



Province of the  
**EASTERN CAPE**  
RURAL DEVELOPMENT AND  
AGRARIAN REFORM

# Brucellosis

*Contagious Abortion, Besmetlike Misgeboorte  
Enzootic Abortion, Epizootic Abortion,*

*Undulant Fever, Malta Fever,  
Mediterranean Fever,  
Bang's Disease*





Province of the  
**EASTERN CAPE**  
RURAL DEVELOPMENT AND  
AGRARIAN REFORM

# Brucellosis

- Overview



Province of the  
**EASTERN CAPE**  
RURAL DEVELOPMENT AND  
AGRARIAN REFORM

# Brucellosis

- Overview
- Legislation

# Brucellosis

- Overview
- Legislation
- *Brucella abortus* – the organism



# Brucellosis

- Overview
- Legislation
- *Brucella abortus* – the organism
- Infection in humans

# Brucellosis

- Overview
- Legislation
- *Brucella abortus* – the organism
- Infection in humans
- Infection in Cattle
  - Infection routes
  - Clinical signs
  - Diagnosis
  - Control

# Brucellosis

- Overview
- Legislation
- *Brucella abortus* – the organism
- Infection in humans
- Infection in Cattle
- Points to remember

# Overview

- Brucellosis is the most common zoonotic infection worldwide with over 500 thousand people infected per year.





# Overview

- Brucellosis is the most common zoonotic infection worldwide with over 500 thousand people infected per year.
- Control and eradication extremely difficult



# Overview

- Brucellosis is the most common zoonotic infection worldwide with over 500 thousand people infected per year.
- Control and eradication extremely difficult
- Infection can lay dormant in some cells for years and cause disease breakdown years later.



# Overview

- Brucellosis is the most common zoonotic infection worldwide with over 500 thousand people infected per year.
- Control and eradication extremely difficult
- Infection can lay dormant in some cells for years and cause disease breakdown years later.
- Highest risk group is the heavily pregnant older cows



# Overview

- Brucellosis is the most common zoonotic infection worldwide with over 500 thousand people infected per year.
- Control and eradication extremely difficult
- Infection can lay dormant in some cells for years and cause disease breakdown years later.
- Highest risk group is the heavily pregnant older cows
- Role of bull, unknown, probably insignificant with natural service.



# Overview

- Brucellosis is the most common zoonotic infection worldwide with over 500 thousand people infected per year.
- Control and eradication extremely difficult
- Infection can lay dormant in some cells for years and cause disease breakdown years later.
- Highest risk group is the heavily pregnant older cows
- Role of bull, unknown, probably insignificant with natural service.
- Abortion or calving produces  $10^8$  infective doses per event  
**ie one abortion can infect 100,000,000 cattle**



# Species affected

Species	Natural Host	Human Pathogen
B. abortus	cattle, bison, buffalo	yes
B. melitensis	goats, sheep	yes
B. suis	swine	yes
	European hares	yes
	reindeer, caribou	yes
	rodents	yes
B. canis	dogs, other canids	yes
B. ovis	sheep	no
B. neotomae	rodents	no
B. maris	marine mammals	yes?
B. pinnipediae, B. cetaceae(?)		



# *Brucella abortus*

- Distribution
  - Worldwide
  - Eradicated in some countries





# *Brucella abortus*

- Distribution
  - Worldwide
  - Eradicated in some countries
- Notifiable disease in many countries







# *Brucella abortus*

- Distribution
  - Worldwide
  - Eradicated in some countries
- Notifiable disease in many countries
- In SA State Controlled Disease governed by Animal Disease Act (Act 35 of 1984)





# *Brucella abortus*

- Distribution
  - Worldwide
  - Eradicated in some countries
- Notifiable disease in many countries
- In SA State Controlled Disease governed by Animal Disease Act (Act 35 of 1984)
- Bovine Brucellosis Control Scheme.



