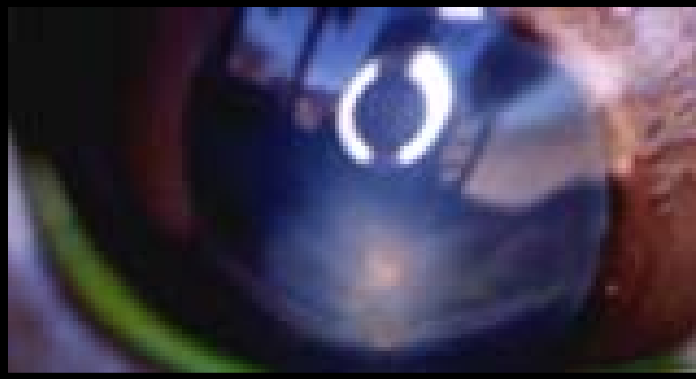
14 days

Will this eye heal?

21 days



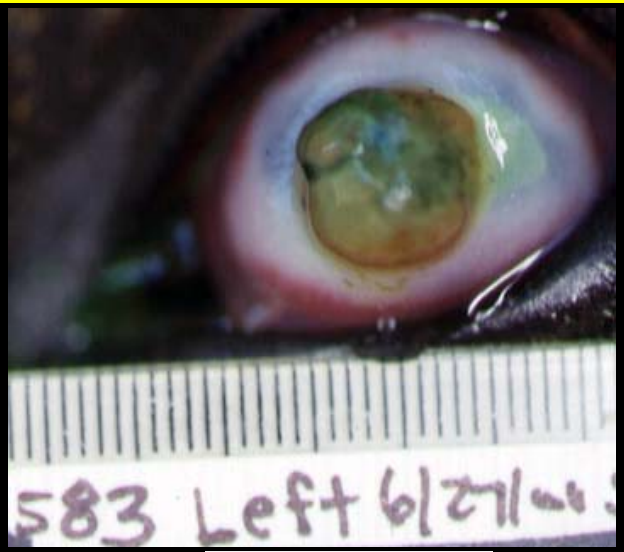
28 days



48 days

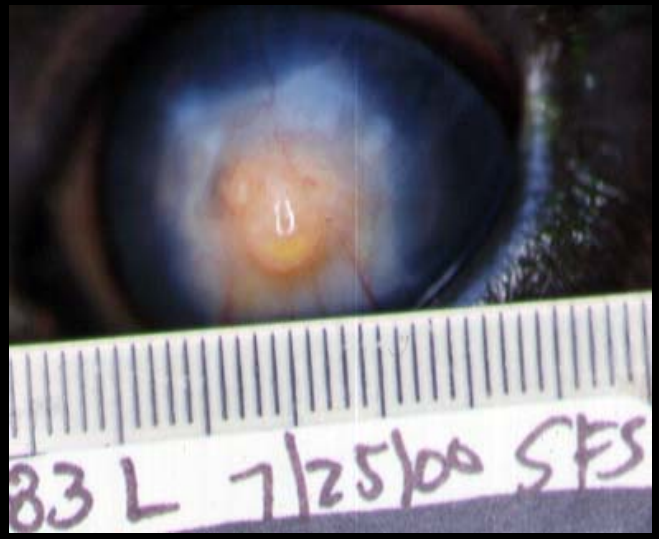
Worst case scenario

Day 0



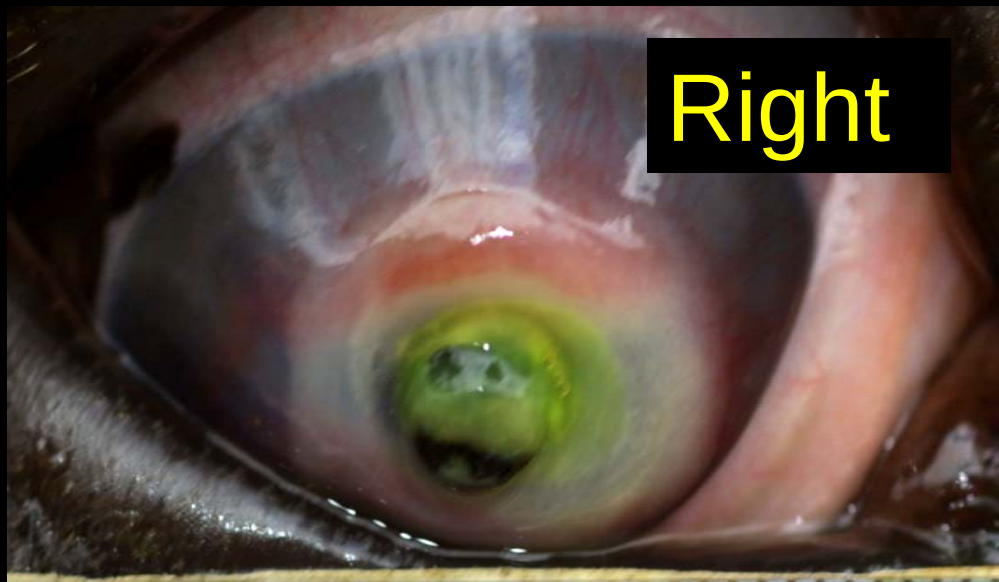
Day 7

Day 13



Day 38

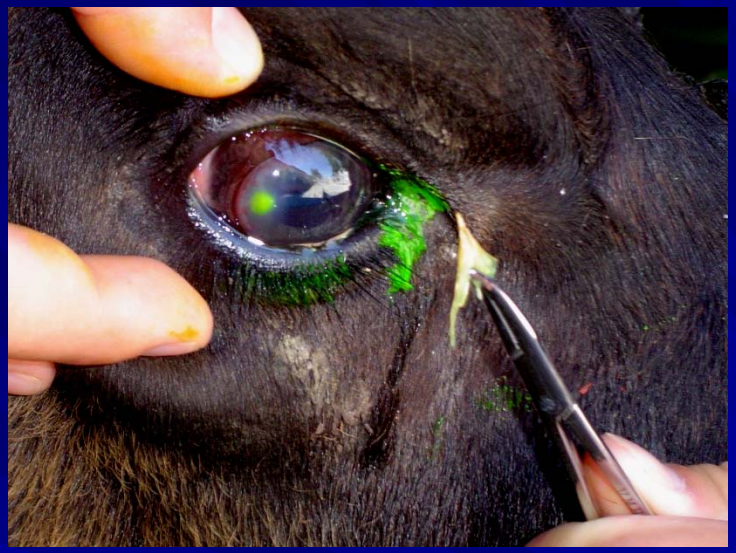
Which eye will go blind?

