



Best practices on diagnostics, surveillance and control/elimination efforts for Bovine Tuberculosis in Fiji

Elva Borja, DVM MVPHMgt *WOAH Support Consultant – Pacific Sub-region*

Regional Workshop on Zoonotic Tuberculosis and Brucellosis Control in Asia Pacific Region
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Lessons learned from zoonotic tuberculosis surveillance program in the Fiji Islands



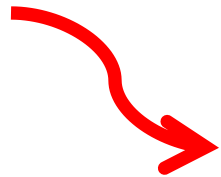
Fiji BTEC:
The Fiji Brucellosis and Tuberculosis Eradication & Control Program



Background: Fiji Brucellosis and Tuberculosis Eradication & Control (BTEC) Program

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- Data suggests that the Fiji Bovine Brucellosis and Tuberculosis Eradication and Control (BTEC) program of the Animal Health and Production (AHP) Division of the Fiji Ministry of Agriculture (MOA) has been in place from 1999...but historical encounters indicated 1960's!



Forgotten? Old data lost?

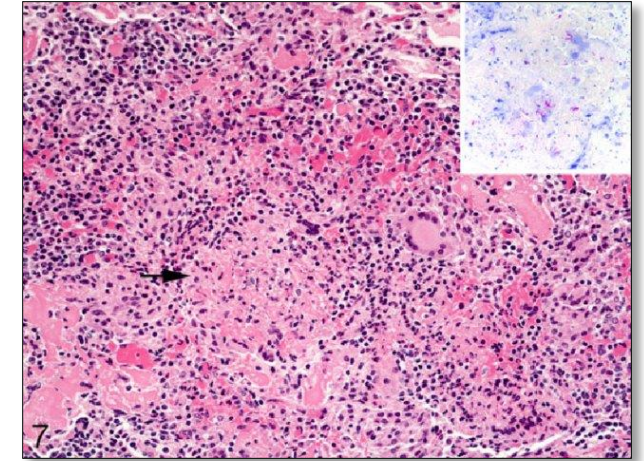




- Animal TB surveillance in Fiji is focused on detection of *M. bovis* using single intradermal tuberculin test.
- TB surveillance also include meat inspection at the abattoir.

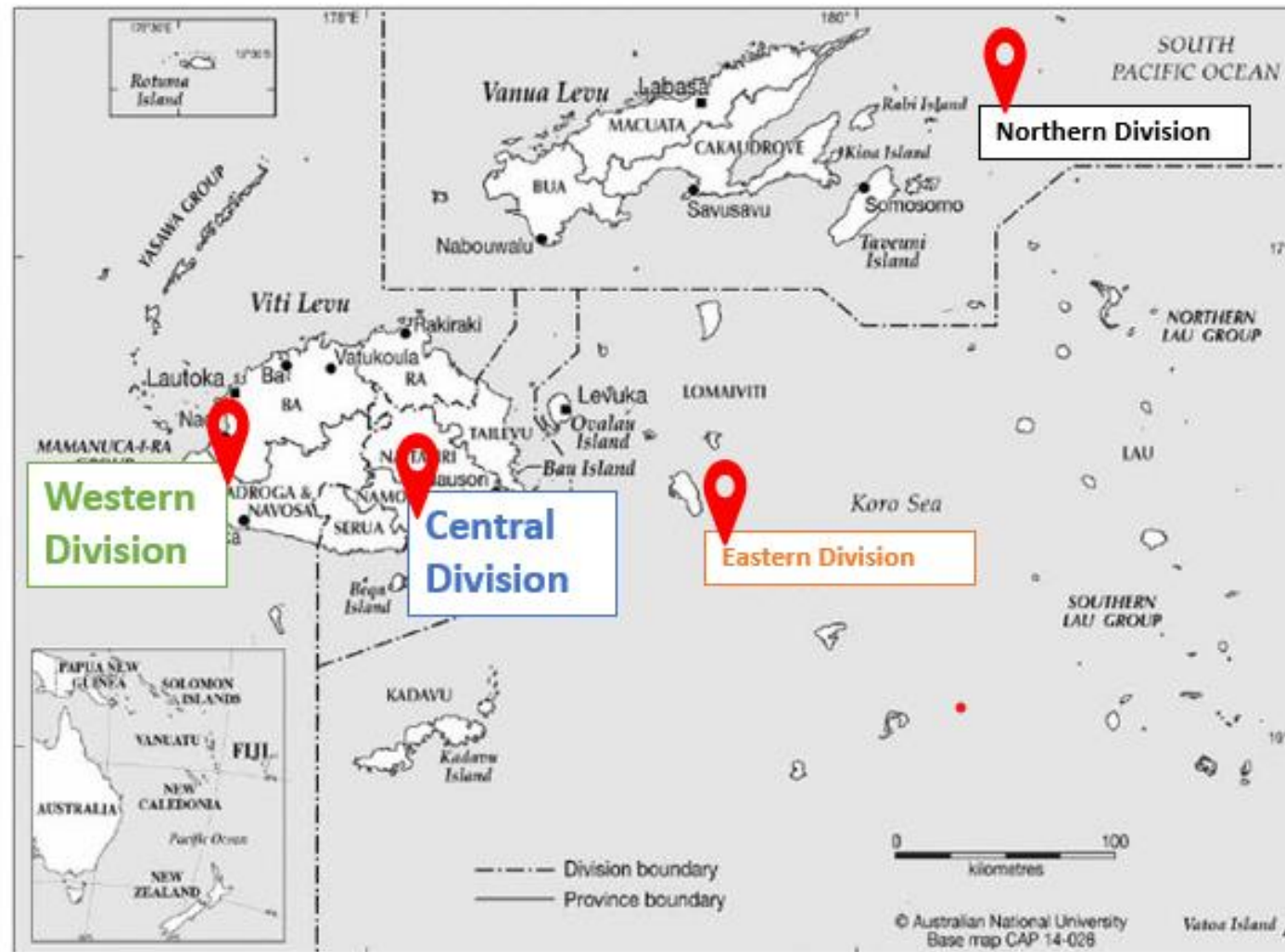


positive



Histopathology of *Mycobacterium bovis* infection, lung, bovine, 30 days post challenge (Palmer, 2019)





Map of Fiji showing Division boundaries. Source: Maps Online, CartoGIS Services, ANU College of Asia and the Pacific, The Australian National University.