# *Legislation*

- Voluntary scheme

# *Legislation*

- Voluntary scheme
- No milk may be sold unless from tested herds

## *Legislation*

- Voluntary scheme
- No milk may be sold unless from tested herds
- To join the scheme (Brucellosis and TB)
  - Fill in a TB1

## *Legislation*

- Voluntary scheme
- No milk may be sold unless from tested herds
- To join the scheme (Brucellosis and TB)
  - Fill in a TB1
  - Undertake to abide by the State requirements if found positive

## *Legislation*

- Voluntary scheme
- No milk may be sold unless from tested herds
- To join the scheme (Brucellosis and TB)
  - Fill in a TB1
  - Undertake to abide by the State requirements if found positive
  - Various “schemes”

## *Legislation*

- Voluntary scheme
- No milk may be sold unless from tested herds
- To join the scheme (Brucellosis and TB)
  - Fill in a TB1
  - Undertake to abide by the State requirements if found positive
  - Various “schemes”
    - Maintenance





## *Legislation*

- Voluntary scheme
- No milk may be sold unless from tested herds
- To join the scheme (Brucellosis and TB)
  - Fill in a TB1
  - Undertake to abide by the State requirements if found positive
  - Various “schemes”
    - Maintenance
    - Herd diagnostic

## *Legislation*

- Voluntary scheme
- No milk may be sold unless from tested herds
- To join the scheme (Brucellosis and TB)
  - Fill in a TB1
  - Undertake to abide by the State requirements if found positive
  - Various “schemes”
    - Maintenance
    - Herd diagnostic
    - Diagnostic



Province of the  
**EASTERN CAPE**  
RURAL DEVELOPMENT AND  
AGRARIAN REFORM

# *Legislation*

- Maintenance Scheme

## *Legislation*

- Maintenance Scheme
  - For herds that require a Brucellosis free declaration

# *Legislation*

- Maintenance Scheme
  - For herds that require a Brucellosis free declaration
    - Dairy herds
    - Stud herds

## *Legislation*

- Maintenance Scheme
  - For herds that require a Brucellosis free declaration
    - Dairy herds
    - Stud herds
  - Whole herd (animals over 18 months of age) must be bled twice with an interval of at least 2 months to be admitted.



Province of the  
**EASTERN CAPE**  
RURAL DEVELOPMENT AND  
AGRARIAN REFORM

## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme



## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
  - Once off test





## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
  - Once off test
  - Whole herd bled

## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
  - Once off test
  - Whole herd bled
  - Gives you an idea of the status of the herd.



## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
- Diagnostic test

## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
- Diagnostic test
  - A group of animals only is tested

## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
- Diagnostic test
  - A group of animals only is tested
  - Usually for sale purposes



## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
- Diagnostic test
  - A group of animals only is tested
  - Usually for sale purposes
  - BEWARE

## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
- Diagnostic test
- Infected herd programme



## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
- Diagnostic test
- Infected herd programme
  - Compulsory



## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
- Diagnostic test
- Infected herd programme
  - Compulsory
  - Quarantine all susceptible animals on the farm

## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
- Diagnostic test
- Infected herd programme
  - Compulsory
  - Quarantine all susceptible animals on the farm
  - Tested at 2-monthly intervals



## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
- Diagnostic test
- Infected herd programme
  - Compulsory
  - Quarantine all susceptible animals on the farm
  - Tested at 2-monthly intervals
  - Positive animals branded “C” on right side of neck



## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
- Diagnostic test
- Infected herd programme
  - Compulsory
  - Quarantine all susceptible animals on the farm
  - Tested at 2-monthly intervals
  - Positive animals branded “C” on right side of neck
  - Must be isolated and sent for slaughter



## *Legislation*

- Maintenance Scheme
- Herd diagnostic scheme
- Diagnostic test
- Infected herd programme
  - Compulsory
  - Quarantine all susceptible animals on the farm
  - Tested at 2-monthly intervals
  - Positive animals branded “C” on right side of neck
  - Must be isolated and sent for slaughter (NO compensation)

## *Legislation*

- Infected herd programme (cont.)
  - Confirmation of infection by culture

## *Legislation*

- Infected herd programme (cont.)
  - Confirmation of infection by culture
  - Oxen may be sent to a feedlot only with permission of State Veterinarian and with full disclosure to the feedlot owner.

