MASTITIS PATHOGENIC AGENTS' SPECTRUM IN DAIRY COWS

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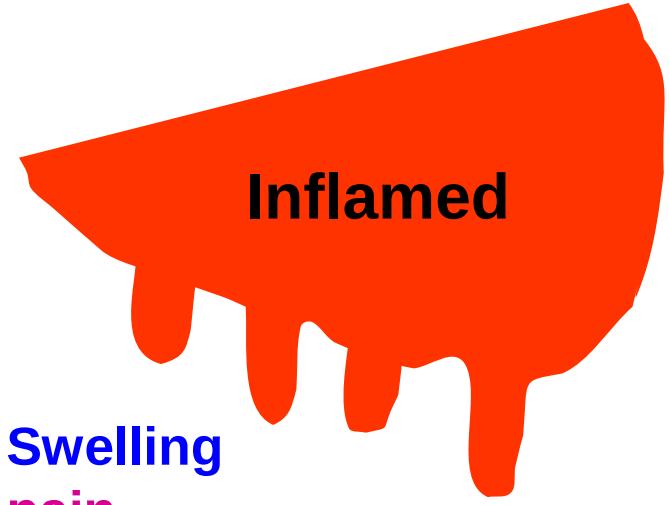
What’s mastitis ?

Inflammation of one or more quarters of the udder



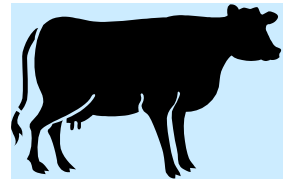
Swelling
pain
warm
redness

What's the significance of bovine mastitis ?

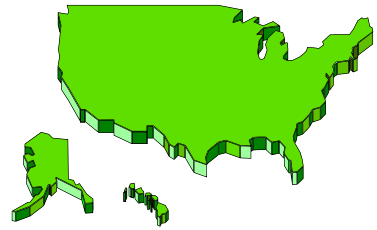
The most costly disease affecting dairy cattle throughout the world

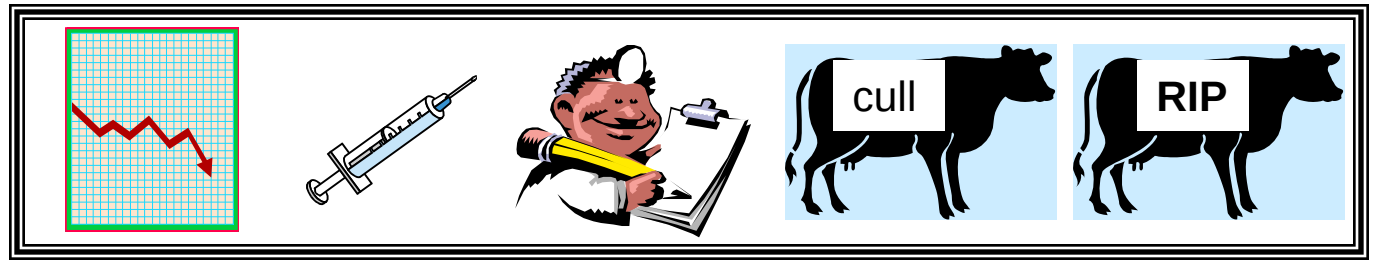
Causes significant economic losses to the dairy industry

>Rs.30000/cow/year



>Rs.300 billion/year





What are the health concerns of mastitis ?

- **Animal health**
  - Loss of functional quarter
  - Lowered milk production
  - Death of cow

- **Human health**
  - Poor quality milk
  - antibiotic residues in milk

How severe can mastitis be ?

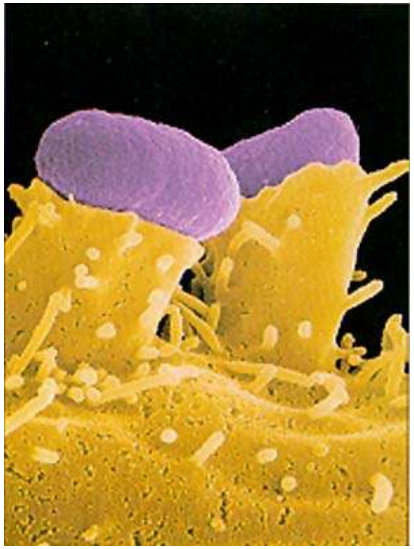
Subclinical Mastitis

- ~ 90 -95% of all mastitis cases
- Udder appears normal
- Milk appears normal
- Higher SCC (score 3-5)
- Lowered milk output (~ 10%)
- Longer duration

