CBPP in Ethiopia: Field and Diagnostic Laboratory Activities

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Outline of Presentation

- **AHI in Brief**
- **Historical Background of CBPP**
- **Laboratory and Field Activities**
- **Challenges**
- **Future thoughts**

Animal Health Institute (AHI), Ethiopia

AHI

AHI in Brief

- Established in1965 & now it is 57 years old
- First name was - Sholla Veterinary Laboratory, Addis Ababa served as Central Veterinary Laboratories
- In 1995 re-named - Central Disease Investigation Laboratory & moved to the current location –SEBETA
- 1997-2007: National Animal Health Research Center- Under EARO (EIAR)
- 2007 to 2022: NAHDIC, MoA
- 2022 to present: AHI, MoA

AHI's Labs & other Facilities

13 BSL- 2 labs:

- **Serology: viral serology and bacterial serology,**
- **Bacteriology and Mycology,**
- **Viriology (cell culture),**
- **Molecular diagnostic lab,**
- **Parasitology: protozoology, acarology-Entemiology, helminthology,**
- **Pathology with autopsy facilities,**
- **Pharmacology and toxicology,**
- **Fish, honey bee disease**

AHI's Sequencing & Bioinformatics Laboratory (USA-DTRA Support)

BSL-3 Zoonoses Diagnostic Laboratory

Established with FAO's support, Inaugurated by his excellence Dr Abera Deressa, State Minister MOARD, and Mr. Mafa Chipeta SRC/E. Africa/ FAOR Ethiopia, AU/ECA on 15 may 2009

BSL-3 Laboratory for the Diagnosis of Public Health Importance Zoonotic Diseases.

- HPAI
- RVF
- TB
- Brucellosis
- Anthrax
- EVD

AHI-MoA, SEBETA, Ethiopia

Conference and Training hall

- Promotes the livestock sector
- Attract international partnership
- Generates revenue

AHI's facilities

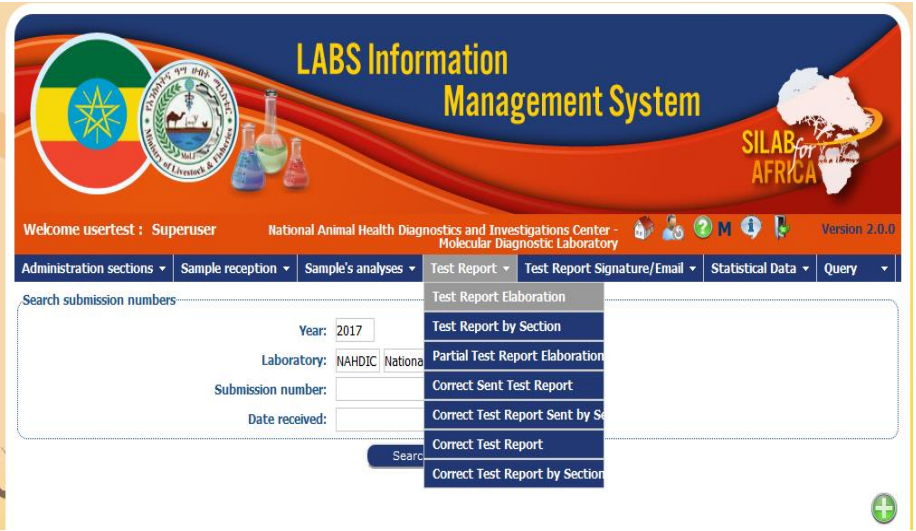
Dead animals examination room

Quarantine facility

Experiment animal House

TA MANAGEMENT, ANALYSIS REPORTING THROUGH SILAB

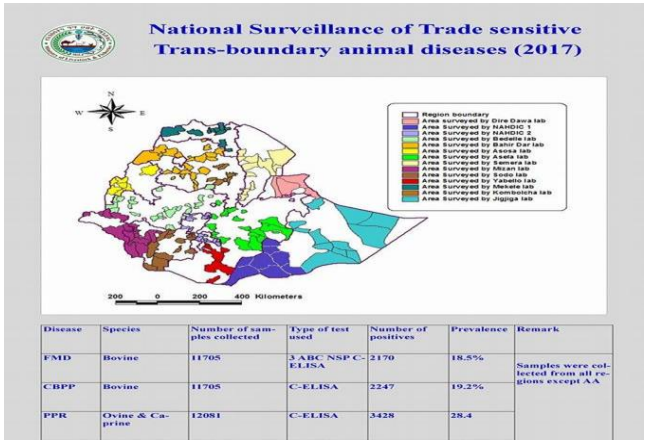
Implemented Laboratory Information Mgt system in collaboration with IZSAM and FAO