## *Legislation*

- Infected herd programme (cont.)
  - Confirmation of infection by culture
  - Oxen may be sent to a feedlot only with permission of State Veterinarian and with full disclosure to the feedlot owner.
  - All animals to leave the farm must be accompanied by a red cross permit.



## *Legislation*

- Infected herd programme (cont.)
  - Confirmation of infection by culture
  - Oxen may be sent to a feedlot only with permission of State Veterinarian and with full disclosure to the feedlot owner.
  - All animals to leave the farm must be accompanied by a red cross permit.
  - All increases and decreases must be accounted for.

## *Legislation*

- Infected herd programme (cont.)
  - Confirmation of infection by culture
  - Oxen may be sent to a feedlot only with permission of State Veterinarian and with full disclosure to the feedlot owner.
  - All animals to leave the farm must be accompanied by a red cross permit.
  - All increases and decreases must be accounted for.
  - Owner **MUST** inform all his neighbours that his farm is infected.

## *Legislation*

- Infected herd programme (cont.)
  - Once 3 consecutive negative tests are achieved test after 6 months,

## *Legislation*

- Infected herd programme (cont.)
  - Once 3 consecutive negative tests are achieved test after 6 months,
  - If negative (and all heifer calves of positive cows are slaughtered) issue Brucellosis free declaration.

## *Legislation*

- Infected herd programme (cont.)
  - Once 3 consecutive negative tests are achieved test after 6 months,
  - If negative (and all heifer calves of positive cows are slaughtered) issue Brucellosis free declaration.
  - After 12 months the herd **MUST** be bled again.



## *Legislation*

- Infected herd programme (cont.)
  - Once 3 consecutive negative tests are achieved test after 6 months,
  - If negative (and all heifer calves of positive cows are slaughtered) issue Brucellosis free declaration.
  - After 12 months the herd **MUST** be bled again.
  - Thereafter it will be returned to Private Vet to test further.