Clinical Mastitis

- ~ 5 - 10% of all mastitis cases
- Inflamed udder
- Clumps and clots in milk
- Acute type
  - major type of clinical mastitis
  - bad milk
  - loss of appetite
  - depression
- Chronic type
  - bad milk
  - cow appears healthy

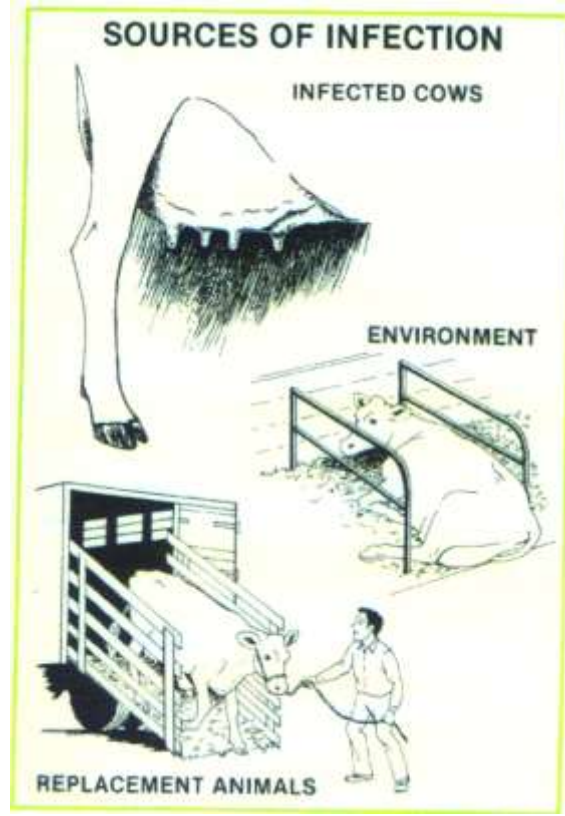
What causes mastitis ?



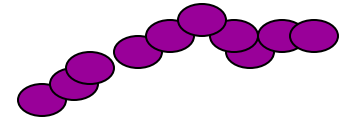
- Bacteria (~ 70%)
- Yeasts and molds (~ 2%)
- Unknown (~ 28%)
  - physical
    - trauma
    - weather extremes

Where do these organisms come from ?

- Infected udder
- Environment
  - bedding
  - soil
  - water
  - manure
- Replacement animals



Streptococci



Field language

"Streps"

"Environmentals"

"Environmental Strep"

- **Environmental**
  - *S. uberis*
  - *S. dysgalactiae*
  - *S. equinus*
- More subclinical mastitis
- Environment
- Predominant early and late lactation

- **Contagious**
  - *S. agalactiae*
- Clinical mastitis
- Cannot live outside the udder
- Treated easily with penicillin

Staphylococci

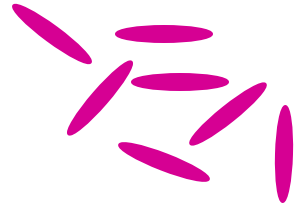
Field language

"Staph"

"Staph. Mastitis"

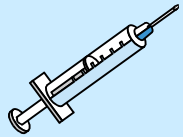
- ***Staph. aureus***
  - Summer mastitis
  - Spread by milking equipment and milker's hands
  - Persistent, difficult to eliminate
  - If unattended leads to chronic mastitis
- **Other Staph**
  - Found normally on skin
  - Lowers milk yield
  - Elevated SCC
  - Easily responds to antibiotics
  - Relapse frequently seen

Coliforms



- Groups of organisms
  - ***E. coli, Klebsiella, Enterobacter***
- Environmental source (manure, bedding, barns, floors and cows)
- Coliforms cause acute clinical mastitis
  - high temp, and inflamed quarter
  - watery milk with clots and pus
  - toxemia