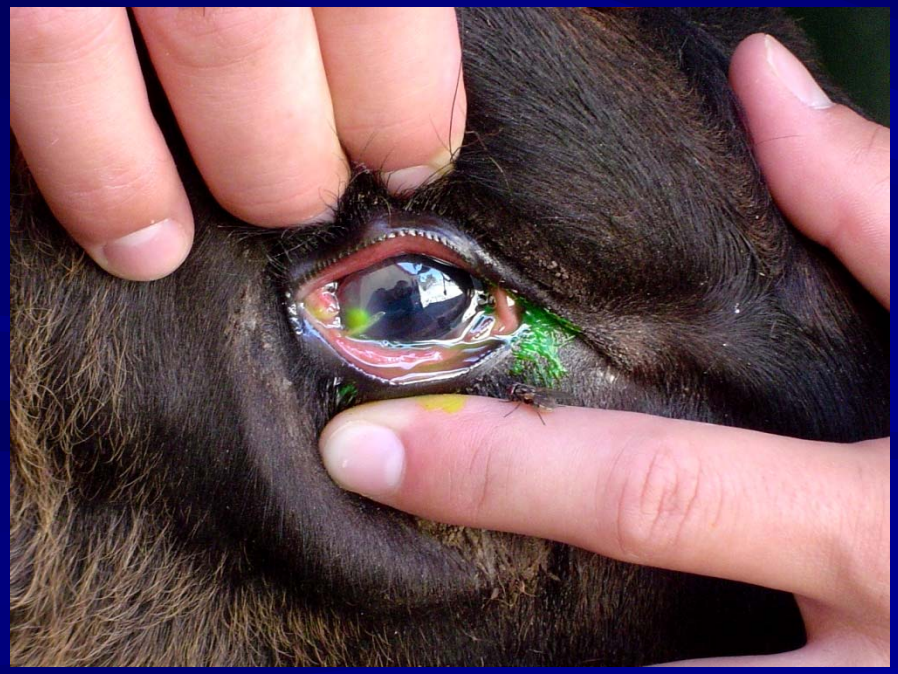


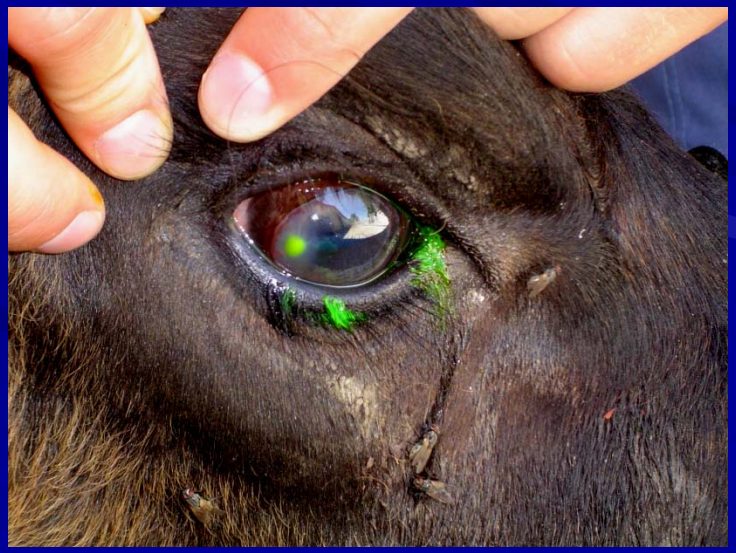
“Popeyes”
Best advice: treat early!

Besides *M. bovis*, *what else is important for causing Pinkeye?*

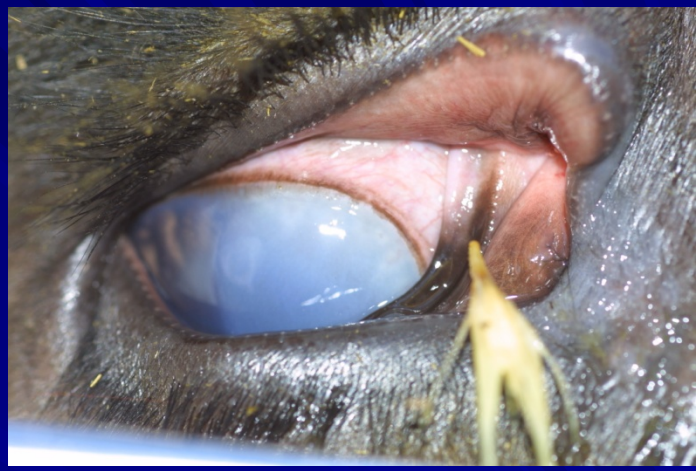
Mechanical trauma from foxtails, dust etc

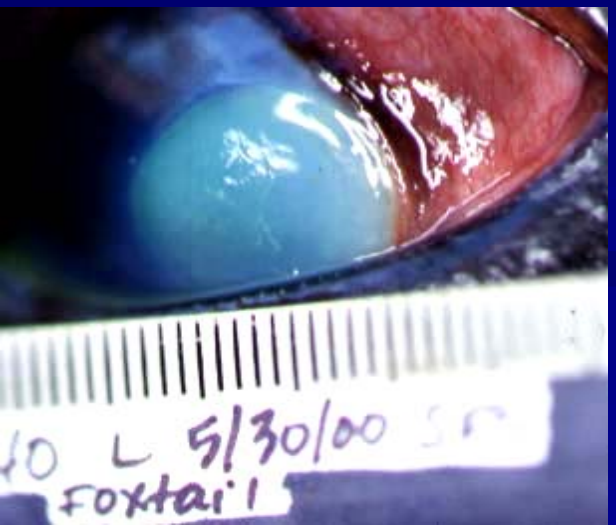


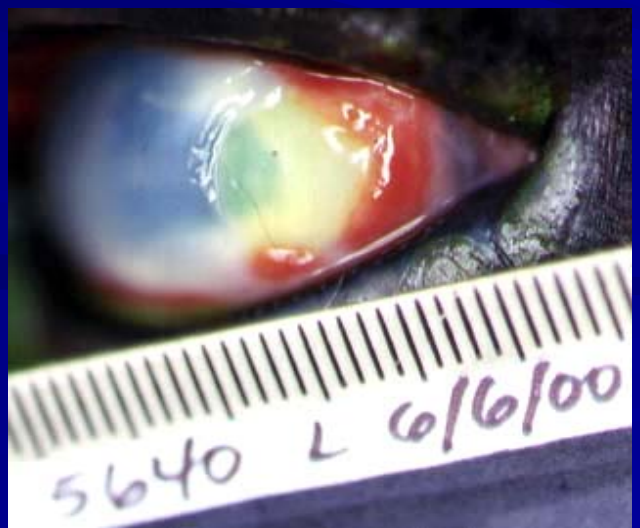


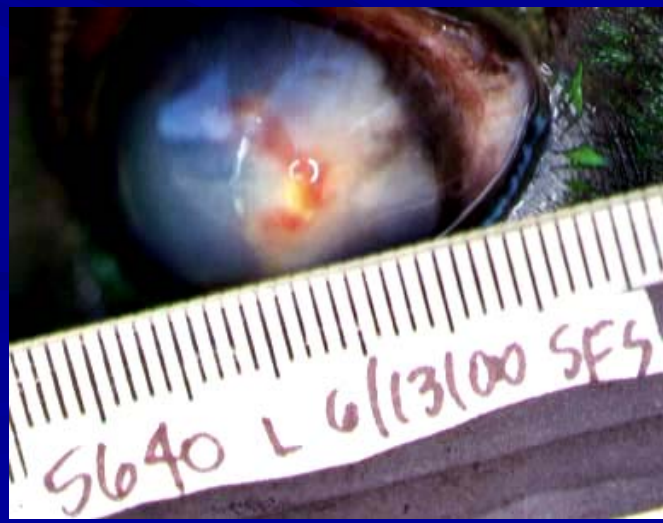


Importance of FOXTAILS!