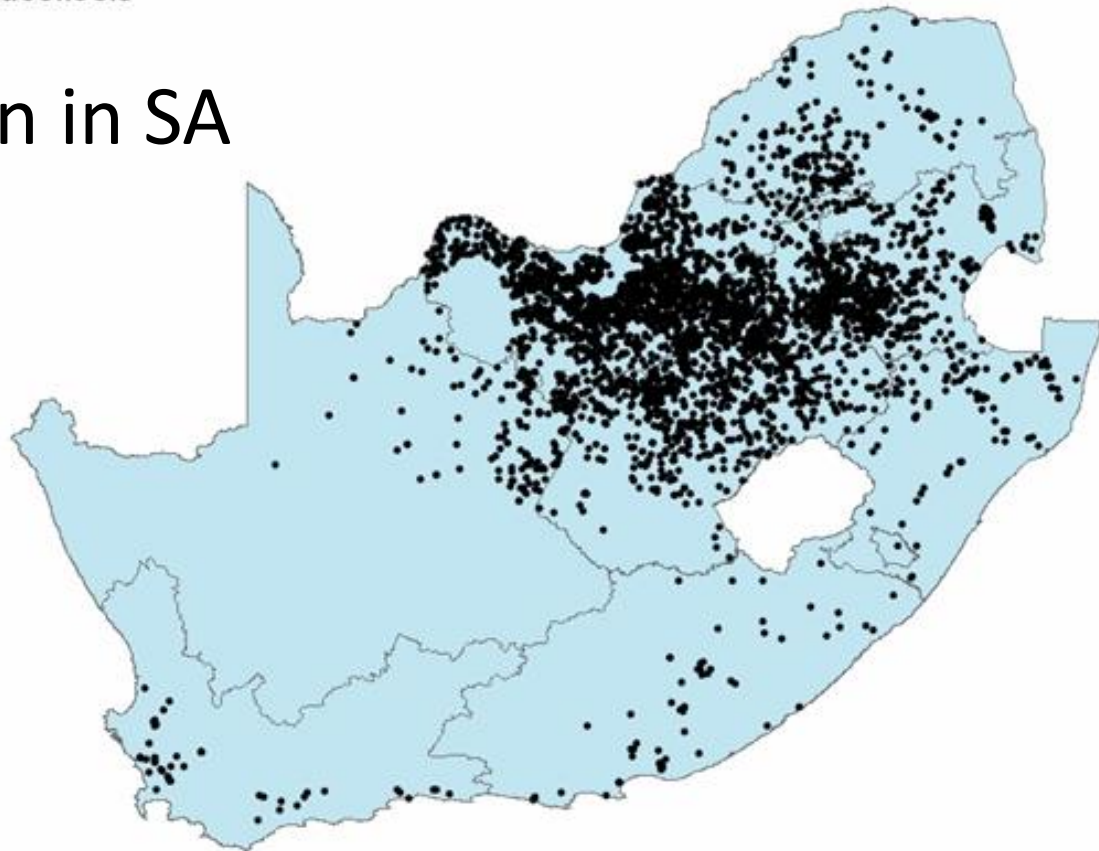


# *Brucella abortus*

Reported Disease Outbreaks (1993 to 2004)

Bovine Brucellosis

- Distribution in SA





Province of the  
**EASTERN CAPE**  
RURAL DEVELOPMENT AND  
AGRARIAN REFORM

# *Brucella abortus*



# *Brucella abortus*

- Environmental persistence
  - Withstands
    - drying (dust, soil)
    - low temperature (survives indefinitely frozen)
    - survives for very long time in cold, wet conditions.



# *Brucella abortus*

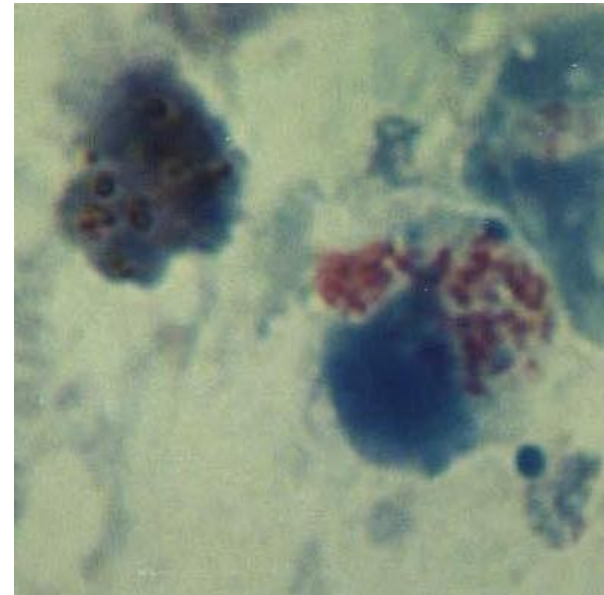
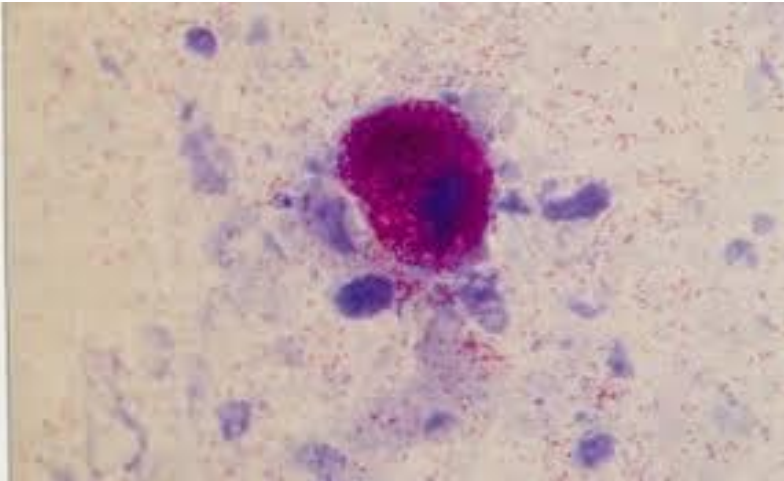
- Environmental persistence
  - Withstands
    - drying (dust, soil)
    - low temperature (survives indefinitely frozen)
    - survives for very long time in cold, wet conditions.
  - Inactivated by sunlight and heat.