- **Impact**
  - Better delivery of service
  - Accreditation
  - International recognition
  - Customer trust
  - Minimize sample turn around time
  - Reliable data when reporting

Responsibility of AHI

- Capacity building
- Outbreak Investigation
- Surveillance
- Research (collaborators)



Disease	Species	Number of samples collected	Type of test used	Number of positives	Prevalence	Remark
FMD	Bovine	11705	3 ABC NSP C-ELISA	2170	18.5%	Samples were collected from all regions except AA
CBPP	Bovine	11705	C-ELISA	2247	19.2%	
PPR	Ovine & Caprine	12081	C-ELISA	3428	28.4	

Quality Management System(QMS) (ISO 17025) & Accreditation

- AHI has implemented (QMS) of ISO/IEC17025:2005 since 2008
- Accredited in 2012 by SANAS
- Accredited by Ethiopian accreditation service for **12 tests** as of February 2020

CBPP in Ethiopia

Historical Background

- CBPP was believed to be introduced to Ethiopia from India by the army of field Marshal Napier when he invaded Ethiopia in 1867–1868 (Masiga et al., 1996)

- In 1993, CBPP was present in 23 countries in Africa, including Ethiopia (Masiga et al., 1996)

CBPP in Ethiopia

- Now CBPP is endemic in Ethiopia
- Sero-prevalence ranges from **0.4** to **96%** (Abdela and Yune, 2017).
- Ethiopia has the largest livestock population in Africa, with over **65 million cattle** (Central Statistics Agency, CSA, 2020a).
- CBPP accounts for losses of over **8.96 million** USD per year (Abdela and Yune, 2017).