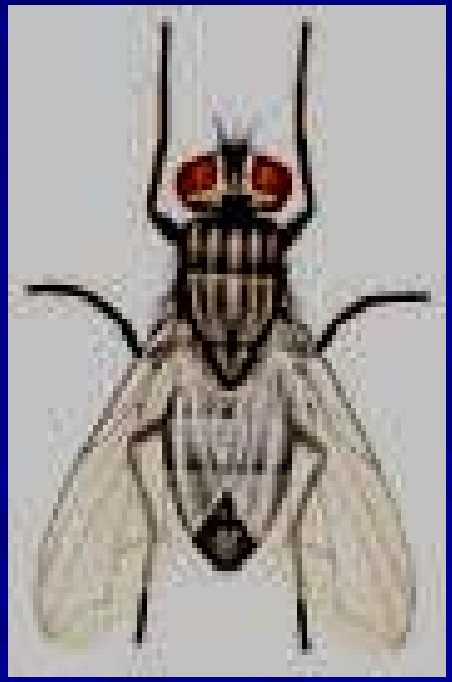


Other risk factors?

Concurrent infections

IBR, Mycoplasma

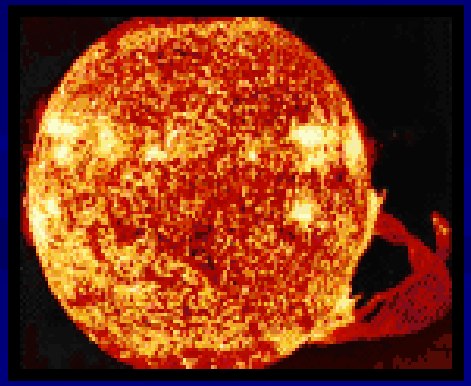
Increase eye, nasal secretions



Sunlight, Dust –

UV radiation

corneal irritation



Flies

M. bovis

survives 2-3 days in/on face flies

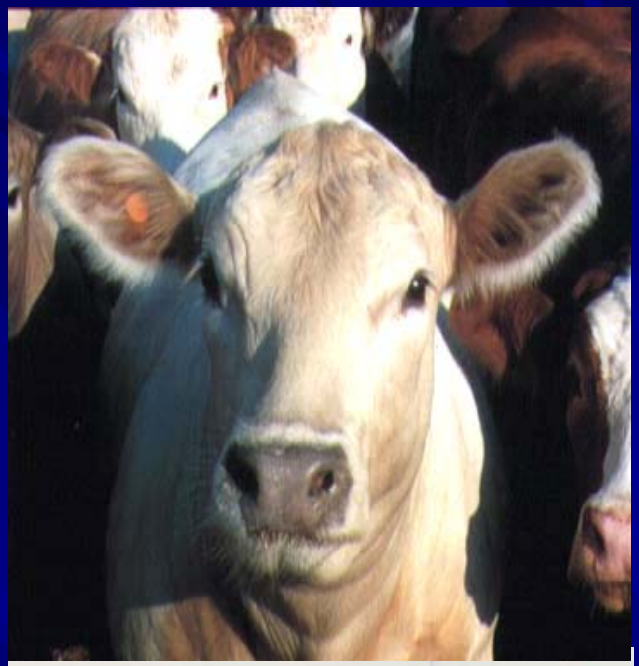
Comments regarding Modified Live IBR vaccines and Pinkeye

- IBR persists several weeks post vaccination
- Recommend to wait before shipping several weeks to help reduce chance for pinkeye outbreak

Other risk factors…

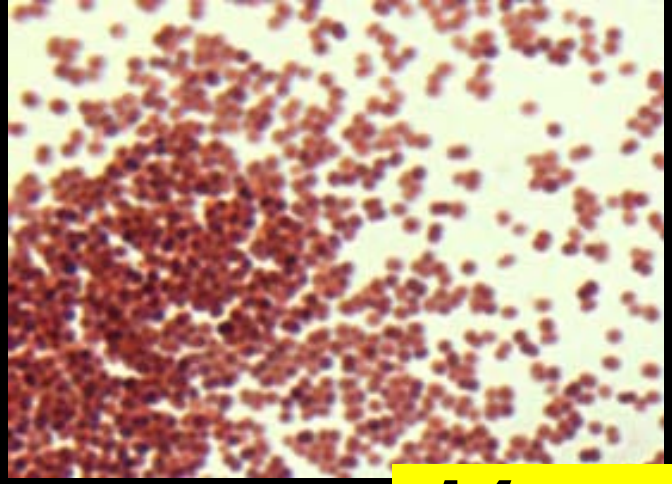
- Asymptomatic carrier cattle!
  - *M. bovis can be found in eyes, nose, vagina* of completely NORMAL

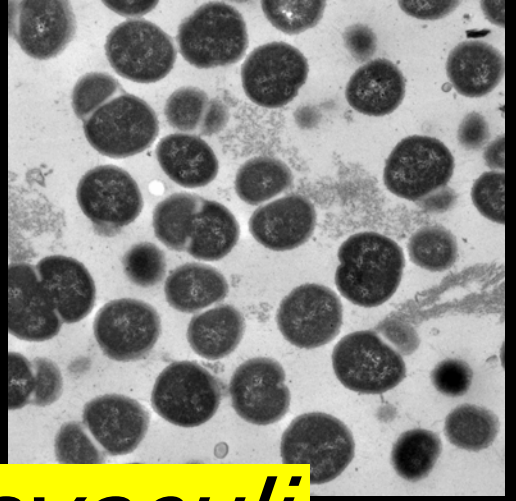
    cattle



What about the "New" Moraxella? *Moraxella bovoculi*?

- Discovered in summer 2002:
  - Of 138 corneal ulcers 3-9 month calves
    - 68 hemolytic **Gram negative <u>cocci</u>**
    - 29 *M. bovis* **(Gram negative <u>rod</u>)**
- Was a **<u>new species</u>**
  - We named them *Moraxella bovoculi*