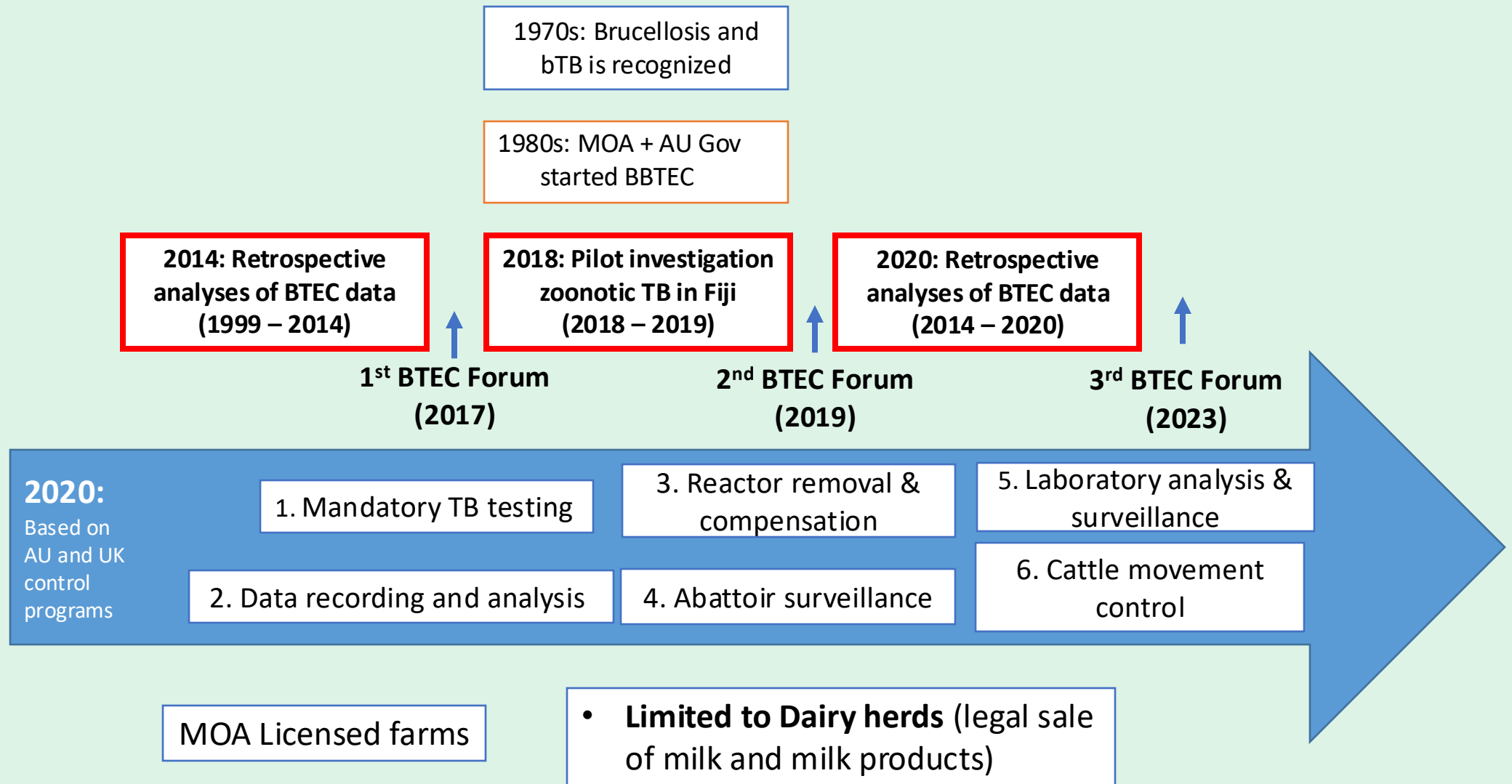
BTEC technical officers during farm testings





BTEC Strategy in Fiji – Key components

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Web-based Database



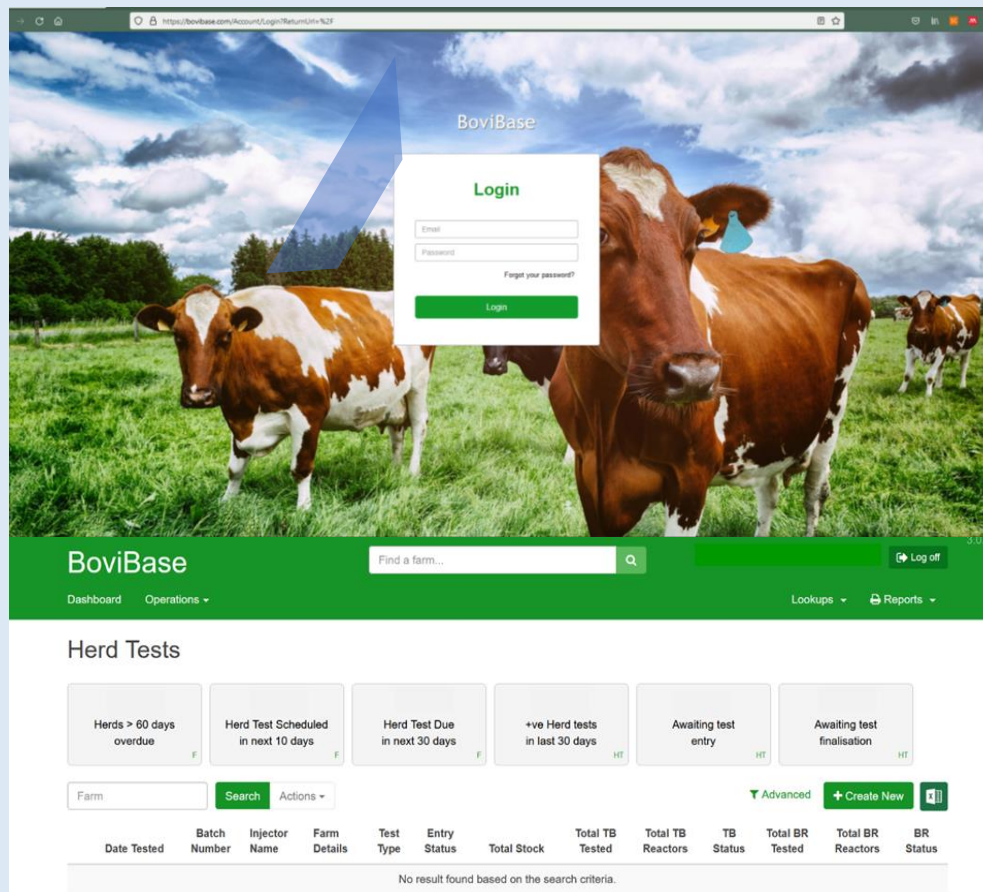
1970's-1998: loose papers

1999-2018: Log books

2007-2010: Summarized data in
MS Excel format

2011-2018: Raw data in MS Excel

2018 – present: Bovibase



Testing & ear tagging

Before 2018, only 6 ≥ mo cattle were tested.

From 2018, cattle ≥ 3 mo started being tested and have a **metal tag** with unique number in the right ear to indicated tested.