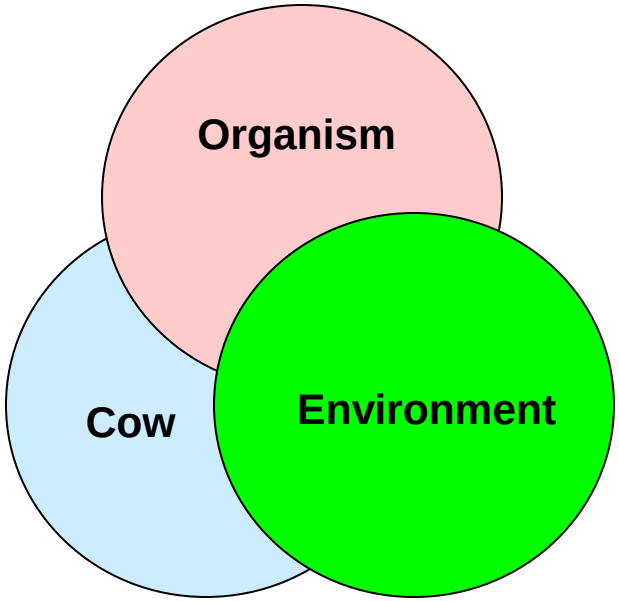
J-5 vaccine



Other organisms

- *Pseudomonas aeruginosa*
  - outbreaks of clinical mastitis
- *Serratia*
  - outbreaks of clinical mastitis
- *Corynebacterium pyogenes*
- Fungi
- *Candida*
- *Mycoplasma bovis*

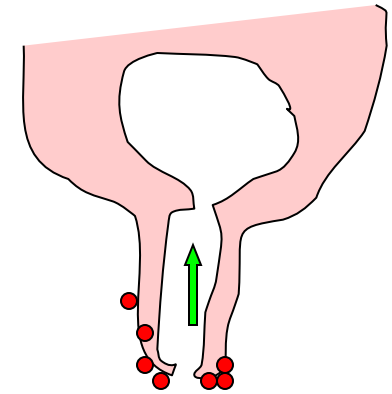
How does mastitis develop ?



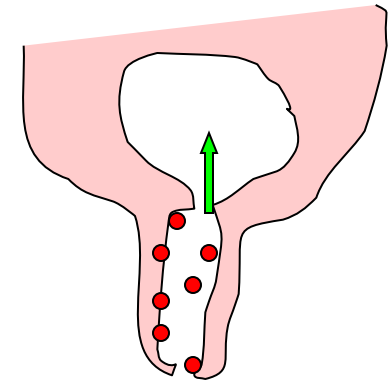
- **Cow**
  - **Predisposing conditions**
    - Existing trauma (milking machine, heat or cold, injury)
    - Teat end injury
    - Lowered immunity (following calving, surgery)
    - Nutrition
- **Organisms**
- **Environment**

Process of infection

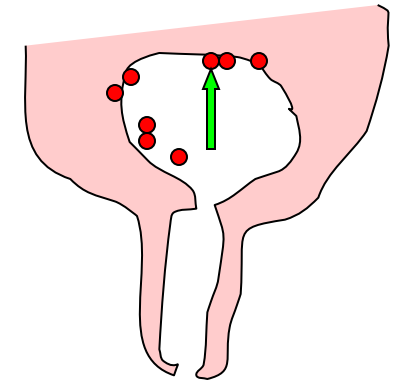
Organisms invade the udder through teat canal