# *Brucella abortus*

- Intracellular organism

INTRACELLULAR BRUCELLA



# *Brucella abortus*

- **Latency (infection hides away) can be up to 3 years.  
Experimental - 9yrs!!**

# *Human infection*

- Ingestion
  - Raw milk
  - unpasteurized dairy products



## *Human infection*

- Ingestion
  - Raw milk
  - unpasteurized dairy products
- Mucous membranes or abraded skin
  - Animal abortion/ birth products (Vaginal discharge, aborted fetuses, placentas)

## *Human infection*

- Ingestion
  - Raw milk
  - unpasteurized dairy products
- Mucous membranes or abraded skin
  - Animal abortion/ birth products (Vaginal discharge, aborted fetuses, placentas)
  - Abattoir workers (meat prior to pH dropping)



## *Human infection*

- Occupational disease
  - Cattle farmers
  - Veterinarians
  - Abattoir workers
  - Meat inspectors
  - Lab workers
- Consumers
  - Unpasteurized dairy products





## *Human symptoms*

- Most common
  - Chronic fatigue,
  - Arthritis,
  - Depression,
  - Orchitis.



## *Human symptoms*

- Most common
  - Chronic fatigue, arthritis, depression, orchitis.
- Neurological
  - 5% of cases
- Other
  - Ocular,
  - cardiovascular,
  - other organs

## *Treatment*

- Antibiotics necessary (often multiple)
- About 5% of treated cases relapse
  - Failure to complete treatment.
  - Treatment started late.
- Rarely fatal if treated

## *Infection in animals*

- Ingestion or inhalation of infected tissues or body fluids
  - Blood, urine, milk, semen, placenta, fetus, and vaginal discharges of infected animals

## *Infection in animals*

- Ingestion or inhalation of infected tissues or body fluids
  - Blood, urine, milk, semen, placenta, fetus, and vaginal discharges of infected animals
- Contact with infected tissues or body fluids
  - Mucous membranes, abrasions, injections