Compensation scheme


Improved in 2018

2014: Retrospective analyses of BTEC data (1999 – 2014)

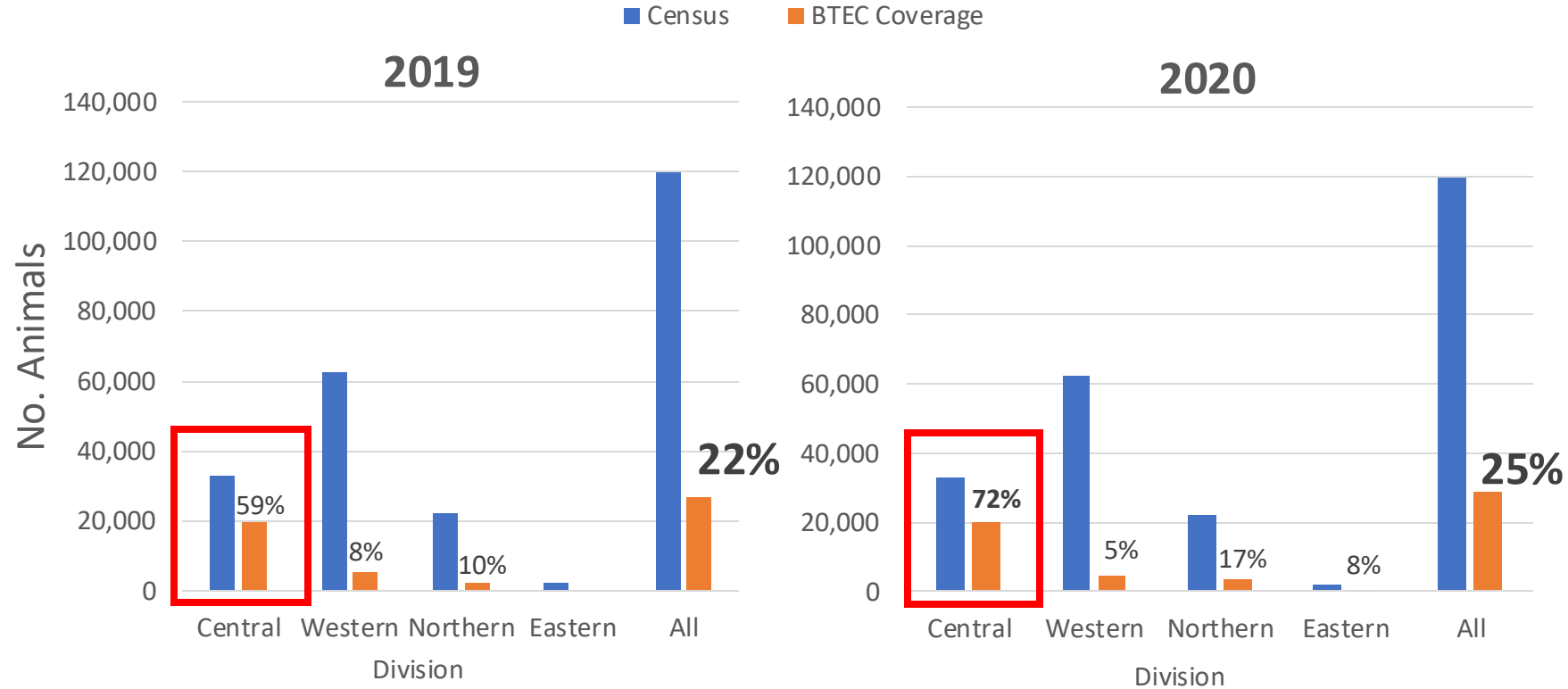
2018: Pilot investigation zoonotic TB in Fiji (2018 – 2019)

2019: Study on potential wildlife reservoir for bTB - mongoose

2020: Retrospective analyses of BTEC data (2014 – 2020)

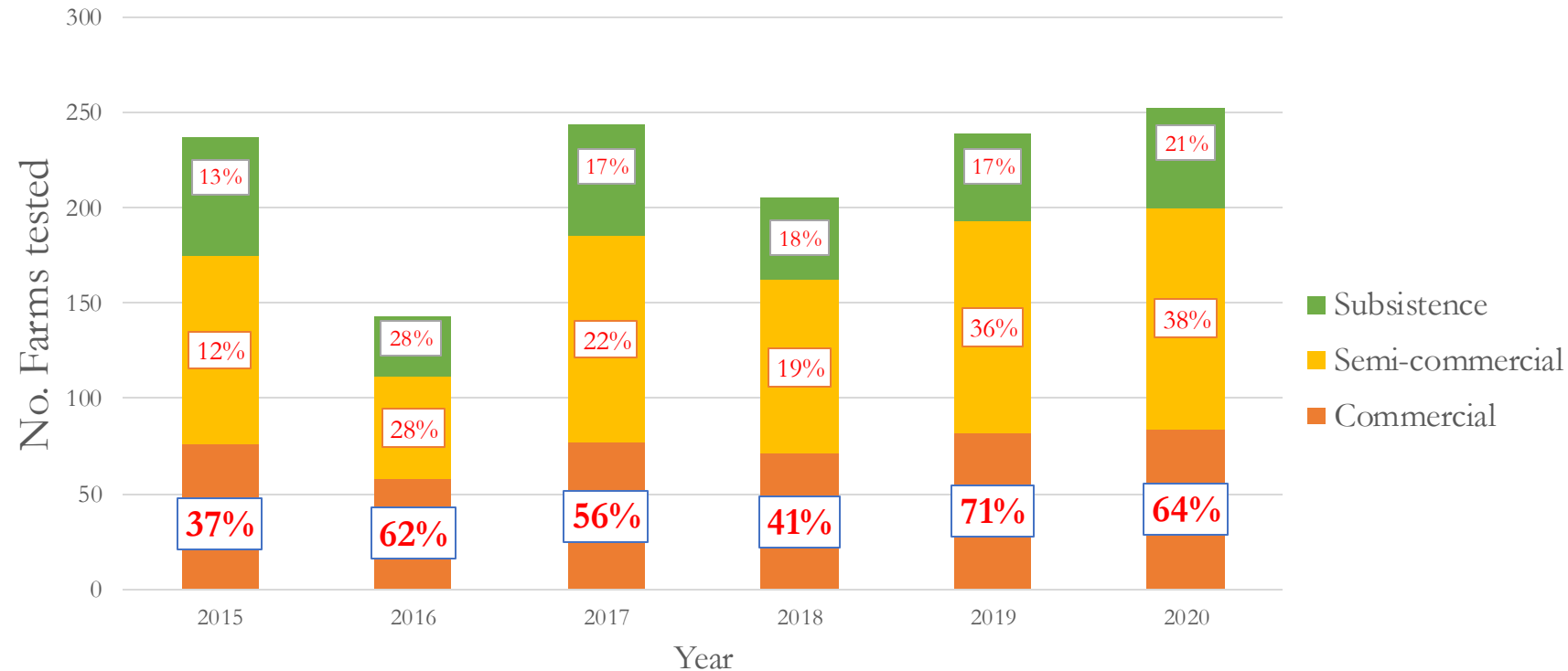
Data Source	Type of data	Data management
	BTEC Records 181,152 entries	Data use approval <i>March 2020</i>
	Meat Inspectors & Bovibase Records 3,654 entries	Transcription (MS Excel) <i>Nov 2020 – Sept 2021</i>
	Meat Certificate Records 3,319 entries	Cleaning (MS Excel, R) <i>Dec 2020 – Sept 2021</i>
	Meat Compensation Records 2,879 entries	Verification (MS Excel, R) <i>Dec 2020 – Sept 2021</i>
	Laboratory Records 1,197 entries	Analysis (MS Excel, R) <i>October 2021</i>