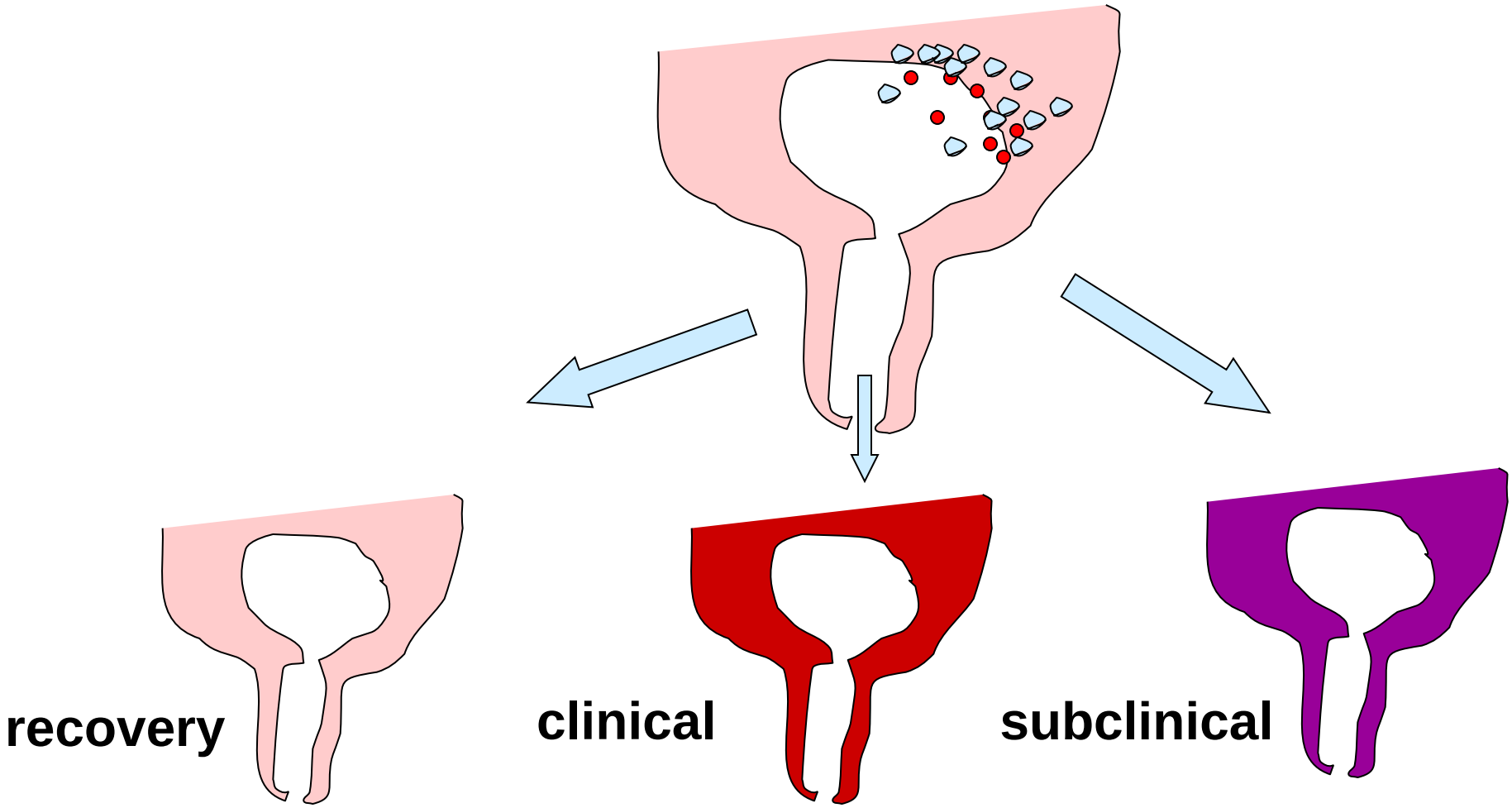
Migrate up the teat canal and colonize the secretory cells



Colonized organisms produce toxic substances harmful to the milk producing cells



White blood cells migrate to fight the organisms



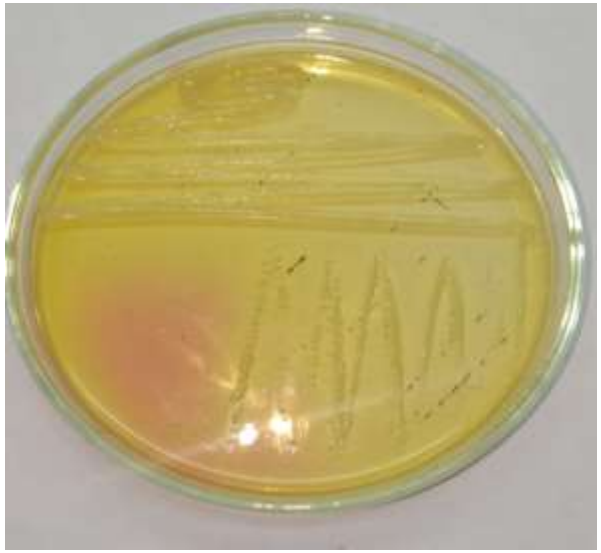
How is mastitis diagnosed ?

- Physical examination
- Chemical tests
- Culture tests
- Molecular tests

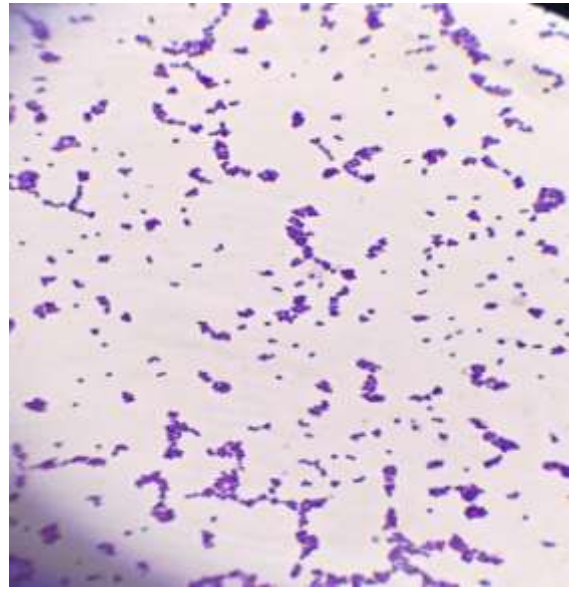
Recent studies in UVAS

- One hundred milk samples positive for CMT were screened for three mastitogens:
  - *Staphylococcus*
  - *Streptococcus*
  - *Escherichia*