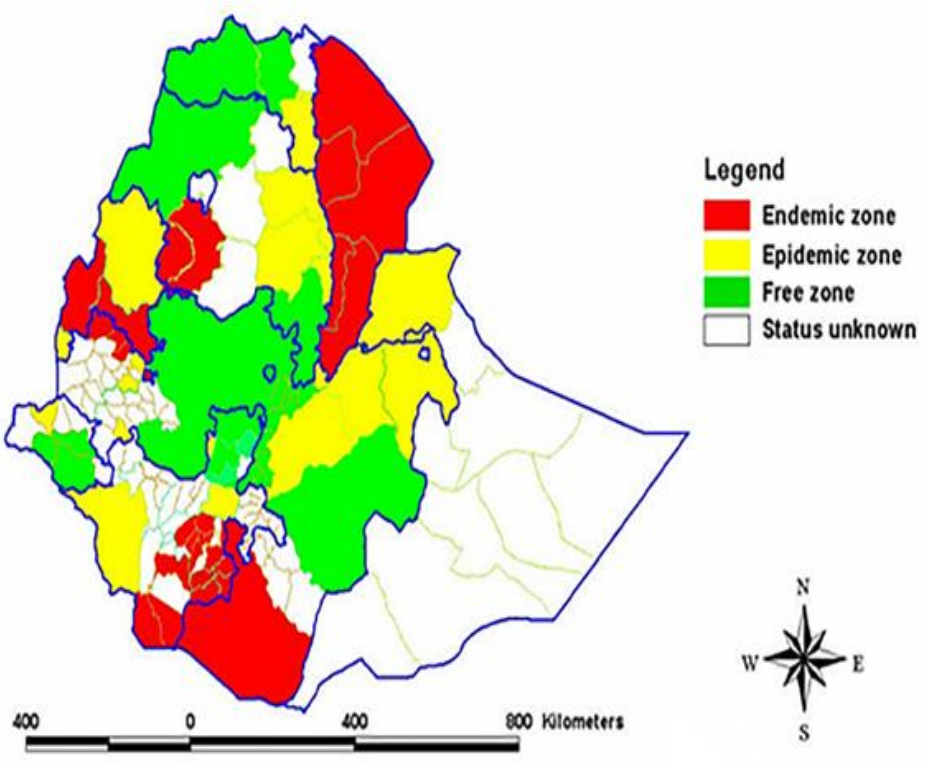
Laboratory and Field Activities

CBPP Seroprevalence (2004) NAHDIC Report

Region	No Zone	No District	Total sample	Negative	Positive	Prevalence
Afar	3	3	1080	1001	79	7.3
Amhara	9	12	4320	4260	56	1.29
B Gumuz	2	2	720	633	87	12.05
Gambela	1	2	720	578	142	19.72
Oromia	11	20	7140	6730	410	5.74
SNNP	8	8	2700	2553	147	5.44
Somali	2	3	1110	1099	11	0.9
Tigray	2	4	1140	1352	88	6.11
Total	**38**	**54**	**19230**	**18210**	**1020**	**5.63**

Zonal classification of CBPP (2004)

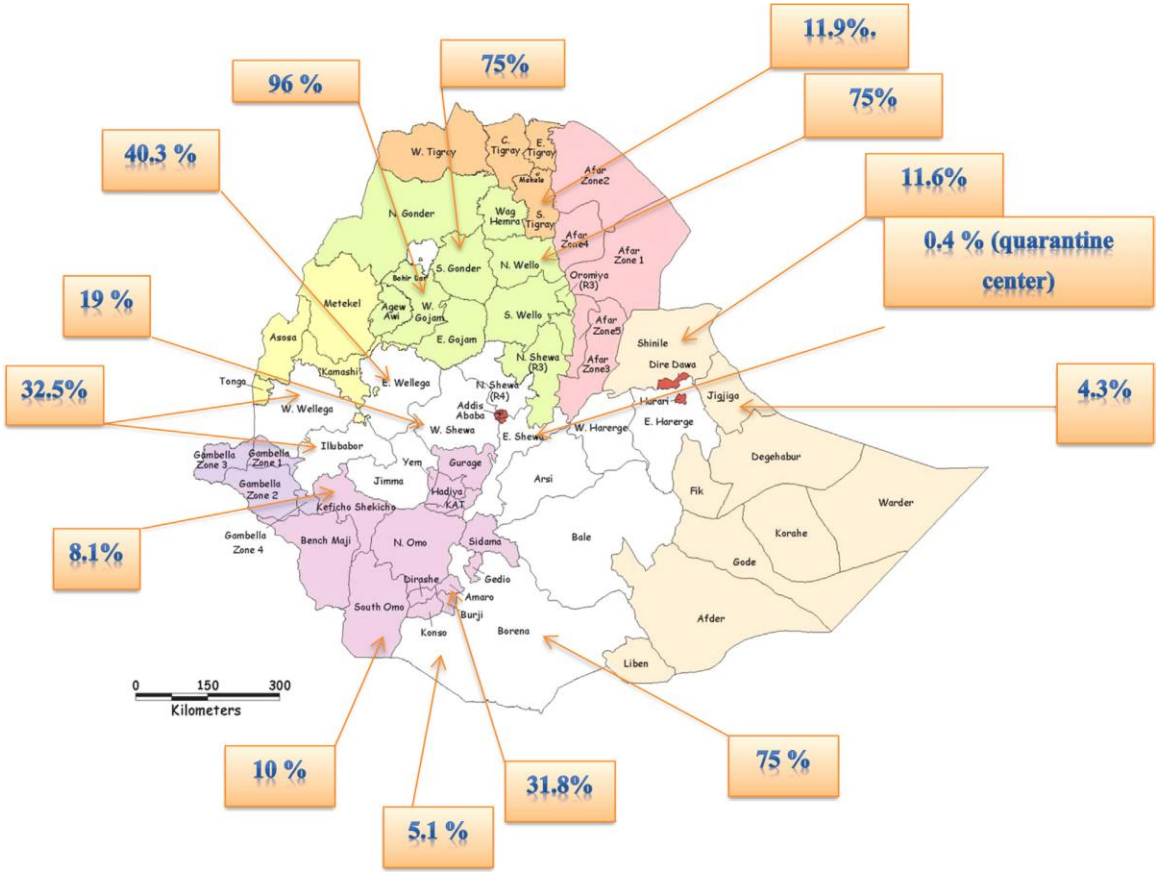
- Endemic zone-low lands
- Epidemic zone- adjacent endemic zone
- Free zone- high lands
- Status unknown- mainly Somali region



