Acute Klebsiella Mastitis in a Guernsey cow

Presenter: Dr. Mutuku J. M.

J56/76195/2012

Introduction

- Def
- Inflammation of the mammary gland that results from the introduction and multiplication of pathogenic microorganisms in the mammary gland (Harmon, 1994)

- Mastitis is the most common and costly production disorder of dairy cattle (Gitau., 2011)
- can manifest as subclinical infection or clinical disease.

- Important bacterial organisms isolated in the peri-urban area of Nairobi Kenya were Streptococcus *spp*., *Staphylococcus aureus and E. coli,*
- other moderately prevalent isolates were *Klebsiella* spp., *Actinomyces and Pseudomonas spp(*Gitau *et al., 2011)*
- *Klebsiella spp*. have become an important cause of clinical mastitis in dairy cows in New York State (Munoz et al., 2007).

Case study

- Name: Lanet (487)
- Spp: Bovine
- Age:
- Breed: Ayrshire
- Parity:
- Production:
- Owner: Vet Farm
- Referred by: Dr. Abuom
- Date of Adm: 22/04/13
- Clinical case No: AD/024/13
- Ward: Therio unit

On admission

- History -
  - Stampede
  - Injured left fore teat by a barbed wire on Saturday (20/ 4)
- Significant findings –
  - Off feed (pain)
  - Spiral lacerating wound,

    left fore teat – caudal cranial
  - Udder warm and painful to touch

Dx: **Spiral Teat Laceration**


22 04 2013


23 04 2013

Physical exam

- Temperament: - Good
- Gait: - Normal
- Demeanour: - Bright
- Nutritional status: - Fair
- Hydration: - Normal
- Resp: - 20/min (Thoraco-abdominal)
- Ruminal motility: - 2/min
- MM: - Pink, moist, rapid refill

On admission

Follow up & Mgt

- **23 – 24/04**
- Pulse 58; resp 20: Rumen 2/min; stool N; milk N. Temp; 38.9^{0}C
- Off feed
- All 4 teats cannulated- Teat infusion cannula – self retaining
- Treatment
- Phenylbutazone (4.4mg/kg)i/v 1
- P/Strep (10mg/kg) i/m= 1ml/25k
- Healing Oil
- Milk drained from 4 quarters

24^{th}

- Milk/secretion from RF quarter yellowish & curded
- Udder very painful to touch
- CMT – Mastitis on RF & RH quarters
- Temp; 38.9^0C
- Milk sample for culture & sensitivity

Sample collection

- Teats cleaned with alcohol, allowed to dry.
- CMT was +ve for all quarters
- The first few streams discarded, 5 ml of secretion was collected in sterile universal bottles for lab culture.
- samples were inoculated by streaking onto the surface of 5%
- McConkey agar, and incubated at 37°c for 24 hrs ((Krieg and Holt, 1984; Quinn *et al*.,1994).

- 25th
- Temp – 38.5^{0}C; Pulse - 120; resp – 36; App – poor; Stool – soft.
- Treatment;
- Multiject IMM – Rt fore & hind teat(1 tube @)
- P/Strep- 20ml i/m
- M/Vit - 20ml i/m
- Lab results out

Lab – cont-

- Findings
- *Cultural xeristics*;
  - Moderate growth of large greyish, non haemolytic colonies on SBA, mucoid, brilliant, pink (lactose- fermentors) colonies on McConkey.
- *Gram reaction & morphology*;
  - Gram –ve rods
- Organism isolated; - *Klebsiella spp*.
- Sensitivity;
  - Gentamycin, Kanamycin &Norfloxacin(++),
  - Streptomycin(+)