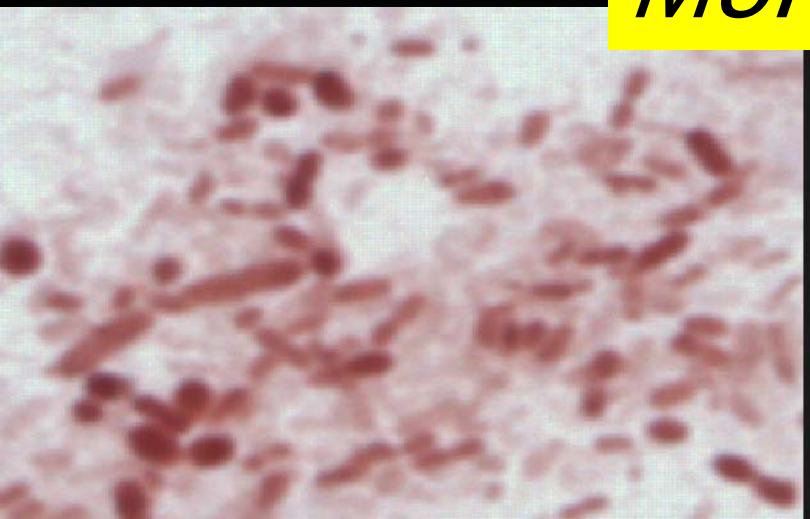


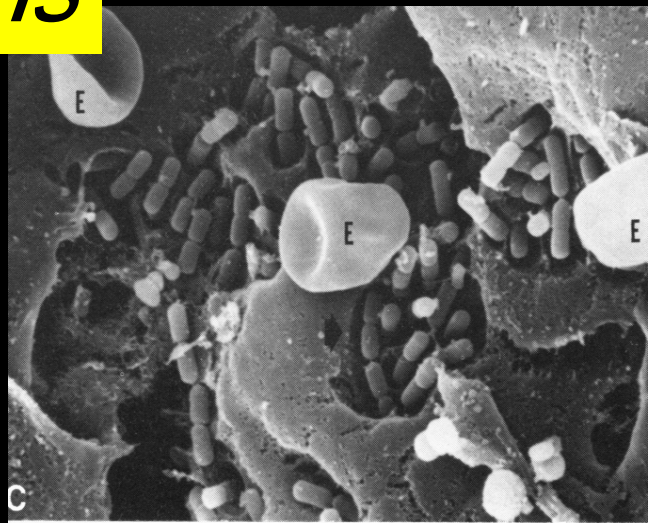


Moraxella bovoculi

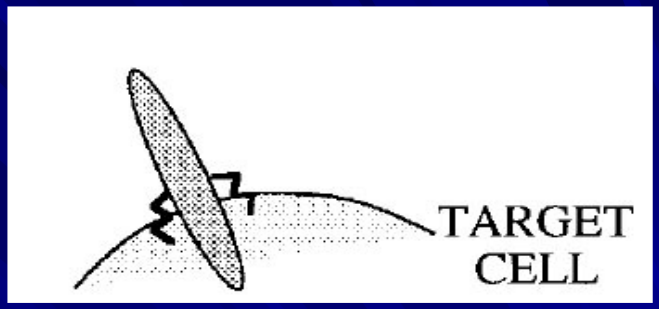
versus

Moraxella bovis





M. bovoculi Facts



- Makes a Cytotoxin
- Isolated from many Pinkeye cases
- <u>NOT</u> proven to cause Pinkeye
- Isolated from normal animals; calves/cows with conjunctivitis
  - -Risk Factor?
- Benefit from some autogenous vaccines

2005 Field Study From 45 ulcers

- ***Moraxella bovoculi*: 23**
- ***Moraxella bovis*: 9**
- ***Both*: 4**
- ***None isolated*: 9**

2006 Field Study From 61 ulcers

- ***Moraxella bovoculi*: 12**
- ***Moraxella bovis*: 21**
- ***Both*: 23**
- ***None isolated*: 5**

CAHFS Diagnoses 2008-2010 (557 eye swabs)

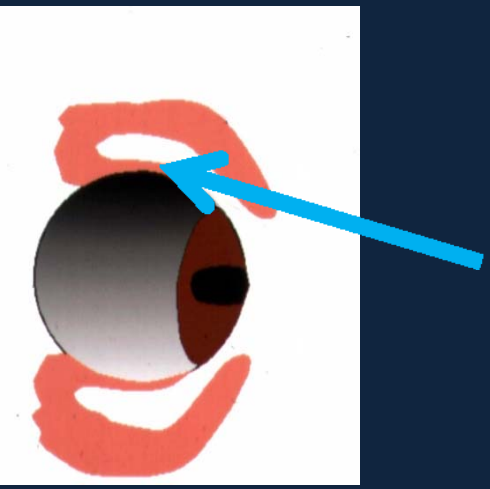
- ***Moraxella bovoculi*: 187**
- ***Moraxella bovis*: 105**
- ***Moraxella ovis*: 15**
- ***Moraxella species*: 29**

Treatment Options

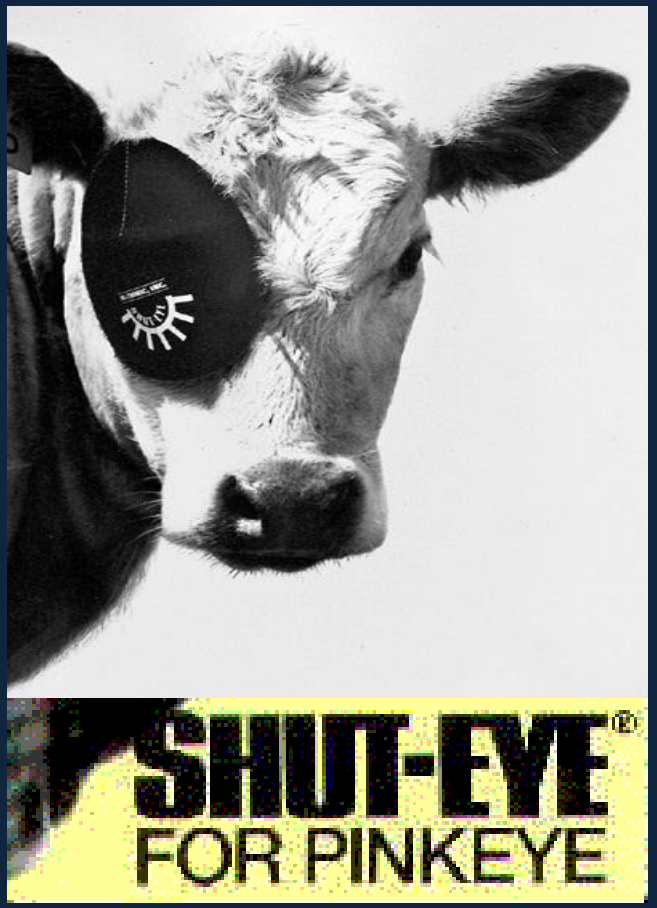
- **200 and 300 mg/ml Oxytetracycline (many products)****
  - 4.5cc/100# SC once or twice
- **Nuflor**
  - 2 doses @ 3cc/100# IM 48 hrs apart
  - 1 dose @ 6cc/100# SC
- **Excede**
  - 1 dose @ 1.5 cc/100 lbs SC ear base
- **DRAXXIN****
  - 1 dose (2.5 mg/kg) SC
- **=approved for pinkeye

Subconjunctival injection of Penicillin

- Benzathine Penicillin G + Procaine Pen G
- Drip several drops on corneal surface and wait about a minute
- 25 gauge 3/4 inch needle goes under bulbar conjunctiva; inject 1-2 ml



To patch or not?

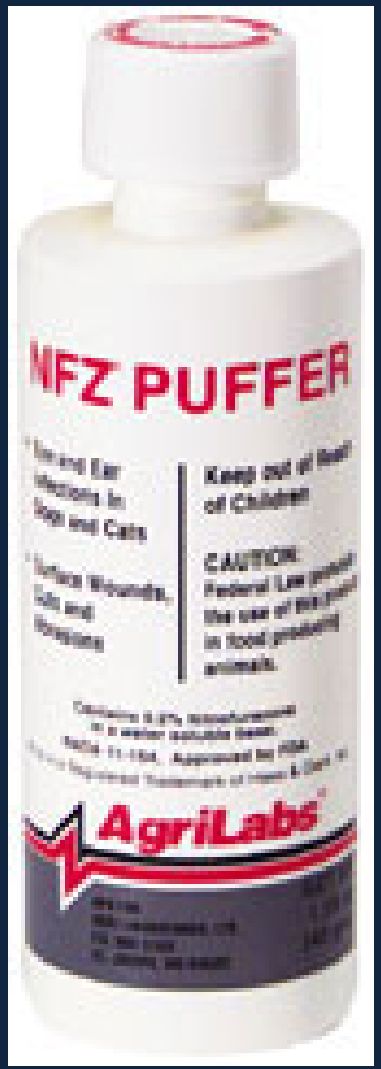


- **Eye more comfortable**
  - Out of sunlight
- Tips on placement
  - **Keep open at bottom for drainage / air circulation**
  - Check eyes at least 1x per week!

What about treatment in an outbreak?

- **Oxytetracycline 20 mg/kg IM followed by oral oxytetracycline (2g/calf/day) in alfalfa pellets for 10 days**
  - Eastman et al. JAVMA 1998

Do these work?