Coverage of animals by BTEC in 2019 and 2020



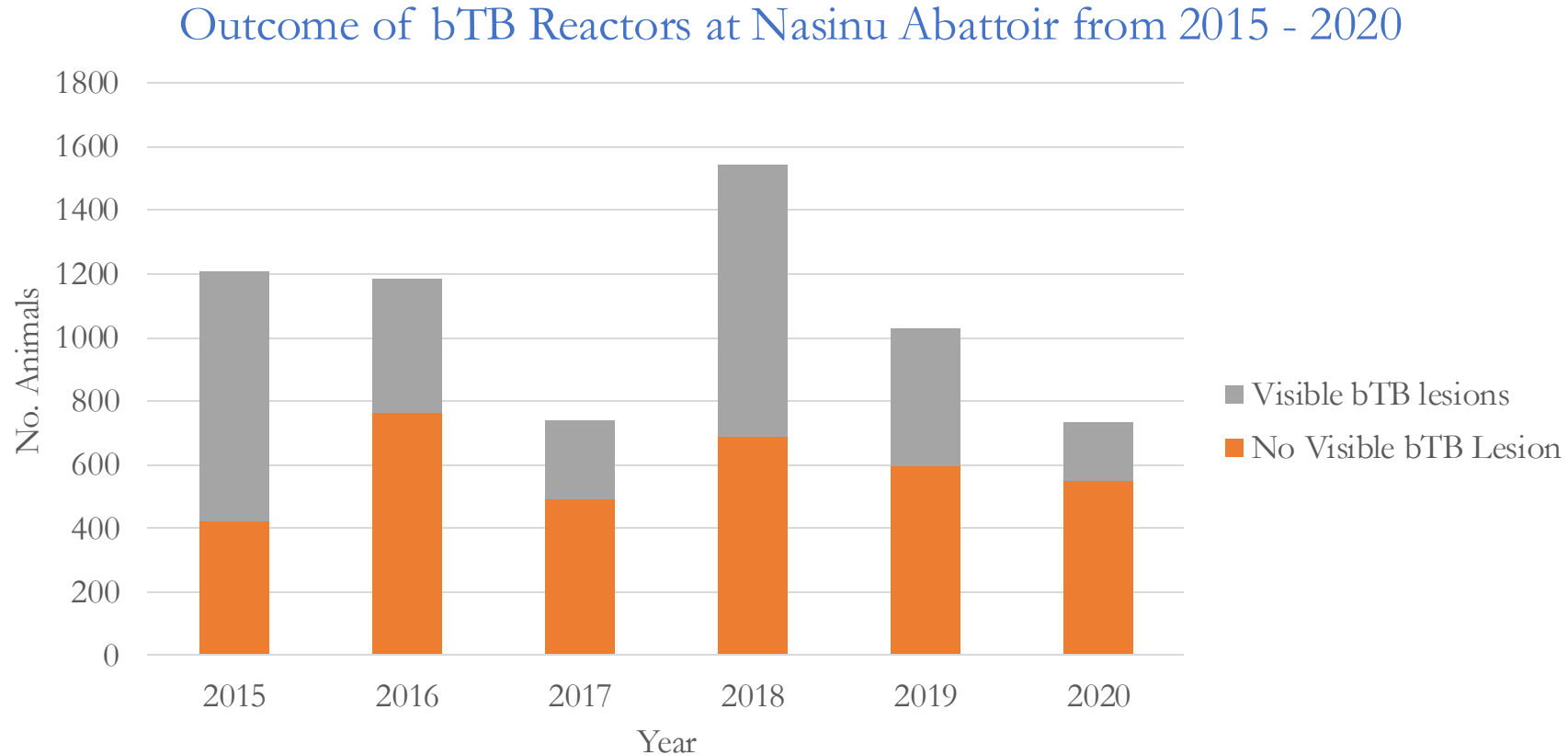
- The coverage of animals was 22% in 2019 and 25% in 2020
- The highest proportion of animals tested was in Central Division (59% in 2019, 72% in 2020) with dairy cattle contributing with more than 70% coverage in 2019 and 2020.

Number of farms tested by operation size from 2015 to 2020. The % of bTB infected farms is shown within each category.



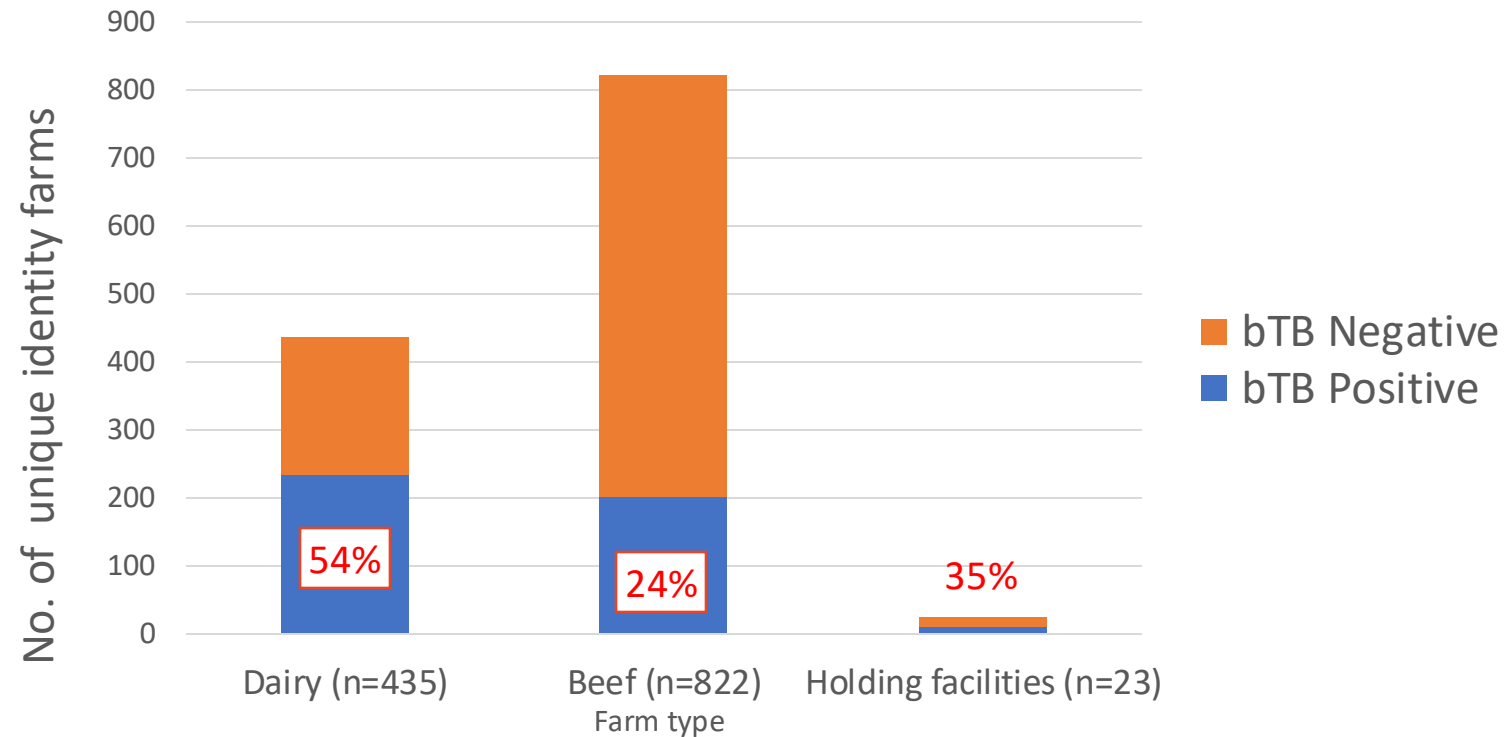
The highest proportion of bTB infected farms were commercial farms, e.g. in 2020, 64% of commercial farms were infected.