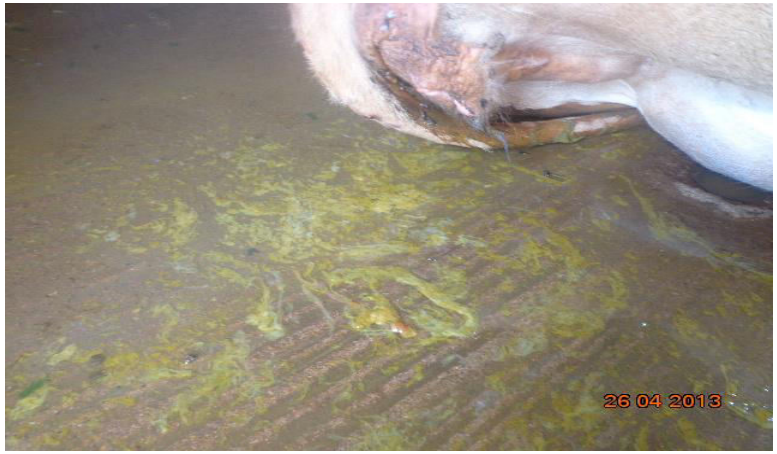
Culture

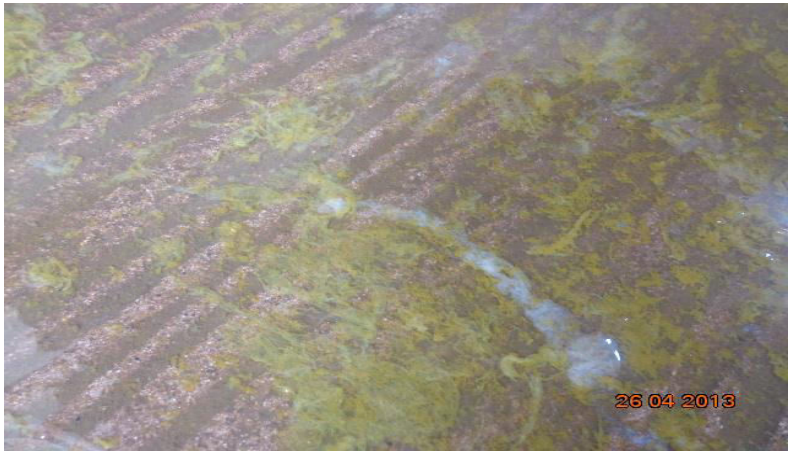
Haematology

cell	value	Range
WBC (m/mm^3)	1.97	4.0 – 15.0
Lymph (5)	66.3	45.0 – 80.0
Mono (%)	3.1	1.0 – 5.0
Granul (%)	30.6	10.0 – 50.0
RBC (m/mm^3)	5.55	6.0 – 11.0
MCV (fl)	50.1	40.0 – 60.0
MCH (pg)	19.0	11.0 – 17.0
MCHC (g/dl)	38.1	30.0 – 40.0
PCV (%)	27.8	25.0 – 50.0
Thro (m/mm^3)	61	100 - 800
EDTA bld on 25/04/013		

- 26th
- Dexamethasone 10ml i/v (2mg/ml – 1.5ml/50kg)
- Gentamycin 15ml i/v (100mg/ml)
- Lugols Iodine 1% IMM
- Hot formentation

26th






26 04 2013

Discussion

- *E. coli, Klebs pneumoniae, and Enterobacter aerogenes - recognized as the* most common coliforms in bovine mastitis (Bannerman et al., 2003).
- Clinical mastitis due to *Klebsiella infection* results in high milk losses and mortality of the affected cows
- Coliform pathogens are essentially opportunistic. Their primary reservoir in transmission - feces, water, soil, sawdust, and shavings that contaminate the teat canals (Radostits *et al*., 2007).

Coliforms –*cont*-

- Exposure of uninfected quarters to coliform pathogens occur primarily between milkings and, secondarily, during milking procedures and dry period. (Radostits *et al*., 2007)

- Coliforms possess lipopolysaccharides (LPS) – so called endotoxins – in the outer layer of the cell wall.

- Endotoxins in contact with the immune system lead to liberation of potent pro–inflammatory mediators (cytokines).