Yes….but…..

(AgriLabs) Contains 0.2% nitrofurazone used for ear and eye infections in dogs and cats. Also for surface wounds, cuts and abrasions in dogs, cats, and on all livestock. Federal law prohibits the use of this product in food producing animals.

How else can we prevent Pinkeye?

- Vaccination
  - Boost immunity to specific *M. bovis* proteins
  - ALL commercial vaccines target *M. bovis*
    - *But different strains*

From: *Compendium for Veterinary Products* **February 2011**

Vaccine	Manufacturer	*M. bovis*	7-way Clostridia
20/20 Vision® 7 with Spur®	Intervet/Schering-Plough		
Alpha-7/MB™-1	Boehringer Ingelheim		
Piliguard® Pinkeye + 7	Intervet/Schering-Plough		
Maxi/Guard® Pinkeye Bacterin	Addison		
Ocu-guard® MB-1	Boehringer Ingelheim		
Piliguard® Pinkeye-1 Trivalent	Intervet/Schering-Plough		
Piliguard® Pinkeye TriView®	Intervet/Schering-Plough		
Piliguard® Pinkeye-1	Durvet		
Pinkeye Shield™ XT4	Novartis		
SolidBac ®Pinkeye IR/PR	Pfizer Animal Health		
I-Site® XP	AgriLabs		

FEATURE	SolidBac® Pinkeye IR/PR®	MAXI/GUARD®	20/20® with SPUR®	20/20® Vision™ with SPUR®	SolidBac® Pinkeye IR/PR®
Maker	SolidTech	Addison	Intervet	Intervet	SolidTech
Dosing	One application (two doses)	One dose	Two doses	Two doses	One application (two doses)

FEATURE	Ocu-Guard® MB	Ocu-Guard® MB-1	Alpha 7/MB™	Alpha 7/MB™-1	Pinkeye Shield™ XT4
Maker	Boehringer-Ingelheim	Boehringer-Ingelheim	Boehringer-Ingelheim	Boehringer-Ingelheim	Novartis
Dosing	Two doses	One dose	Two doses of MB required	One dose	One dose

FEATURE	Piliguard® Pinkeye-1 Trivalent	PINKEYE-3	Piliguard® Pinkeye + 7	Piliguard® Pinkeye TriView®	I-Site™
Maker	Schering-Plough/Durvet	Aspen	Schering-Plough	Schering-Plough	Agri-Labs
Dosing	One dose	One dose	Two doses	One dose	Two doses

- Addison
- Novartis
- Schering

PILIGUARD® **PINKEYE-1**

Durvet

MORAXELLA BOVIS BACTERIN TRIVALENT

Contains chemically-inactivated cultures of *Moraxella bovis* isolates referred to by Schering-Plough Animal Health Corp. as Strains **Epp 63, Fla 64 and SAH 38** in an oil emulsion adjuvant. For use in healthy cattle to aid in the control of pinkeye associated with infection by *Moraxella bovis* strains expressing pili similar to those expressed by isolates referred to by Schering-Plough Animal Health Corp. as Strains Epp 63, Fla 64 and SAH 38.

PILIGUARD® PINKEYE + 7

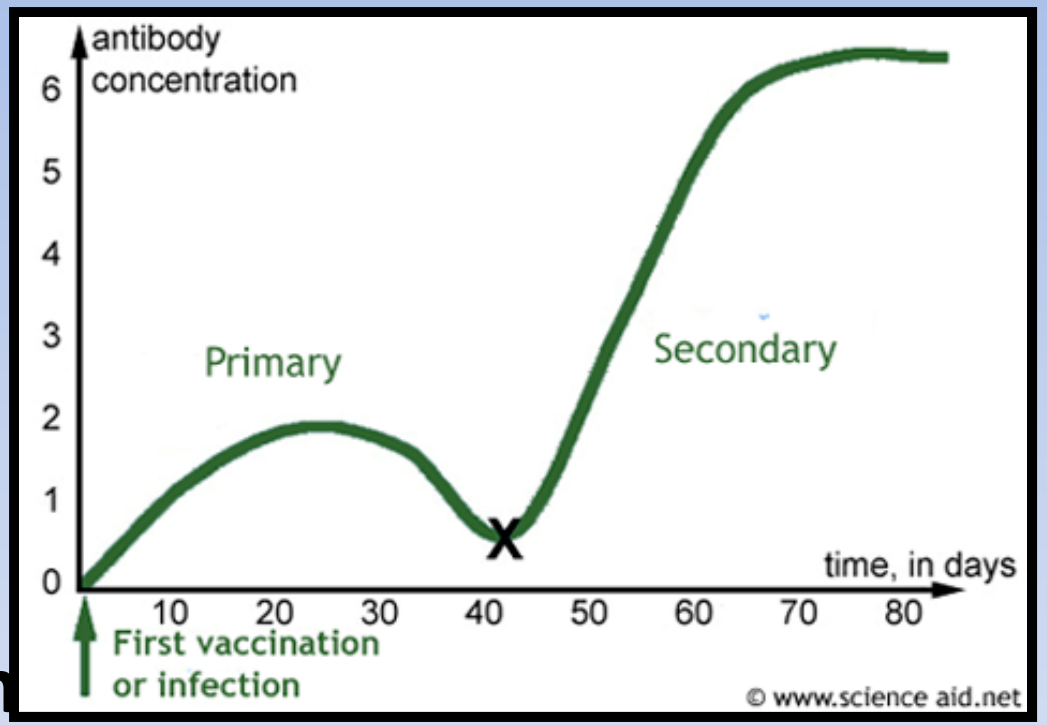
Intervet/Schering-Plough Animal Health

Clostridium Chauvoei-Septicum-Novyi-Sordellii-Perfringens Types C & D-Moraxella Bovis Bacterin-Toxoid

PILIGUARD® Pinkeye + 7 is recommended for the vaccination of healthy cattle as an aid in the control of pinkeye caused by *Moraxella bovis* strains expressing pili similar to those expressed by isolates referred to by Schering-Plough as strains **EPP 63, FLA 64 and SAH 38,** and against diseases caused by *Clostridium chauvoei, C. septicum, C. novyi* Type B, *C. sordellii, C. perfringens* Types C and D. Immunity is also provided against the beta and epsilon toxins of an additional clostridial organism, *C. perfringens* Type B. This immunity is derived from the combination of the Type C (beta) and Type D (epsilon) fractions.

DOSAGE: Inject cattle **subcutaneously** with 5 mL. Repeat in 3-4 weeks and annually prior to periods of extreme risk or parturition. For C. novyi, revaccinate every 5-6 months. Animals vaccinated under 3 months of age should be revaccinated at weaning or at 4-6 months of age.