Staphylococcus aureus

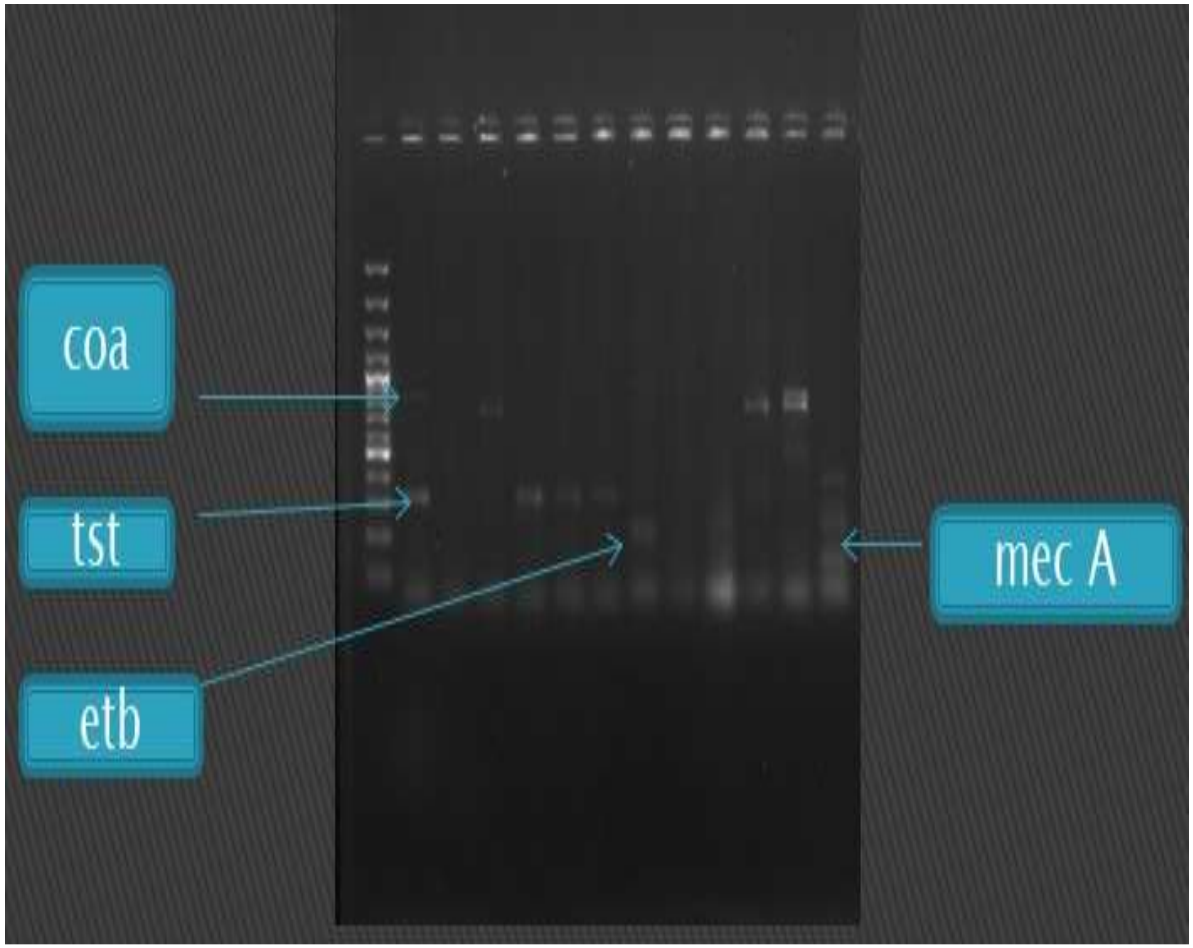


Growth of *Staphylococcus aureus* on mannitol salt agar



Gram positive cocci

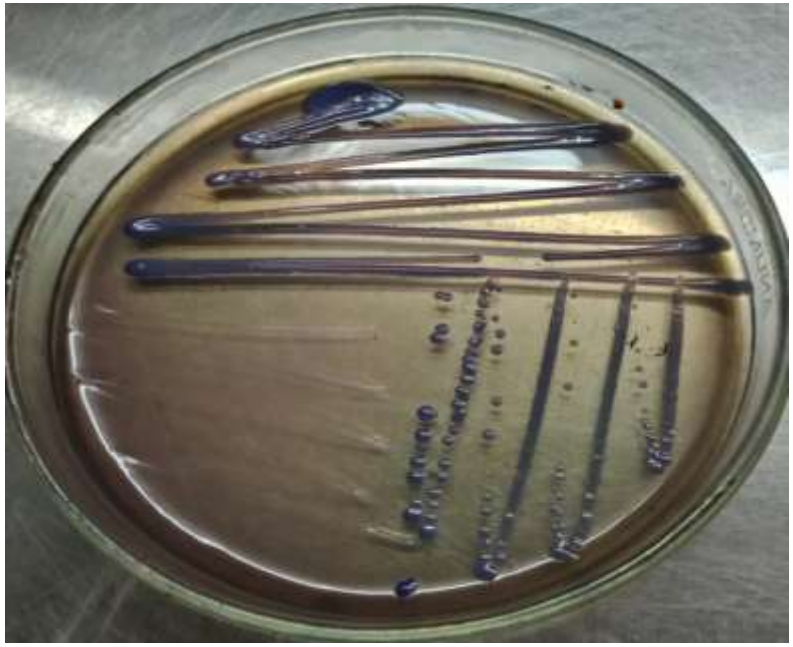
Out of 100 CMT positive samples, 