CBPP Reports (1996–2016) : Published papers

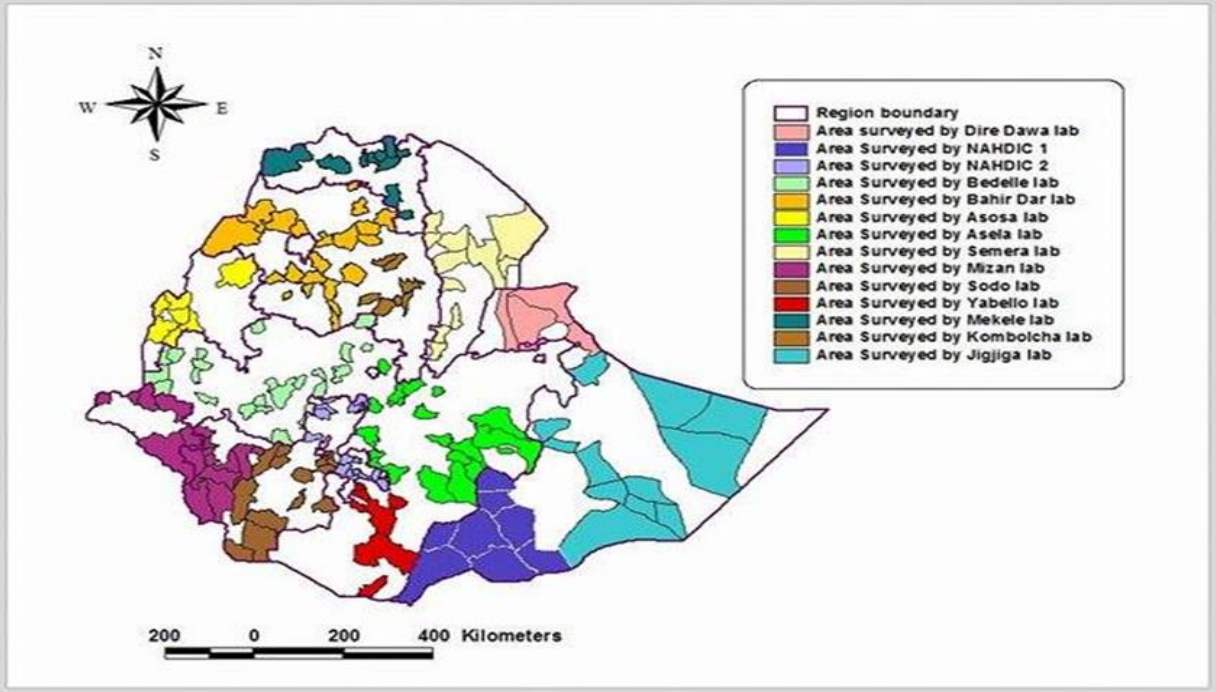
- Seroprevalence that ranges from 0.4 to 96%

- Agro-ecology-the highest was reported from lowland in which 40% of livestock population was kept



Abdela N and Yune N (2017). Review. Front. Vet. Sci. 4:100. doi: 10.3389/fvets.2017.00100

National Surveillance of Trade sensitive Trans-boundary animal diseases (2017)