- **Start vaccinating 6-8 weeks BEFORE you expect the first cases**

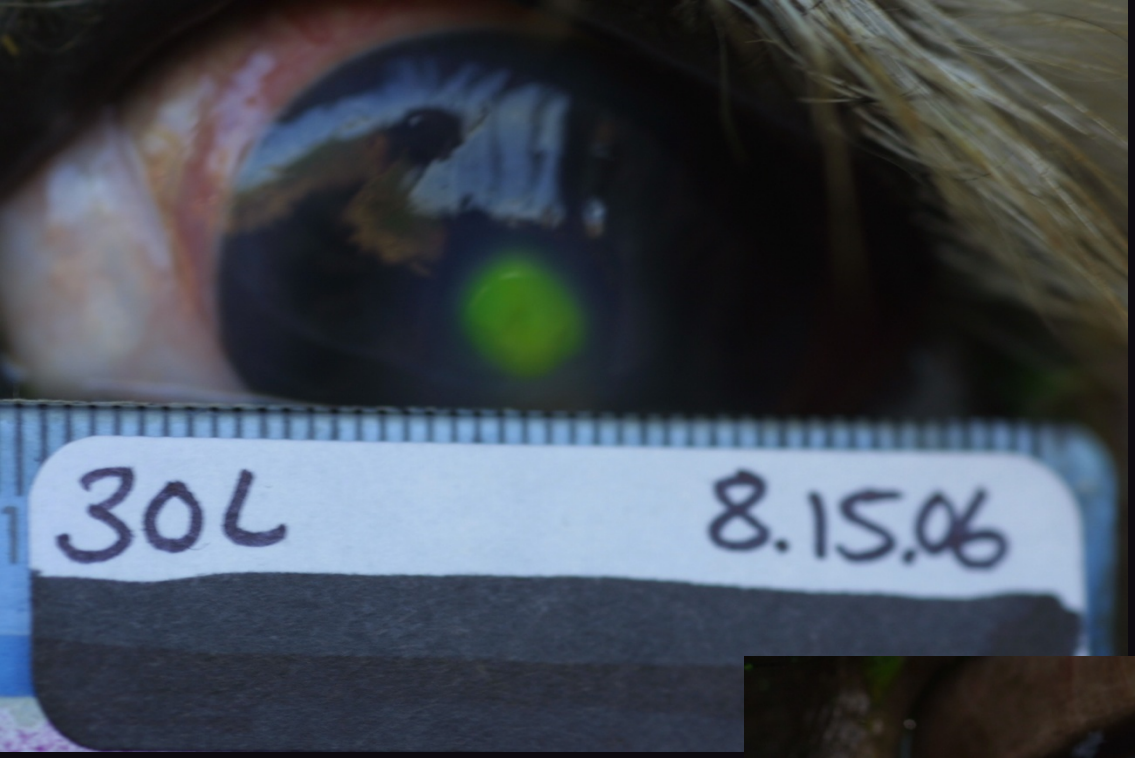


- **Copper and Selenium supplementation!**

General Vaccination Recommendations

- Start: **Commercial** *M bovis* product
- If breaks, consider a **different** commercial vaccine or **autogenous vaccine**
  - **Culture animals (ideally 5-10)**
  - ***M. bovis* and/or *M. bovoculi***
- **Follow label instructions!**
- Why might efficacy change over time?
- When switching products, **consider sources of antigen!**