## *Infection in animals*

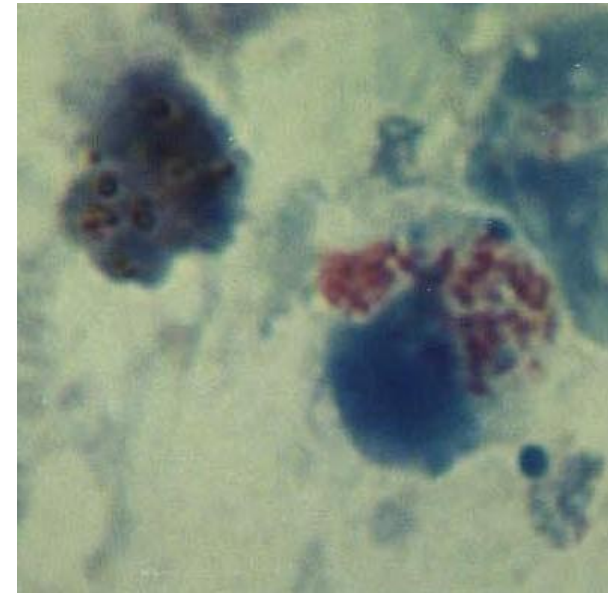
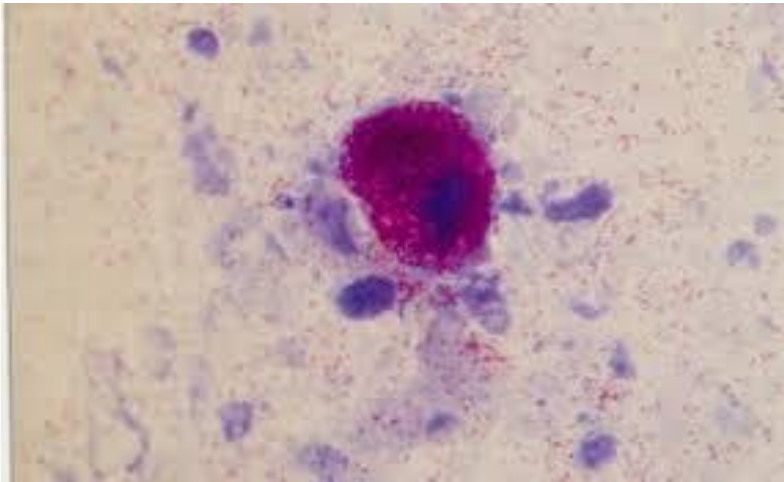
- Ingestion or inhalation of infected tissues or body fluids
  - Blood, urine, milk, semen, placenta, fetus, and vaginal discharges of infected animals
- Contact with infected tissues or body fluids
  - Mucous membranes, abrasions, injections
- Fomites
- Venereal (?)
- Flies (?)



## *Infection in animals*

- After penetrating the membranes the bacteria are ingested by the white blood cells and taken to the lymph nodes

INTRACELLULAR BRUCELLA



## *Infection in animals*

- After penetrating the membranes the bacteria are ingested by the white blood cells and taken to the lymph nodes
- Then to the uterus and udder where they multiply.



## *Infection in animals*

- Incubation period depends on when the animal is infected.
- Can be 6 weeks to 8 months.

## *Infection in animals*

- Incubation period depends on when the animal is infected.
- Can be 6 weeks to 8 months.
- Possibly up to 18 months. (Latency)



Province of the  
**EASTERN CAPE**  
RURAL DEVELOPMENT AND  
AGRARIAN REFORM

# *Clinical signs in animals*



## *Clinical signs in animals*

- Abortions - usually third trimester.



## *Clinical signs in animals*

- Abortions - usually third trimester.
- Retained placentas.



## *Clinical signs in animals*

- Abortions - usually third trimester.
- Retained placentas.
- Birth of dead or weak calves.



## *Clinical signs in animals*

- Abortions - usually third trimester.
- Retained placentas.
- Birth of dead or weak calves.
- Endometritis



## *Clinical signs in animals*

- Abortions - usually third trimester.
- Retained placentas.
- Birth of dead or weak calves.
- Endometritis
- Infertility, low milk yield, lameness







## *Clinical signs in animals*

- Abortions - usually third trimester.
- Retained placentas.
- Birth of dead or weak calves.
- Endometritis
- Infertility, low milk yield, lameness.
- May be NO symptoms at all.





## *Clinical signs in animals*

- Abortions - usually third trimester.
- Retained placentas.
- Birth of dead or weak calves.
- Endometritis
- Infertility, low milk yield, lameness.
- May be NO symptoms at all.
- **EROSIVE DISEASE**





Province of the  
**EASTERN CAPE**  
RURAL DEVELOPMENT AND  
AGRARIAN REFORM

# *Brucella abortus* diagnosis



# *Brucella abortus* diagnosis

- Serology – screening of herds



# *Brucella abortus* diagnosis

- Serology – screening of herds
- Milk Ring Test (dairy herds)