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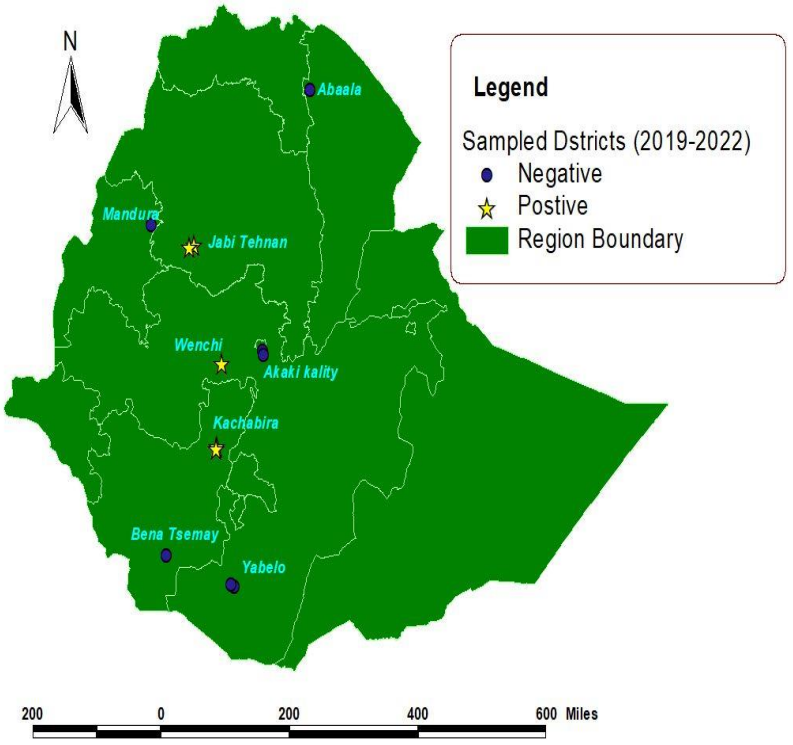
CBPP at AHI: Samples Tested (2019-2022)

(OB+Surv+Research)

Year	Specimen type	No. tested	No. pos	% proportion
2019	Serum	16	2(CFT)	12.5
	Swabs	30	0(culture)	0
2020	Serum	298	89(c-ELISA)	29.9
	Swabs	53	0(culture)	0
	Tissue	72	0(culture)	0
2021	Serum	1572	442(c-ELISA)	28.11
	Swabs	32	7(RT-PCR)	21.9
	Tissue	03	0(culture)	0
	Tissue	18	6(RT-PCR)	33.3
2022	Exudate	03	0(culture)	0
	Serum	20	0(c-ELISA)	0
	Tissue	12	2(culture)	16.7
	Whole blood	02	0(culture)	0
Total		**2131**	**578**	**27.1**

CBPP Outbreaks (2019-2022) (Investigated by AHI)

- 8 Districts (3 districts - pos)
- 93 animals sampled
  (45 F & 48M)
- 8 animals positive
  (5 M & 3F)



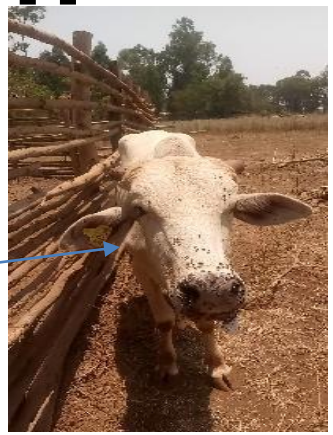
Recent CBPP Outbreak at a Fattening Farm