Quiz: To Treat or Not?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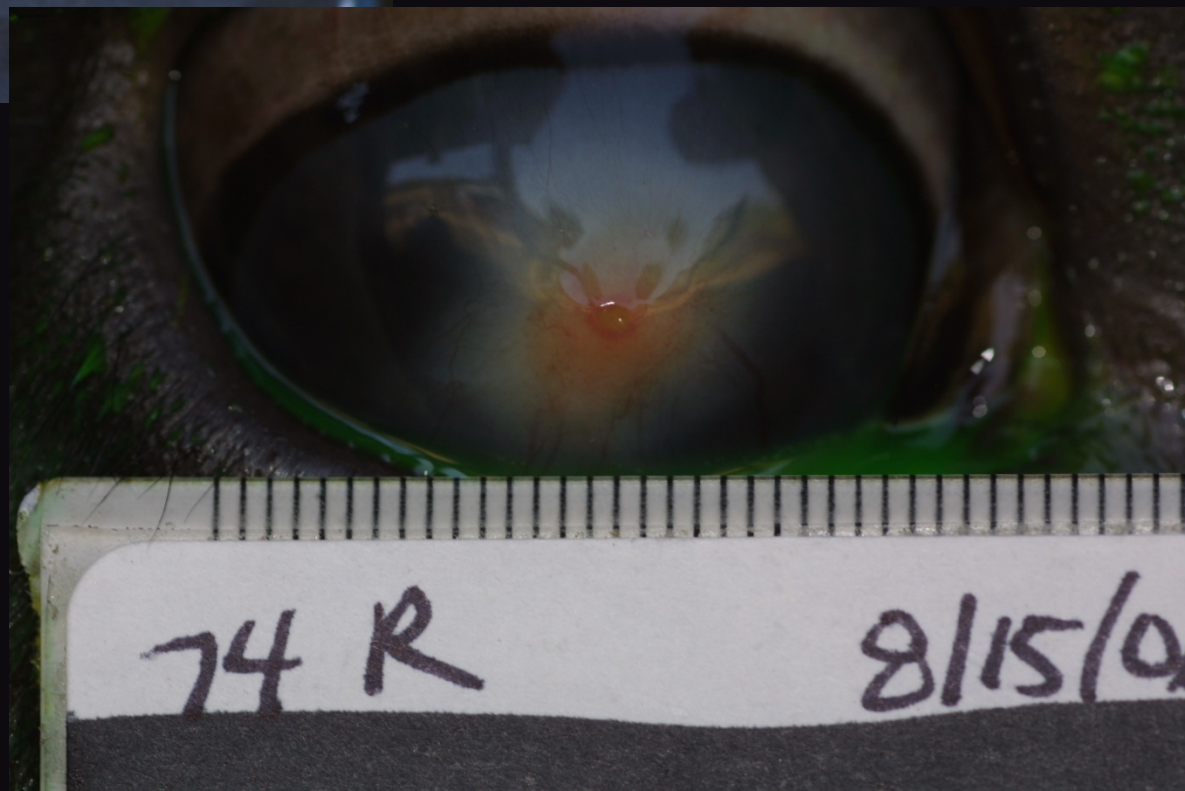
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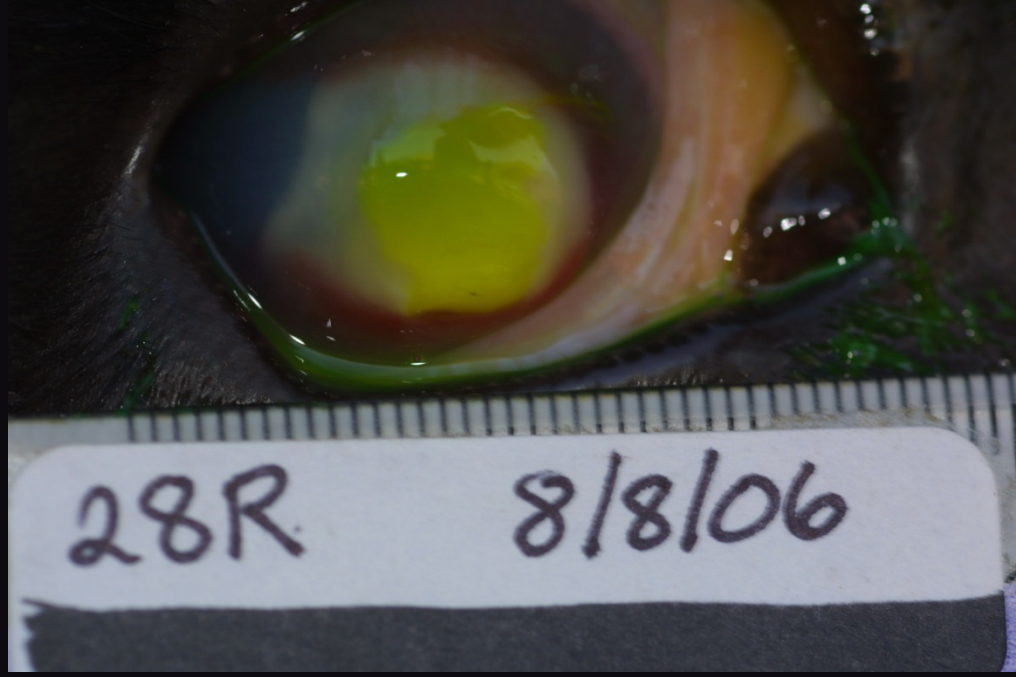
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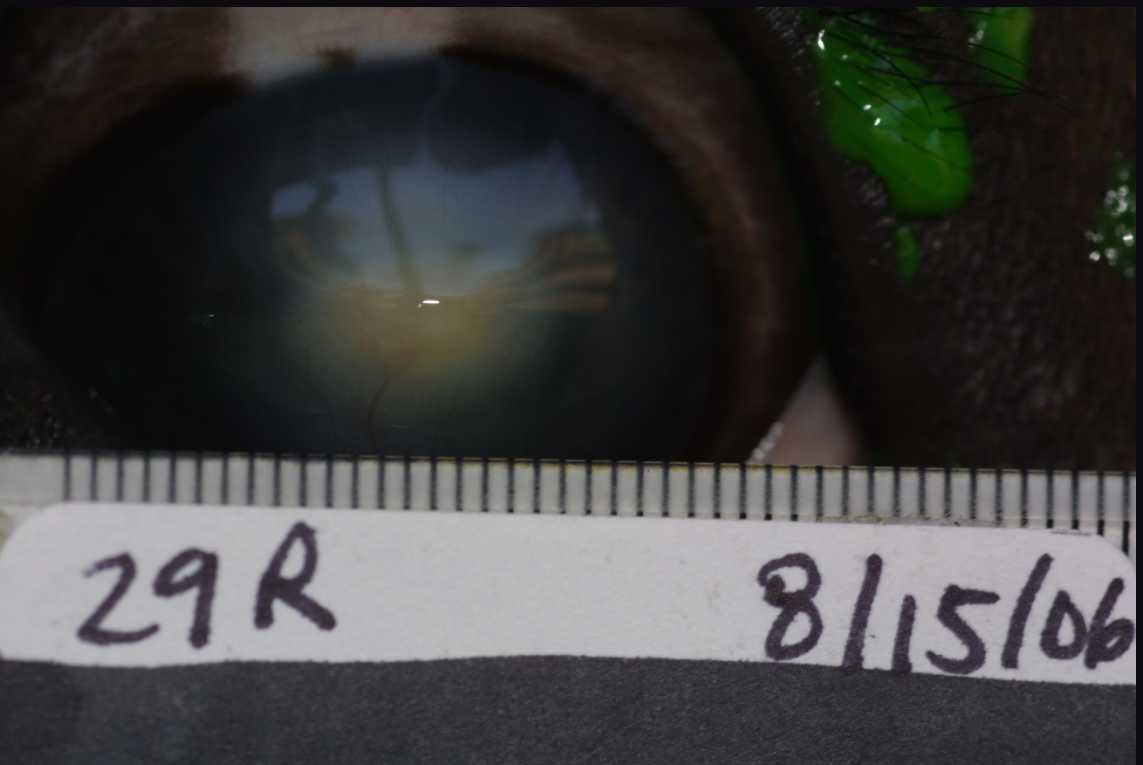
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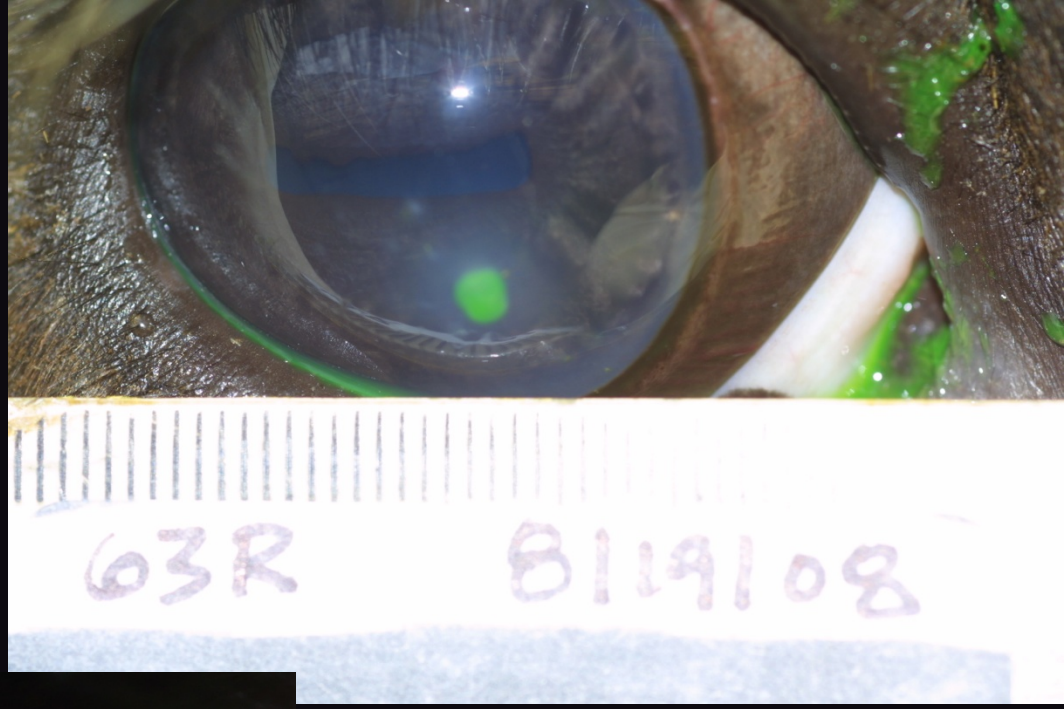