Coliforms – cont-

- Mammary glands of the domestic animals are extremely sensitive to LPS (Munoz *et al*., 2006).
- The endotoxins induce severe changes in;
  - vascular permeability,
  - mammary gland and milk → increase in somatic cells.
- resulting in;

➢ edema, depression, toxemia, and severe peracute or acute clinical signs of mastitis (Ribiero *et al*., 2008)

- Cont -

- Occasionally, complication of coliform mastitis occurs when pathogens disseminate from the mammary gland to systemic circulation, leading to severe clinical signs of bacteremia and/or septicemia (Radostits *et al*., 2007).
- *Clinical signs:-*
- Fever, agalactia, anorexia, depression, rumen stasis, and dehydration(Ribeiro *et al.,* 2006; Santos and Fonseca, 2007).
- The mammary gland presents with marked swelling and regions containing signs of congestion and necrosis
- Mammary secretion - watery to serous, containing small flakes.(Radostits *et al*., 2007)

- Cont -

- Migration of high numbers of neutrophils into affected quarter(s).
  - Associated with severe leukopenia and neutropenia in bovine coliform mastitis (Radostitis et al., 2007).

Cont

- Klebsiella mastitis are associated with contamination by wood or sawdust used in the environment of the animals (Wenz et al., 2001; Munoz et al., 2006; Sampimon et al., 2006; Radostits et al., 2007).

- Deficient management of organic material and fecal material in the environment were probably the primary sources of the microorganism for transmission to the mammary gland.

Conclusion – cont-

- Identify risk factors associated with Klebsiella mastitis in dairy herds.
- Encourage, where possible, Culture & Sensitivity before treatment.
- Improve on hygiene of dairy animal facilities
- Judicious use of drugs – avoid those with known resistance in specific areas.
- Fluid (electrolyte) therapy is indicated to manage endotoxin induced shock.