32 were positive for *Staphylococcus aureus* and four toxins were detected



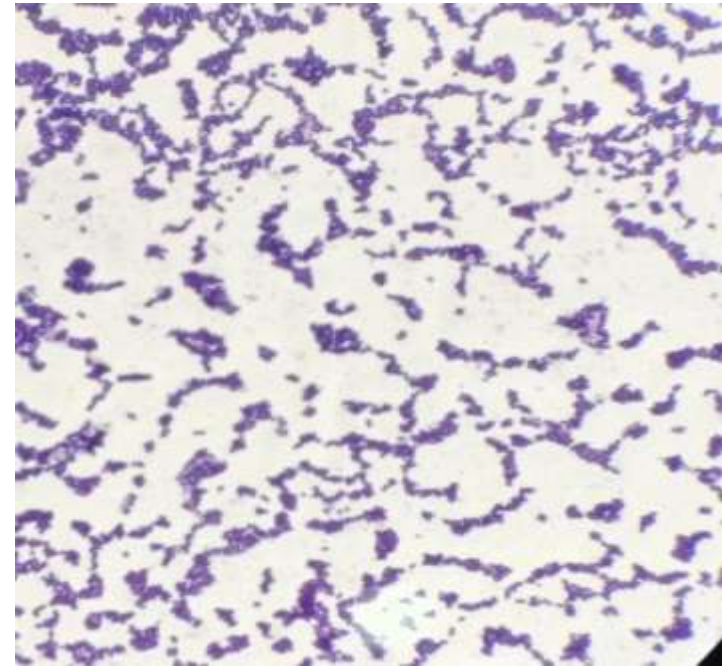
coa: Coagulase
tst: Toxic shock syndrome toxin
etb: Exfoliative toxin B
mecA: methicillin resistance