Outcome of bTB reactors sent to Nasinu Abattoir and Fiji Veterinary Pathology Lab



- At Nasinu Abattoir, reactors were classified based on post-mortem inspection.
- In 2019 and 2020, only samples from NVL reactors were sent to Fiji Veterinary Laboratory (FVL) for culture. Of them, on average, 79 % were presumptive culture positive to *M. bovis*.

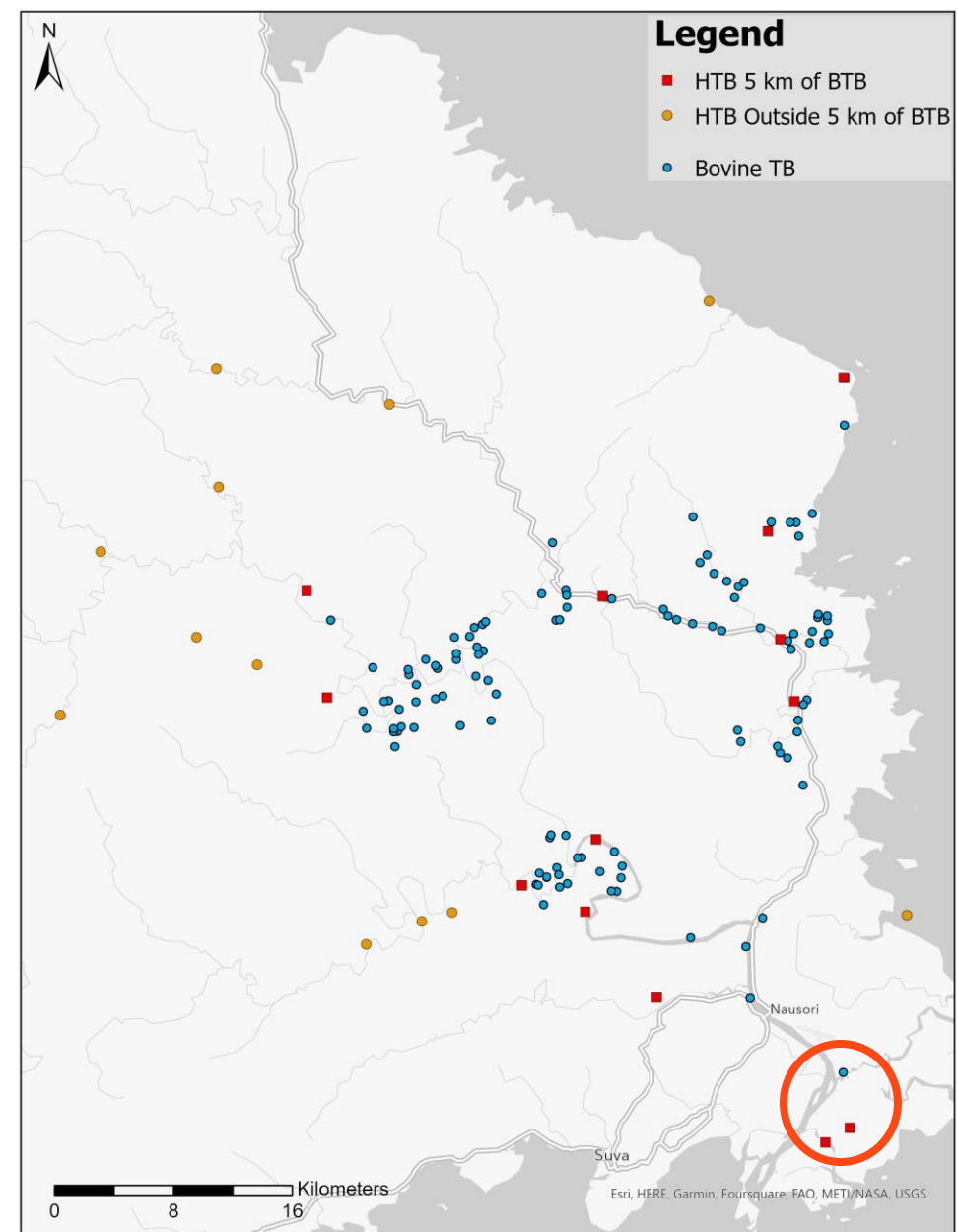
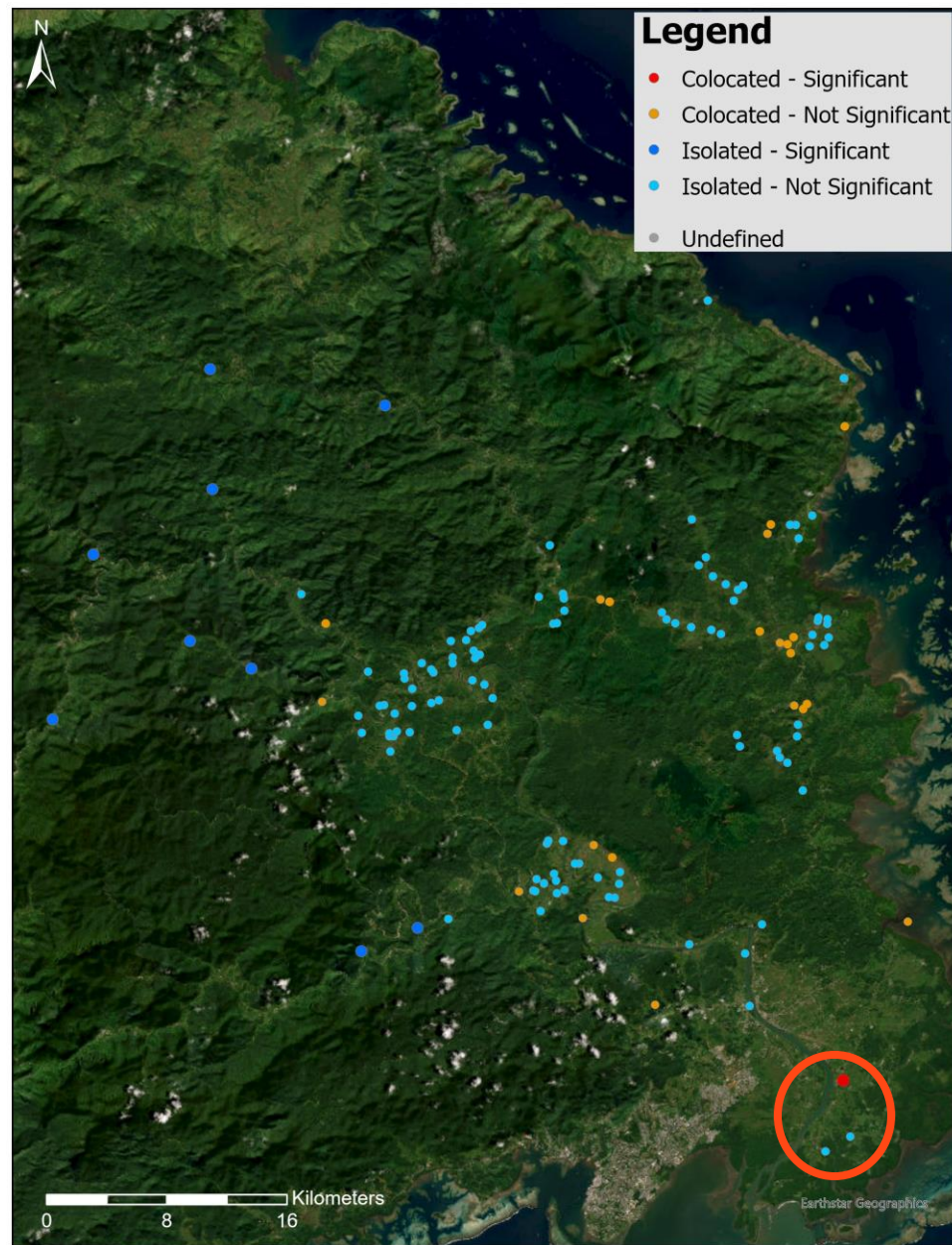
Number of bTB negative and positive unique identity farms by type 2015-2020.
The % of bTB infected farms is shown within each bar.