- Reporting date to AHI: March 28/2022
- Source location: Unknown

Clinical Investigation

Signs observed

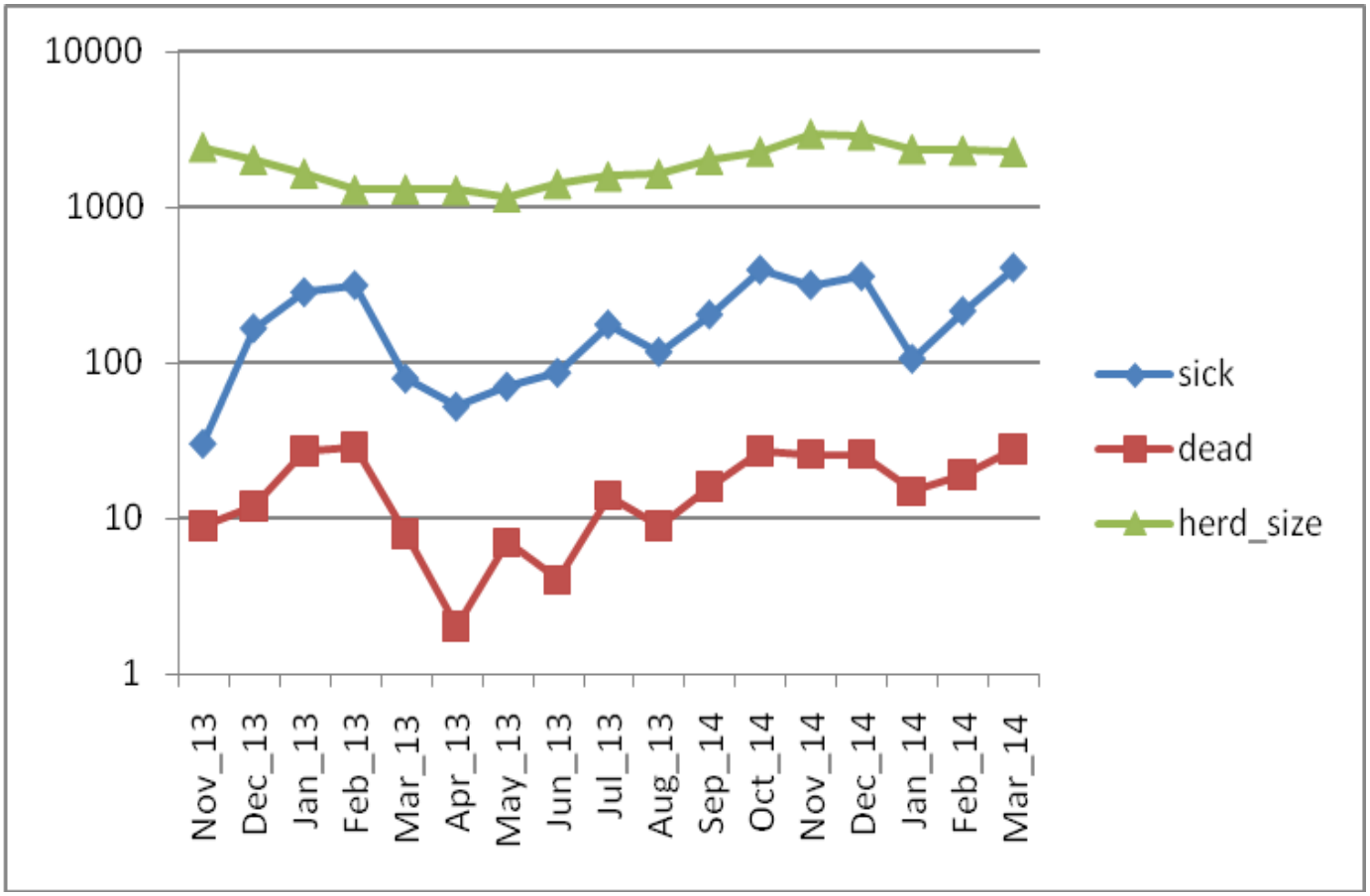
- Expiratory grunting
- Head extension
- Nasal discharge
- Depression
- Dyspnoea
- Isolated from the group
- Foamy salivation
- Agalactiate/recumbency



Epidemiology: Morbidity & Mortality)

Variable	Mar/2022	%
Number affected	409	18
Number of deaths	28	1.2
Total number susceptible	2267	

Epidemiology: Trend at the Fattening Farm (Nov., 2021 to March, 2022)



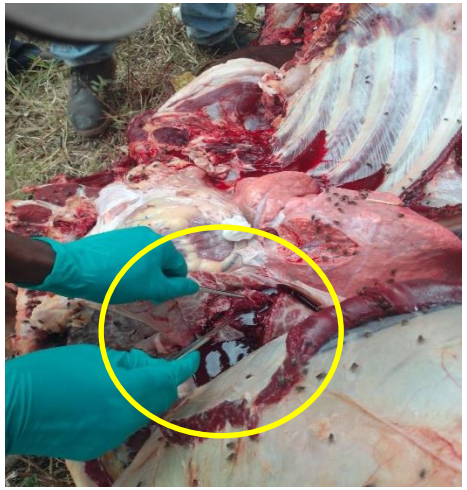
N.B. Nov-13: Nov. 2013 in Ethiopian Calendar