Representative picture of *Staphylococcus aureus* amplicons on 1.5% agarose gel

Streptococcus uberis

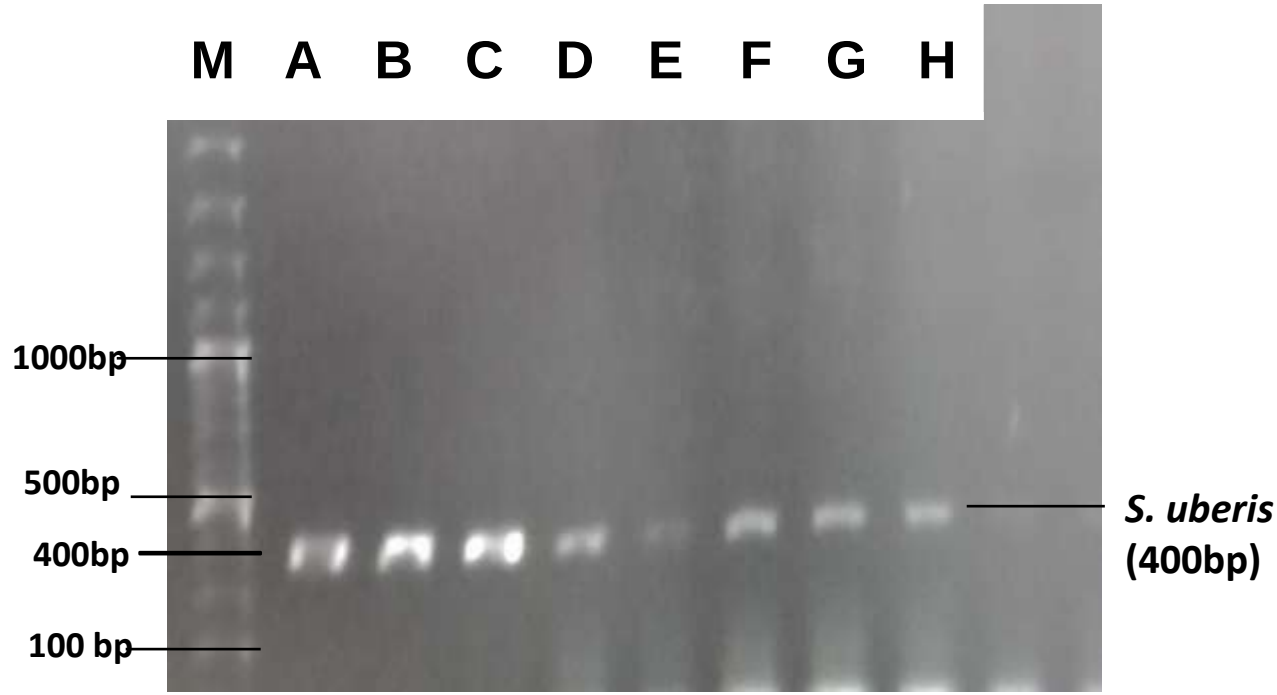


Growth of *Streptococcus* on Blood agar



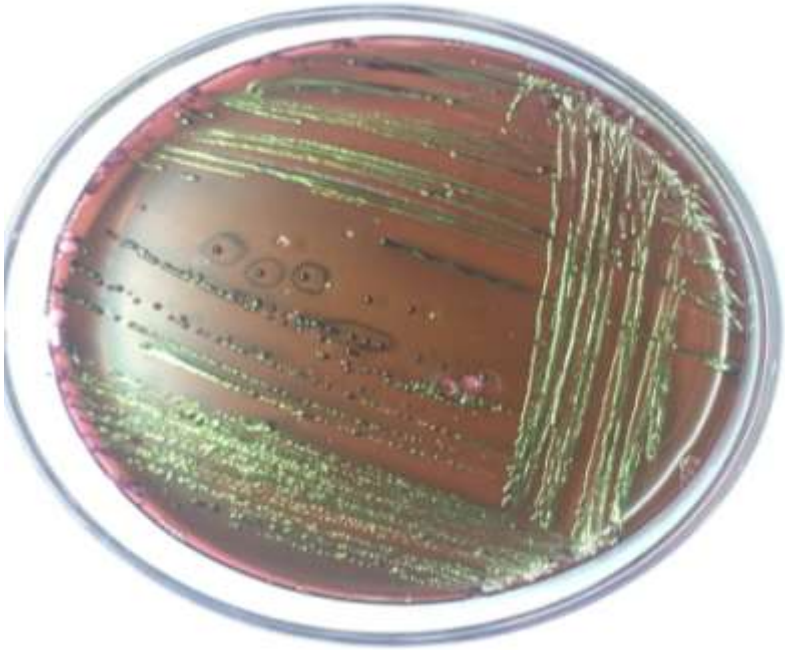
Gram positive cocci

Out of 100 CMT positive samples, 12 were positive for *Streptococcus uberis*

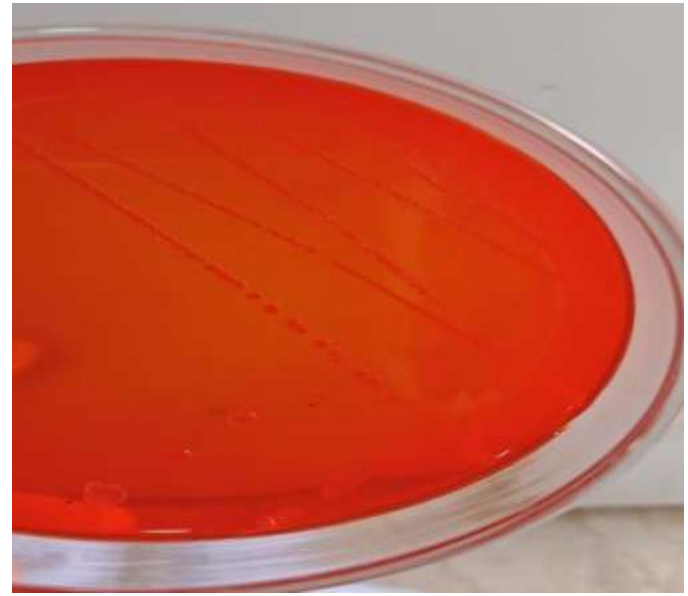


Representative picture of *Streptococcus uberis* amplicons on 1.5% agarose gel