A greater proportion of dairy farms were bTB infected, compared to beef farms and holding facilities

- A pilot investigation - existing data sets from Ministry of Agriculture and Ministry of Health Fiji and a questionnaire-based survey designed and implemented using One Health principles
- Existing data (2018-2019) from MOA and MOH revealed where bTB is established on dairy farms in Fiji, there are also human EPTB cases reported
- The bTB infection status of farms was significantly associated with the presence of an unfenced water source where cattle graze.
- Of the 247 households that were surveyed, 65% **shared drinking water sources** (communal dams) with cattle and 62% of participants reported **backyard slaughter of cattle**, 36% **consumed raw milk** without boiling.
- Farmers had limited understanding of the practices required to prevent bTB at farm level – how to prevent animal-animal and potential animal-human transmission

Public reminder: Pasteurisation of milk is important to prevent transmission of animal TB & brucellosis to humans – 63° C for 30 mins or 72° C for >15 sec



- Target study were households of dairy farmer and dairy farm workers with infected dairy herds from Naitasiri and Tailevu in Central Division

- **Human exposure:** The greatest burden of zoonotic diseases lies within poor, marginalised, rural communities that live in close proximity with livestock or wildlife hosts (wandering cattle?) or reservoirs (mongoose?)
- **Wildlife consequences:** General impact of stray cattle/animals to conservation areas for wildlife
- **Environmental contamination** thru free-grazing of infected cattle in neighboring areas and shared (or flowing) water sources, and
- Disposal of culled animals and its offal (backyard and village slaughter)

Involving environment sector in future BTEC forum?

- Stronger evidence on bTB level in the Fiji dairy industry is presented in comparison with previous studies. BTEC coverage, SOPs review and data management improved gradually from 2015 to 2020.
- The factors contributing to bTB persistence in dairy farms must be targeted, with government policy and industry support needed for more farms to achieve and/or maintain a bTB clear status.
- Emphasis on the potential risk of bTB to public health, esp farmers – *important!*



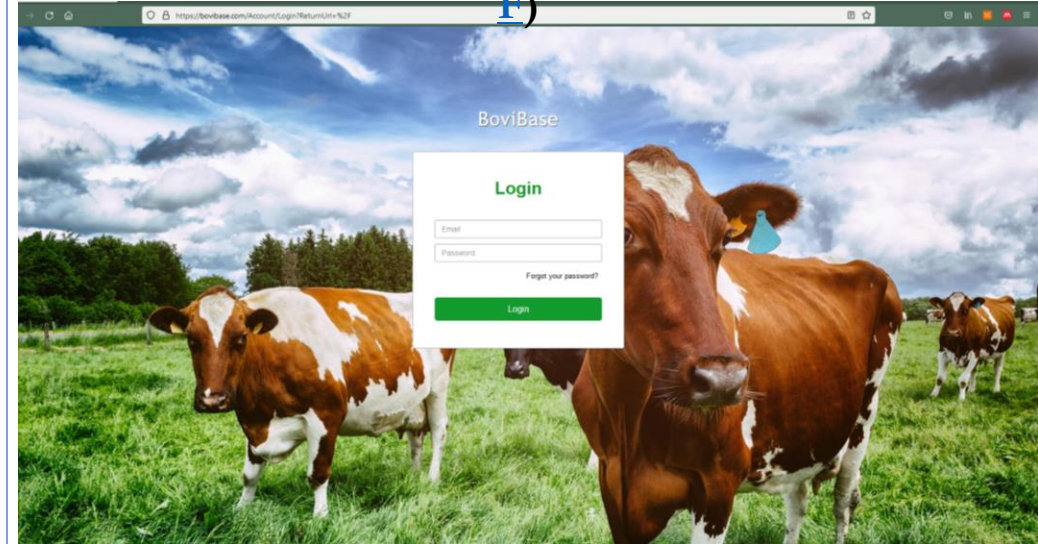
Agreement on Documentation of:

1. The Fiji BTEC Strategy
2. The BTEC Operational Manual



To address legislative and stakeholder responsibilities

Web-based database implementation (<https://bovibase.com/Account/Login?ReturnUrl=%2F>)



Testing criteria improvement

Meat Inspection Upskilling

Compensation increase

Bovibase

Find a farm...

3.0.0

Hello Elva Borja

Log off

Dashboard

Operations

Lookups

Reports

Admin

981

0

0

0

8

57

67

Herds > 60 days overdue

Test Scheduled in next 10 days

Herd Test Due in next 30 days

Farm with > 1 reschedule in year

+ve Herd tests in last 30 days

Awaiting test entry

Awaiting test finalisation

Enter search text

Locality

Search

×

Actions

Advanced

Create New

Farm #	Milk Supply #	Farm Name	Locality, Province	Phone	Total Stock	Link Count	TB Status	Next TB Test Due	Next TB Scheduled	BR Status	Next BR Test Due	Next BR Scheduled
No results found based on the search criteria.												