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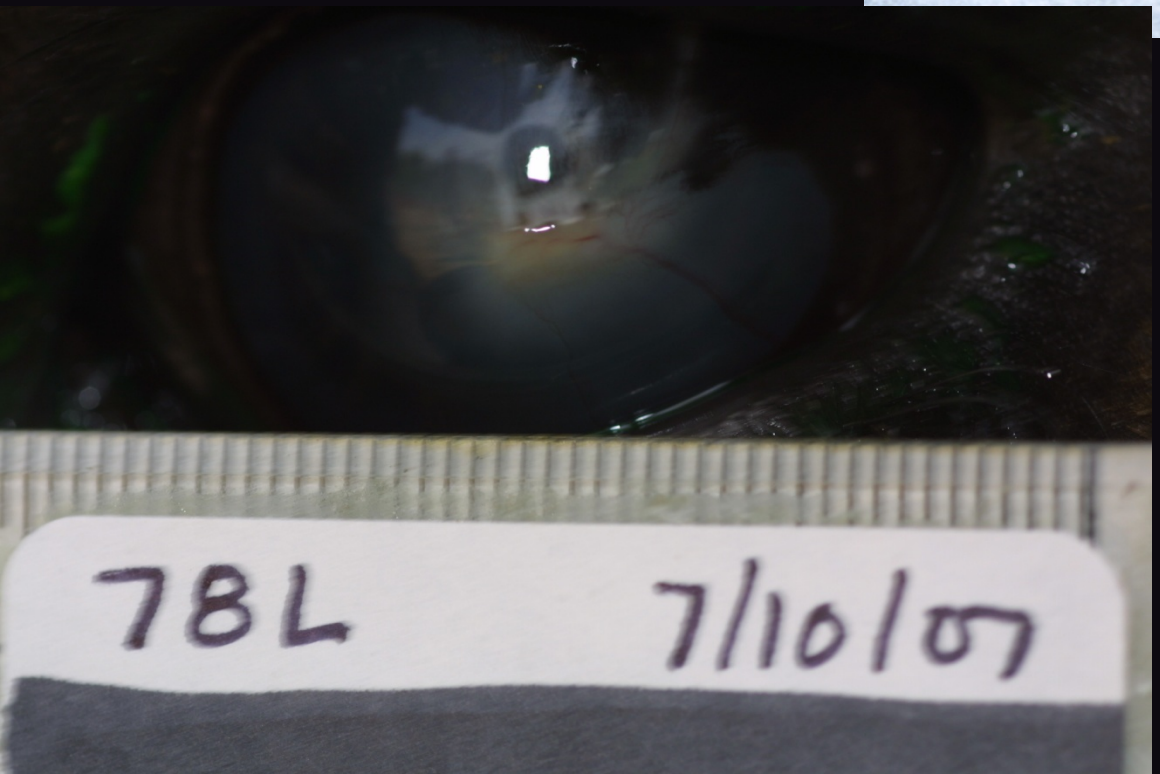
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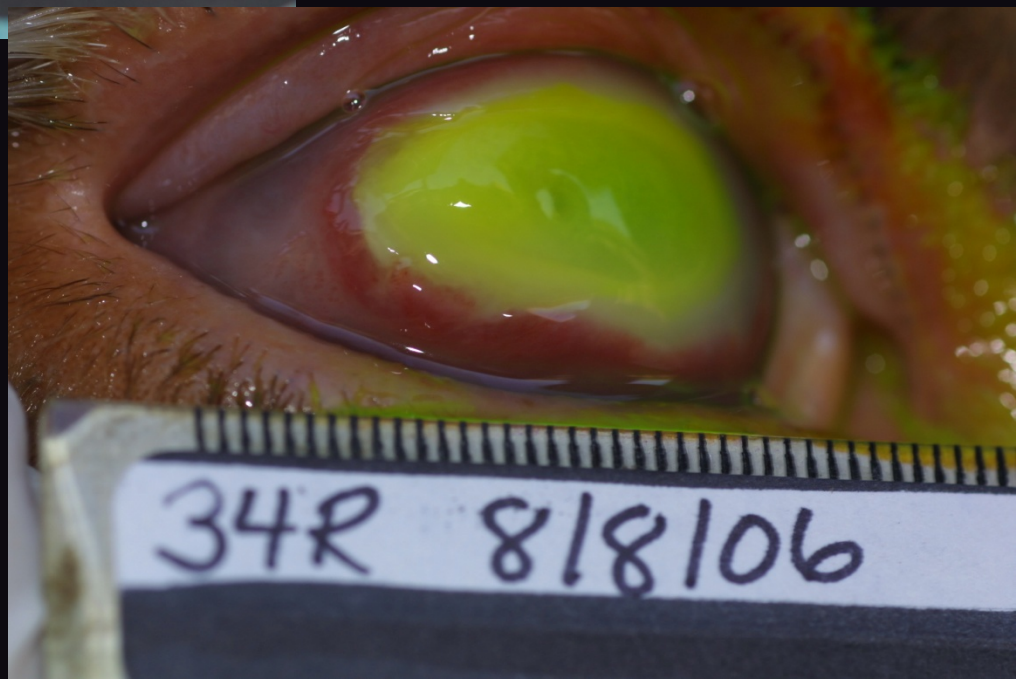
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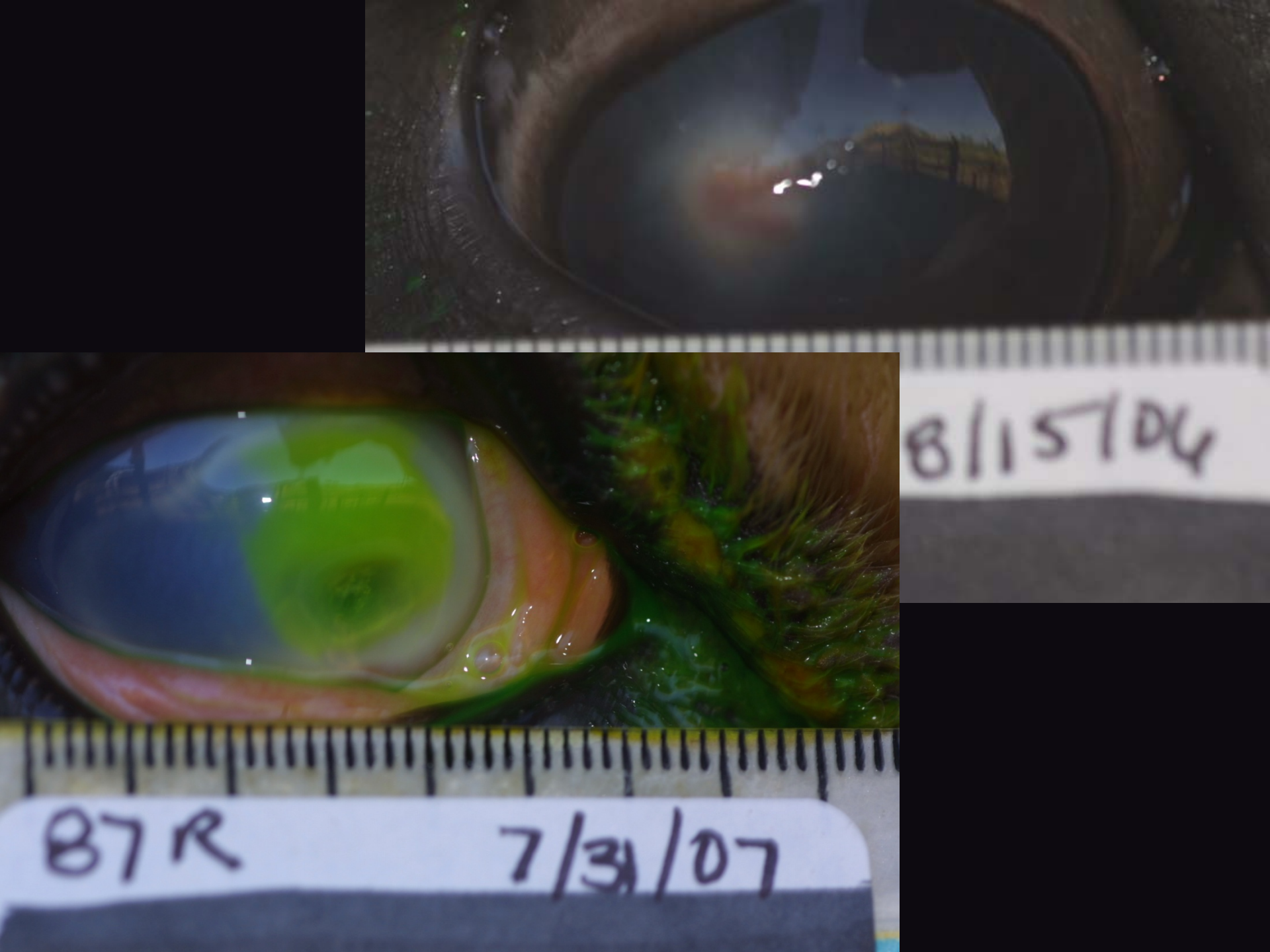
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