Escherichia coli

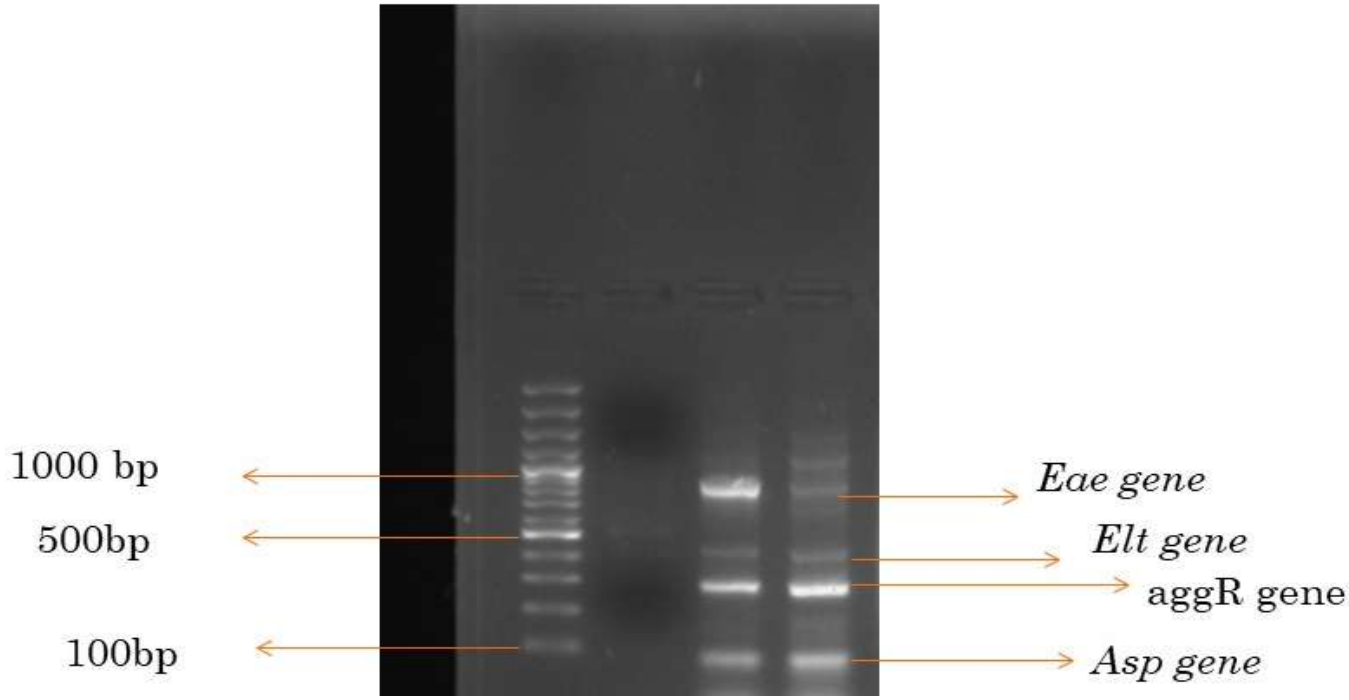


Growth on EMB Agar



Growth on Congo red agar

Out of 100 CMT positive samples, eight were positive for *E. coli* and four toxinotypes were identified



Representative picture of *E. coli amplicons* on 1.5% agarose gel

Eae: Intimin (outer membrane protein)
Elt: Enterotoxin
aggR: Aggregative regulator
AspU: U protein

Thank You