# *Brucella abortus* diagnosis

- Serology – screening of herds
- Milk Ring Test (dairy herds)
- Culture of the organism (gold standard)



# *Brucella abortus* diagnosis

- Serology – screening of herds
- Milk Ring Test (dairy herds)
- Culture of the organism (gold standard)
  - Difficult



## *Brucella abortus* diagnosis

- Serology – screening of herds
- Milk Ring Test (dairy herds)
- Culture of the organism (gold standard)
  - Difficult
  - Specimens: Foetus (98% success)





# *Brucella abortus* diagnosis

- Serology – screening of herds
- Milk Ring Test (dairy herds)
- Culture of the organism (gold standard)
  - Difficult
  - Specimens: Foetus (98% success)  
Colostrum (87% success)



## *Brucella abortus* diagnosis

- Serology – screening of herds
- Milk Ring Test (dairy herds)
- Culture of the organism (gold standard)
  - Difficult
  - Specimens: Foetus (98% success)  
Colostrum (87% success)  
Lymph nodes (20% success)



## *Brucella abortus* diagnosis

- Serology – screening of herds
- Milk Ring Test (dairy herds)
- Culture of the organism (gold standard)
  - Difficult
  - Specimens: Foetus (98% success)  
Colostrum (87% success)  
Lymph nodes (20% success)
  - Ideally need at least 3 specimens.



## *Brucella abortus* diagnosis

- Serology – screening of herds
- Milk Ring Test (dairy herds)
- Culture of the organism (gold standard)
  - Difficult
  - Specimens: Foetus (98% success)  
Colostrum (87% success)  
Lymph nodes (20% success)
  - Ideally need at least 3 specimens.
  - In live animal: placenta, colostrum plus lochia



Province of the  
**EASTERN CAPE**  
RURAL DEVELOPMENT AND  
AGRARIAN REFORM

# *Brucella abortus control*

- State Controlled disease (legal obligations)



# *Brucella abortus control*

- State Controlled disease (legal obligations)
- Know your herd status



# *Brucella abortus control*

- State Controlled disease (legal obligations)
- Know your herd status
- Biosecurity

## *Brucella abortus* control

- State Controlled disease (legal obligations)
- Know your herd status
- Biosecurity
  - Purchase only from CERTIFIED herds.



# *Brucella abortus control*

- State Controlled disease (legal obligations)
- Know your herd status
- Biosecurity
  - Purchase only from CERTIFIED herds.
  - Heifers are always a risk.

# *Brucella abortus* control

- State Controlled disease (legal obligations)
- Know your herd status
- Biosecurity
  - Purchase only from CERTIFIED herds.
  - Heifers are always a risk.
  - Use AI semen from known source.

## *Brucella abortus* control

- State Controlled disease (legal obligations)
- Know your herd status
- Biosecurity
  - Purchase only from CERTIFIED herds.
  - Heifers are always a risk.
  - Use AI semen from known source.
- Increase herd immunity (vaccinate)

## *Brucella abortus* control

- Increase herd immunity (vaccinate)
  - Vaccination of heifer calves 3 – 8 months is required by law.

## *Brucella abortus* control

- Increase herd immunity (vaccinate)
  - Vaccination of heifer calves 3 – 8 months is required by law.
  - This may be S19 or RB51.

## *Brucella abortus* control

- Increase herd immunity (vaccinate)
  - Vaccination of heifer calves 3 – 8 months is required by law.
  - This may be S19 or RB51.
  - DO NOT use S19 in Jersey heifers after 6 months.

## *Brucella abortus control*

- Increase herd immunity (vaccinate)
  - Vaccination of heifer calves 3 – 8 months is required by law.
  - This may be S19 or RB51.
  - DO NOT use S19 in Jersey heifers after 6 months.
  - Remember that vaccination will not necessarily prevent infection.