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Animal Movement Summary

Farm Inspection Summary

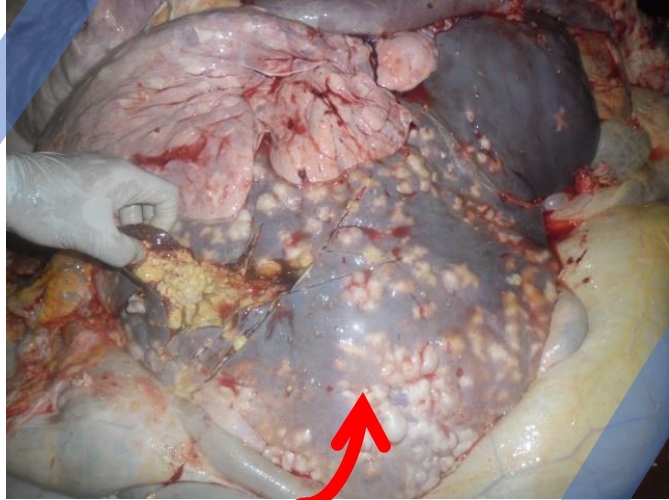
Herd Test

Herd Test (Stock Breakdown)

Meatworks Report

Farm Inspection Printout

Herd Test Record Sheet Printout



Tubercles in carcass

- Despite test-and-slaughter method, several farms remained positive from *M.bovis*.
 - *A total of 1021 untested animals from 146 dairy farms in Central Division, either with an incomplete bTB test or that were not presented by the farmer for testing during 2019 and 2020*
- bTB knowledge improvement (disease transmission, maintenance, host range)
- Limitations of routinely used diagnostic test
- Availability of replacement cattle stock

- Producers and society's views
- Disease management policy
- Public health impact
- Early 2014, three farmers in Fiji managing infected herds was tested positive for tuberculosis (Mantoux test)
- 2018-2019 pilot investigation zoonotic TB...preliminary & needs follow up
- In 2023, there was a recorded human TB mortality with extra-pulmonary lesions, highly suspected for M.bovis infection

bTb is a One Health issue!



- The Fiji government have continued to provide investments to the Fiji Brucellosis and Tuberculosis Eradication & Control program for the past 40 years, with increasing inputs thru time
- Exerted efforts for collaboration and cooperation between the Fiji Ministry of Agriculture, regional partners and various stakeholders to identify the gaps of the BTEC Program
- There is better awareness with stakeholders on the importance of controlling bovine TB in animal herds, and potential impact to human and environmental health...*but still a huge space to improve!*
- Initiation of a database management system to improve the existing tools in data analysis as a scientific basis for improving the BTEC Program

Roadmap for Zoonotic TB: 10 Priorities

IMPROVE THE SCIENTIFIC EVIDENCE BASE

1. Collect and report more complete and accurate data
2. Improve diagnosis in people
3. Address research gaps

REDUCE TRANSMISSION AT THE ANIMAL-HUMAN INTERFACE

4. Ensure safer food
5. Improve animal health
6. Reduce the risk to people

STRENGTHEN INTERSECTORAL AND COLLABORATIVE APPROACHES

7. Increase awareness, engagement and collaboration
8. Develop policies and guidelines
9. Implement joint interventions
10. Advocate for investment

TIMELINE FOR ACTION

To end the global TB epidemic by 2030, action must begin today. Key milestones to be achieved in the short-term, by 2020, and in the medium-term, by 2025, are indicated under the three core themes. Ongoing monitoring of progress is essential, to evaluate achievements and shortcomings, identify gaps, and refine the timeline as appropriate.

Improve the scientific evidence base

By 2020

- Joint guidance developed for surveillance and management of zoonotic and bovine TB, at global and national levels
- Improved detection, recording and reporting of zoonotic and bovine TB within countries to allow more accurate estimations of disease burden
- Capacity of national healthcare and laboratory services strengthened for diagnosing and treating zoonotic TB

By 2025

- New, rapid diagnostic tools available for diagnosing zoonotic TB and rolled-out to high risk groups
- Appropriate drug regimens defined for effective treatment of zoonotic TB
- Anti-TB vaccine available for people and rolled-out

Reduce transmission at the animal-human interface

By 2020

- Capacity of national veterinary services strengthened for improving animal health, including detecting and controlling bovine TB in livestock and wildlife
- Efforts scaled-up to improve national food safety standards
- Community education campaigns implemented nationally to raise awareness of foodborne diseases and promote behavioural change
- Targeted surveys conducted to identify high-risk populations

By 2025

- New diagnostics assays available for livestock
- Effective bovine TB vaccines available for livestock and rolled-out in endemic settings
- Multi-species transmission pathways and sources of infection better characterized and used to inform the design of appropriate interventions

Strengthen intersectoral and collaborative approaches

By 2020

- Zoonotic and bovine TB properly addressed by government authorities and other stakeholders, in light of available evidence
- Intersectoral and multidisciplinary collaborations established to build mechanisms and policies for One Health coordination and communication, within and between countries
- Global case for investment and business plan developed, providing rationale for investing in zoonotic and bovine TB and detailing the activities and resources needed

- Global advocacy strengthened to promote a research agenda that addresses knowledge gaps

By 2025

- Mainstreaming of One Health approaches into efforts to improve human and animal health at global, national and community levels

- Further improve communication of farmer stakeholders to encourage better collaboration and participation in control of bovine TB
- Stakeholder awareness on the impact of untested and uncontrolled cattle movements
 - to immediate control of bTB in Fiji's cattle herds
 - impact of straying animals to environment
 - risk to livelihood, food safety, public health
- National animal identification system – Bovibase, plastic tagging to RFID



What next in the area of One Health?

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- Classification of farms based on more recent bTB test data (ongoing with BTEC Program)
- Molecular typing of isolates to confirm *M. bovis* cases in humans, cattle and the environment
- Assessment of lifetime EPTB diagnoses
- Expand spatial analysis (mapping) – an overlay of human and bovine TB cases, environment risk pathways to visually demonstrate OH implication of bovine TB
- Explore possible water and soil-based reservoirs in these identified locations
- Targeted awareness and education
 - reduce the future risk of zoonotic TB
 - ensure uptake of recommendations and practices aimed at controlling and preventing bTB.

- **Awareness.** Improve community knowledge - A targeted education/awareness approach - on One Health implications of bovine tuberculosis.
- **Communication.** Better relationship between stakeholders, improved cooperation with communities, and between sectors.
- **Effective data management and analysis.** To continue the consistent use and enhancement of Bovibase for efficient data analysis and reporting.
- **Animal movement control.** To continue close monitoring of large farms and investigate farm management practices to understand reasons for high bTB prevalence
- **Improved farm management.** This include consistent testing of farms nationwide. To stop movements from infected farms; to address reasons for incomplete testing
- **Diagnostic skill.** To continue upgrading the laboratory capacity for early detection and speciation of the culture specimen.
- **Restocking.** To find practical and sustainable sources for compensation and replenishment of culled stocks, simultaneously improving animal husbandry and welfare practices on farm using cost-effective biotechnology practices (i.e. artificial insemination).
- **Technical capacity building.** FETP for veterinarians and veterinary paraprofessionals participating in the BTEC Program



Anabel Garcia, DVM
PhD Researcher
University of Sydney



Elva Borja, DVM MVPHMgt
Director - Vet Essentials Fiji /
WOAH Consultant - PVS & GFTADS AP



Jenny Ann Toribio, BVSc MANZCVS
Med, PhD
Associate Professor Epidemiology
The University of Sydney