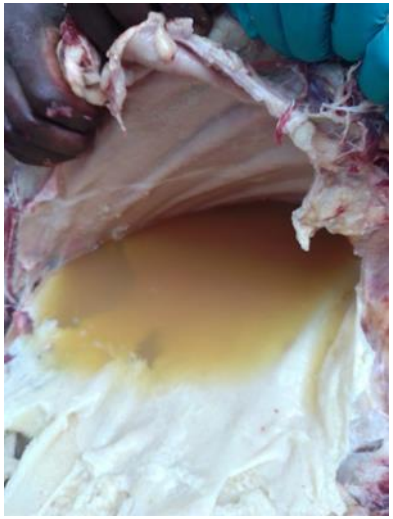
Postmortem examination

- Conducted on three animals
- All male
- Age: 5, 6 & 8 yrs

PM Lesions

- Congestion and consolidation of lungs with fibrinous adhesions in pleura
- Marbled appearance on cut surfaces of lungs
- Serofibrinous exudate in thoracic cavity





Sample collection & transportation

17 specimens: 12 tissue; 3 Exudate; 2 Whole blood
NB. Duplicate samples were taken

ID: 2904

- Lung tissue
- Fibrinous exudates
- bronchial lymph node

ID: 3479

- Lung tissue
- Fibrinous exudates
- bronchial lymph node
- Whole blood

ID: 1857

- Lung tissue
- Fibrinous exudates
- bronchial lymph node
- Retropharyngeal lymph node
- Whole blood

Samples were transported in ice and stored at -20oC until culture

Media Preparation

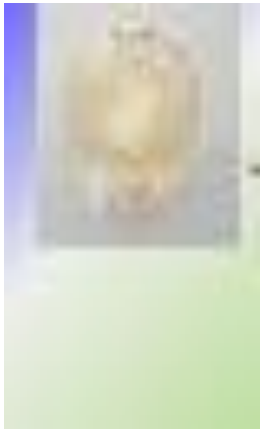
Procedure we followed

- PPLO Agar base/broth- as per the manufacturer (Difco)
- Glucose 0.1%(50% of glucose)
- Sodium Pyruvate ?% (50% of pyruvate)
- DNA 0.0024% (0.2% of DNA)
- Mycoplasma supplement – as per the manufacture instruction

Mycoplasma isolation & characterization

Procedures followed

- Grind tissue with 10ml tryptose broth in sterile pestle and mortar
- Collect the homogenate
- Centrifuge the homogenate at 1400g 4^{o}C, 15 min
- With syringe and a 0.45µm filter pour 6-7 drops of the supernatant both on agar and in broth parallel



PPLO Agar

PPLO Broth

Culture & Genotyping Result

Two animals culture positive (tissue & exudate)

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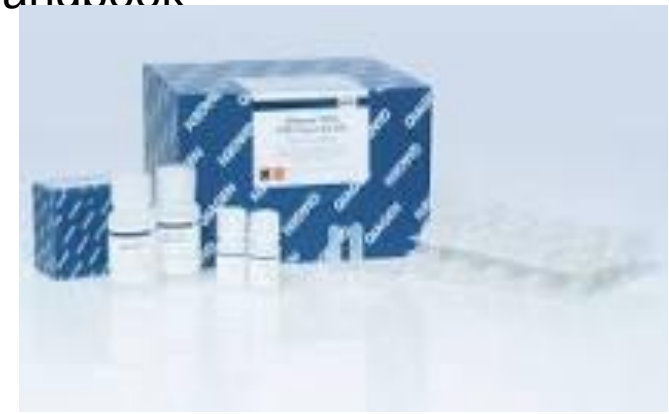
One animal positive for MmmSC by RFLP

QIAamp® DNA Mini and Blood Mini Handbook



AHI

RFLP

IZSAM, Teramo, Italy

Sequencing of MmmSC

- Waiting for the result from IZSAM, Teramo, Italy

Challenges

- Experienced staffs (CBPP culture) re-tired/leave for better salary
- Lack of inputs: supplements, reagents (molecular)

Future thoughts

- Twining to be OIE CBPP Reference labs
- Diagnostic kit production (CFT test)
- Surveillance & research

THANK YOU!! እናመሰግናለን!!