## *Brucella abortus control*

- Only 70 % of animals will respond adequately to vaccination



## *Brucella abortus* control

- Only 70 % of animals will respond adequately to vaccination

No of vac.	No of animals vac.	No protected
1 <sup>st</sup>	100	70
2 <sup>nd</sup>	30	21 (91 % of original 100)
3 <sup>rd</sup>	9	6 (97 % of original 100)
4 <sup>th</sup>	3	2
5 <sup>th</sup>	1	0.7 (99.7% now protected)



## *Brucella abortus control*

- Only 70 % of animals will respond adequately to vaccination
- A high dose of infective organisms may overwhelm even good immunity.

## *Brucella abortus control*

- Only 70 % of animals will respond adequately to vaccination
- A high dose of infective organisms may overwhelm even good immunity.
  - Remember  $10^8$  infective doses per abortion/calving



## *Brucella abortus control*

- Only 70 % of animals will respond adequately to vaccination
- A high dose of infective organisms may overwhelm even good immunity.
  - Remember  $10^8$  infective doses per abortion/calving
  - Brucella is intracellular – antibodies can't get to them easily.



## *Brucella abortus* control

- Recommended vaccination programme:
  - 1<sup>st</sup> dose (S19) 4-6 months
  - 2<sup>nd</sup> dose (RB51) 10 – 12 months



## *Brucella abortus* control

- Recommended vaccination programme:
  - 1<sup>st</sup> dose (S19) 4-6 months
  - 2<sup>nd</sup> dose (RB51) 10 – 12 months
- OR: in high risk herds
  - 1<sup>st</sup> dose (S19) 4-6 months
  - 2<sup>nd</sup> dose (RB51) 8-10 months
  - 3<sup>rd</sup> dose (RB51) 2-3 months before mating

## *Brucella abortus control*

- NB: It is essential to have a dedicated syringe and needles for S19 vaccine. (Or disposable and dispose of them!)
- You CANNOT wash or boil S19 vaccine out of a syringe.

## *Brucella abortus*

- NB: up to 15% of cows that have been recently infected and have recently calved/aborted, test **NEGATIVE** on serology, but are **POSITIVE** on culture.



## *Brucella abortus*

- NB: Up to 20% of heifer calves born to infected cows will be infected with *Brucella*, but will remain test negative until after calving.

## *Brucella abortus*

- NB: Up to 20% of heifer calves born to infected cows will be infected with *Brucella*, but will remain test negative until after calving.
  - This may not necessarily be the first calving.

## *Brucella abortus*

- NB: Up to 20% of heifer calves born to infected cows will be infected with *Brucella*, but will remain test negative until after calving.
  - This may not necessarily be the first calving.
  - This is the cause of the “2 – year breakdown” in infected herds.



Province of the  
**EASTERN CAPE**  
RURAL DEVELOPMENT AND  
AGRARIAN REFORM

# Take home message

- Know your status

# Take home message

- Know your status
- Beware of introducing problems (biosecurity)

# Take home message

- Know your status
- Beware of introducing problems (biosecurity)
- Test regularly

# Take home message

- Know your status
- Beware of introducing problems (biosecurity)
- Test regularly
- Prevention is better than cure.



Province of the  
**EASTERN CAPE**  
RURAL DEVELOPMENT AND  
AGRARIAN REFORM

# DAFF: 5 core facts



# DAFF: 5 core facts

- 1. Brucellosis is a herd disease

# DAFF: 5 core facts

- 1. Brucellosis is a herd disease
- 2. It affects your pocket

# DAFF: 5 core facts

- 1. Brucellosis is a herd disease
- 2. It affects your pocket
- 3. You can buy in disaster

# DAFF: 5 core facts

- 1. Brucellosis is a herd disease
- 2. It affects your pocket
- 3. You can buy in disaster
- 4. Humans can get sick





Province of the  
**EASTERN CAPE**  
RURAL DEVELOPMENT AND  
AGRARIAN REFORM

# Thank you



Umlando eLizwekwenkqeni