Hon. Tomasi Tunabuna
Assistant Minister
Fiji Ministry of Agriculture



Richard Whittington
Professor Emeritus
The University of Sydney



Vijendra Samy
Agriculture Officer – Research
Fiji Ministry of Agriculture



Leo Felicito Borja, DVM
Practice Manager – Vet Essentials Fiji
(Former) Senior Veterinary Officer
Fiji MOA



Ronil Prasad
Senior Agriculture Officer
Fiji Ministry of Agriculture



Shivani Singh, BVSc
Technical Officer – Global
Health Security Program
Food and Agriculture
Organisation Fiji

Aiofe Reed, BVSc
BTEC Program Veterinarian
(Former)



Authors - Assessing risks for bovine and zoonotic tuberculosis through spatial analysis and a questionnaire survey in Fiji – a pilot study

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Jenny Ann Toribio, BVSc MANZCVS Med, PhD
Associate Professor Epidemiology
The University of Sydney

Keresi Lomata, BVSc
Senior Veterinary Officer
Biosecurity Authority of Fiji

Sam Fullman, MD
CWM

Frank Underwood, MD
(Former) Twoomey Hospital Fiji

Elva Borja, DVM MVPHMgt
Founder Vet Essentials Fiji /
WOAH Consultant - PVS & GFTADS AP

Richard Whittington, BVSc
Professor Emeritus
The University of Sydney

Ben Marais, DVM
The University of Sydney

Anabel Garcia, DVM
PhD Candidate
University of Sydney

Shumila Arif, DVM
PhD Candidate
The University of Sydney



Aaron Jenkins
Project Manager WISH Fiji

Senior Research Fellow
The University of Sydney



David Blake
Senior Lecturer, Geospatial Science
Edith Cowan University



Jarrad McKercher
Masters Student
Edith Cowan University



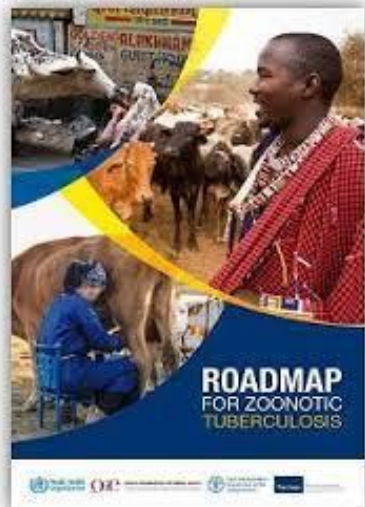
OIE Bulletin 2019



A Retrospective Study on Bovine Tuberculosis in Cattle on Fiji: Study Findings and Stakeholder Responses



Bovine tuberculosis control in Fiji: Retrospective study findings for 2015 to 2020



Roadmap for Zoonotic Tuberculosis (2017)



Mongoose (*Herpestes auropunctatus*) May Not Be Reservoir Hosts for *Mycobacterium bovis* in Fiji



Assessing risks for bovine and zoonotic tuberculosis through spatial analysis and a questionnaire survey in Fiji – a pilot study



Thank you

Food Science Building 5F – The University
of Tokyo, 1-1-1 Yayoi, Bunkyo-ku
Tokyo 113-8657 JAPAN
T. +81 3 5805 1931
F. +81 3 5805 1934

rr.asiapacific@woah.org
rr-asia.woah.org

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World Organisation
for Animal Health
Founded as OIE

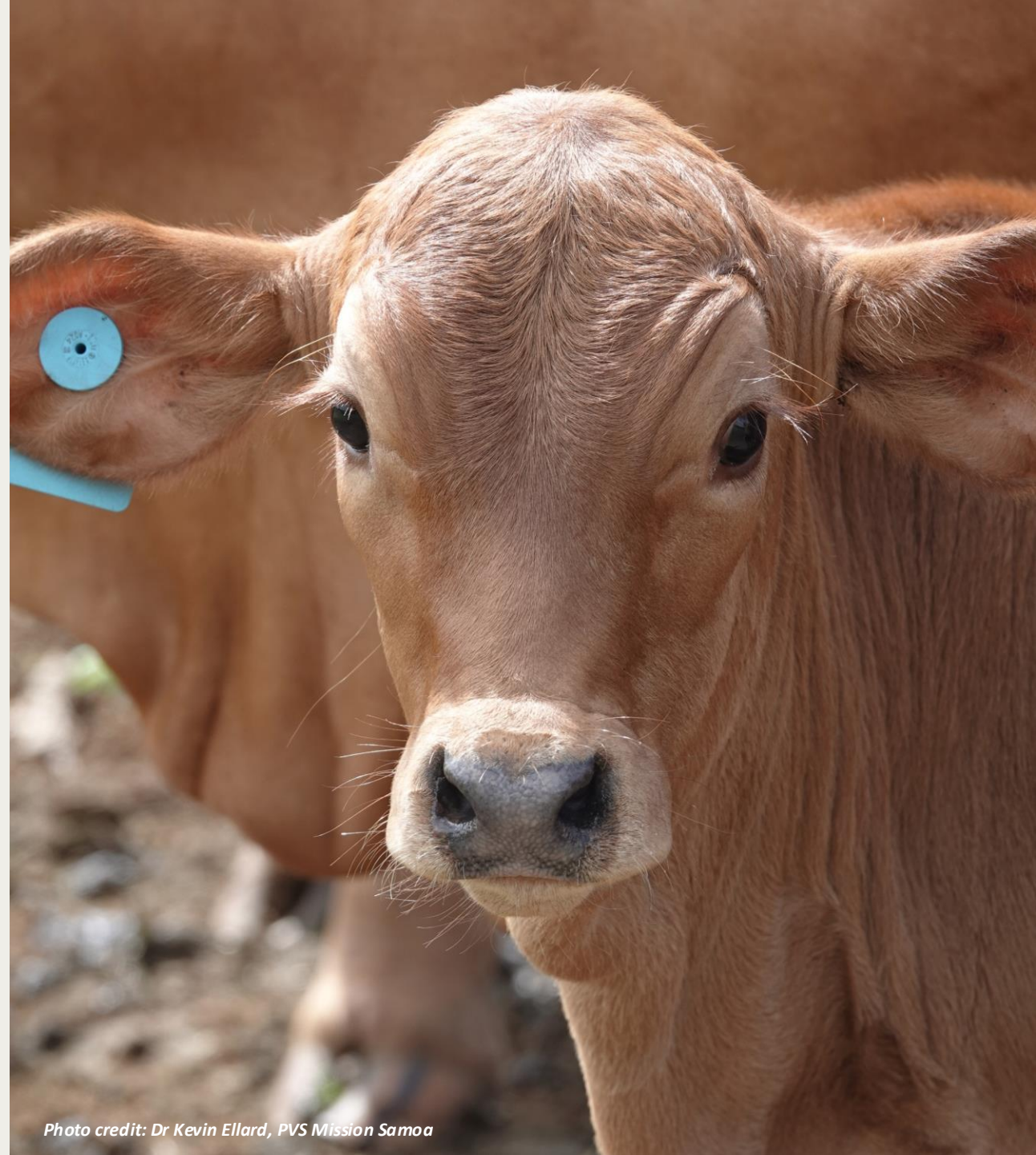


Photo credit: Dr Kevin Ellard, PVS Mission Samoa