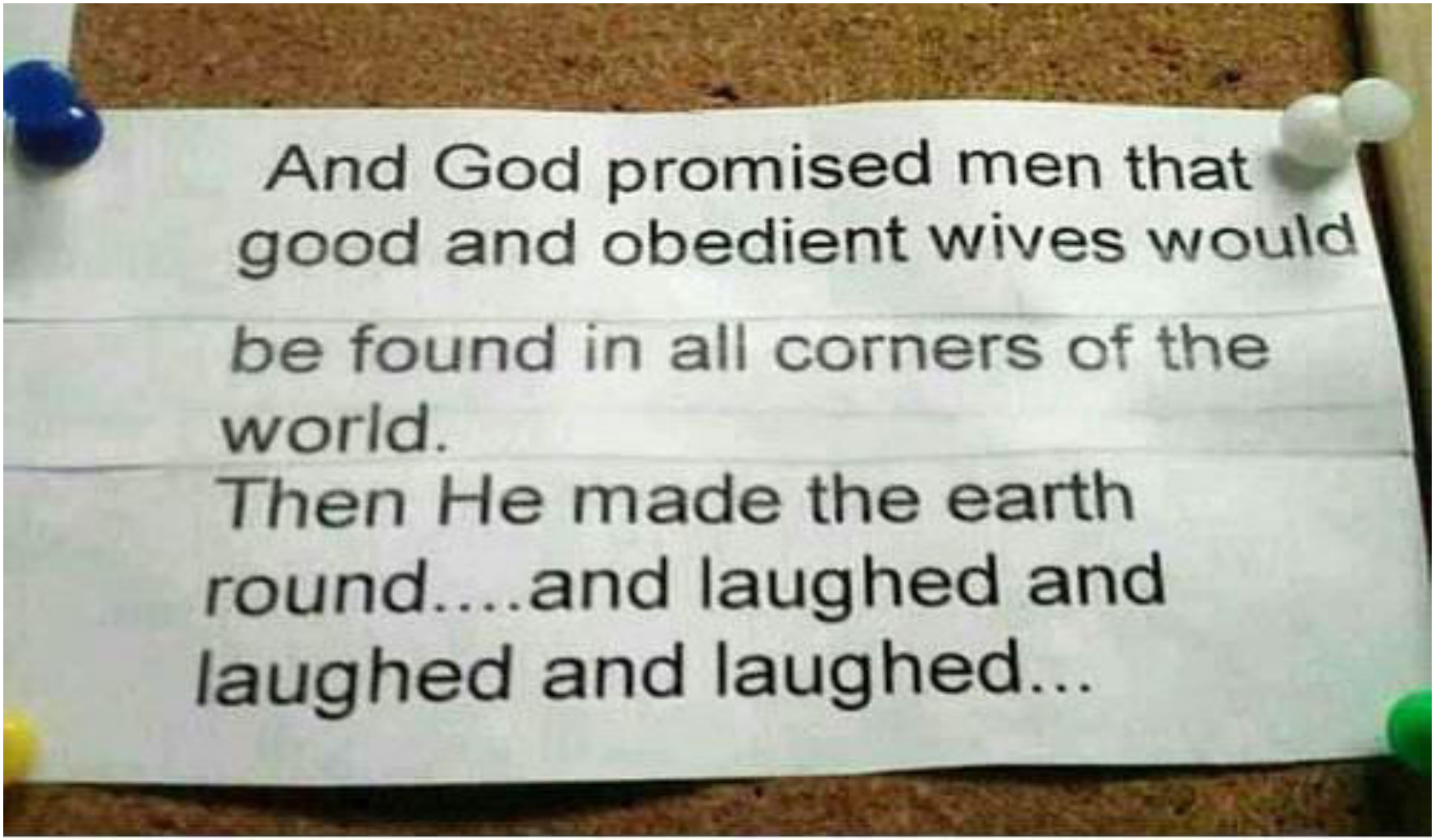
References

- **Bannerman, D., Paape, M,J., and Hare, W.R.** ***(2003):*** Increased levels of LPS-binding protein in bovine blood and milk following bacterial lipopolysaccharide challenge. *J. Dairy Sci.,* ***86****, p.3128-3137.*
- **Gitau, G.,. K. Wabacha, J., M. Mulei,C., Ndurumo, S. and Nduhiu, J.(2011):** Isolation rates and antimicrobial sensitivity patterns of bovine mastitis pathogens in peri-urban area of Nairobi, Kabete, Kenya. *Ethiop. Vet. J.,* ***15 (1)****, 1-13*
- **Gröhn, Y., Wilson, D., González, R., Hertl, J., Schulte, H., Bennett, G., and Y. H. Schukken. Y.(2004):** Effect of pathogen-specific clinical mastitis on milk yield in dairy cows. J.Dairy Sci. **87**:3358-3374.
- **Harmon, R.J. (1994).** Physiology of Mastitis and Factors Affecting Somatic Cell Counts*. J. Dairy Sci.* ***77****: 2103-2112*.
- **Krieg, N.R., Holt, J.G. (1984**): *Bergey's Manual of Systematic Bacteriology. London:* Williams & Wilkins. p.984, 1984.

Ref – cont-

- **Munoz, M., Ahlstrom, C. and Rauch, B. (2006):** Fecal shedding of *Klebsiella pneumoniae* by dairy cows. *J. Dairy Sci., **89:**, p.3425-3430.*
- **Munoz, M., Welcome, F., Schukken, Y.,and Zadoks R(2007):** Molecular Epidemiology of Two *Klebsiella pneumoniae 1 Mastitis Outbreaks on a* 2 Dairy Farm in New York State
- **Ribeiro, M., Motta, R., Paes, A., Allendorf, S., Salerno, T., Siqueira, A., Fernandes, M. and Lara G. (2008):** Peracute bovine mastitis caused by *Klebsiella pneumoniae. Arq. Bras. Med. Vet. Zootec**., **60**, n.2, p.485-488*
- **Quinn, P., Carter, M. and Markey, B. (1994):** *Clinical veterinary microbiology.* London: Wolfe,. 648p.
- **Santos, M. and Fonseca, L.(2007):** *Estratégias para controle de mastite e melhoria da qualidade do leite. São Paulo: Manole.3*14p
- **Wenz, J., Barrington, G. and Garry,F.(2001):** Bacteremia associated with naturally occurring acute coliform mastitis in dairy cattle. *J. Am. Vet. Med. Assoc., 219, p.976-981.*

Thank you


And God promised men that good and obedient wives would be found in all corners of the world.
Then He made the earth round....and laughed and laughed and laughed...
more awesome pictures at THEMETAPICTURE.COM