

# Veterinary Biosciences

Dr Jorge Gutierrez-Merino

# Overview of this presentation

- » Our Vet Bio Programme
- » Our Professional Training Year (PTY)
- » Our Vet Bio Research

# What is a Veterinary Scientist?



## One Health

Improving health and preventing disease  
in production, exotics and pet animals,  
and subsequently in humans



Basic

Translational

Clinical

Veterinary Biosciences is key to allow the transition from  
Basic Research to Applied/Clinical Research

# Facilities

Innovation for  
Health Laboratory

School of Veterinary  
Medicine



# Veterinary Science at Surrey

BSc Veterinary  
Biosciences  
**2009**

MSc Veterinary  
Microbiology  
**2012**

Veterinary  
Medicine &  
Science (BVMSci)  
**2014**

MSc Comparative  
Pathology  
**2016**



# Our Veterinary Biosciences programme

- » Provides high quality, **research-led teaching** with a veterinary bias
- » Focused on the **understanding of animal (and human) health**
- » Prepares you for a career in professions of **animal and human public health**



Dr Nick Selemetas  
Teaching Fellow in  
Veterinary Biology



Dr Teresa Hollands  
A Biologist at the Vet School!



Dr Jorge Gutierrez Merino  
A vet at the School of  
Biosciences!



Dr Lorenzo Santorelli  
Zoologist



Prof Falko Steinbach  
Veterinary Immunologist

# Modular Bioscience Programmes



8 Modules (15 credits each)  
at each level

Semester system:

- » **Autumn: September-January**
- » **Spring: February-June**
- » 4 week breaks at Christmas & Easter
- » Exams in January and June
  - Summer resit period
- » A mixture of compulsory and optional modules
- » Some flexibility to change between programmes

# Teaching and Assessment

## Contact time

Year One	20 – 25 hours per week
Year Two	15 – 20 hours per week
Year Three	about 15 hours per week

## Modes of Delivery

Lectures

Tutorials

Lab-based practicals

Role plays

Small group work

## Assessment methods

Examinations

Essays/critical essays

MCQs

Presentations

Practical write ups





# Vet Bioscience Course content



## 8 x compulsory modules

Biochemistry: a conceptual overview

Biochemistry: the molecules of life

Cell biology

Microbiology: introduction to the microbial world

Evolutionary origins of Biodiversity

Molecular Biology and Genetics

Introduction to Principles of Physiology

Veterinary Anatomy and Physiology



YEAR 1

# Vet Bioscience Course content



## 5 x compulsory modules

From genes to biological function

Introduction to immunology

Biochemistry: Enzymes and metabolism

**Food microbiology**

**Animal nutrition**

YEAR 2

## 2 x optional module out of 7 to choose from:

Cellular Microbiology and Virology

Microbial Communities and Interactions

Integration of Physiological Systems

Pharmacology

Pathology and Medicine

**Animal Biology**

**Animal Ecology**

# Teaching Laboratory: Innovation for Health



# Lectures and Practicals at the Vet School

Academic  
building and  
small animal skill  
centre



Veterinary  
pathology  
facility



Large animal  
clinical skills  
centre



# Professional Training Year (PTY)

- » We help find placements
- » All students can choose to take up a PTY
- » 40% of students choose to do a PTY
- » Tuition fee is significantly reduced
- » Two to three tutor visits

\*Does not  
count  
towards  
degree  
classification



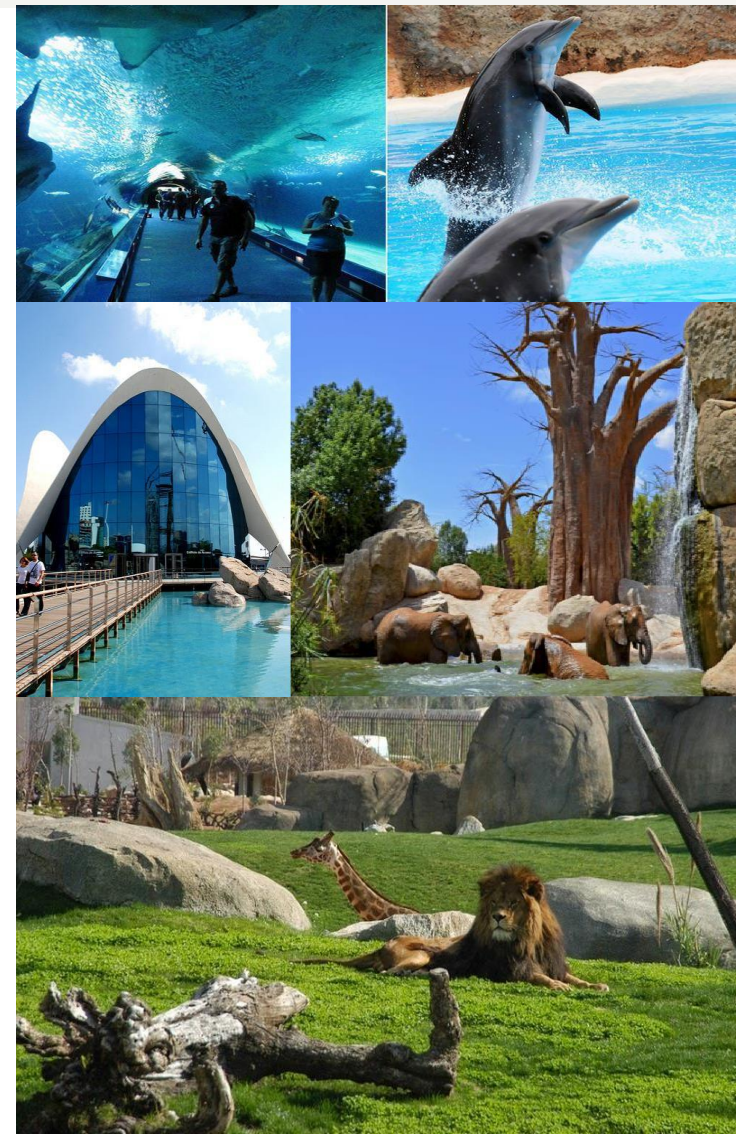


# Veterinary Science External Partners in the UK





# Veterinary Science External Partners Abroad



# Professional Training placement





# Professional Training placements

United Kingdom	
Sanofi	Royal Surrey County Hospital
Medpharm	LGC Forensics
GlaxoSmithKline	Cardiff Medical School
Plymouth Hospital	AstraZeneca Environmental
Quotient Bioresearch	UCL Molecular Biology Laboratory
Whitman labs	Thermofisher Scientific
Zoological Society of London	

International	
Belgium: Leuven	Italy: Milan, Sardinia
Denmark: Lindholm	Spain: Madrid, Barcelona, Pamplona
Finland: Turku, Kuopio, Helsinki	Sweden: Kalmar, Lund
France: Paris, Lyon	Australia: Sydney
Germany: Potsdam, Bonn, Frankfurt	USA: New York, Boston, North Carolina
Holland: Amsterdam, Groningen	China: Shanghai



# Veterinary Biosciences course content



## 3 x compulsory modules

Research Project (x2)

Veterinary Immunology and Pathology

Animal Infectious Diseases

## 4 x optional modules choose from:

Animal Diversity

Animal Behaviour

Man and the Environment

Food Security

Advanced Pharmacology

Receptors and Energy Metabolism

Introduction to Mathematical Biology

Epidemiology of Infectious Diseases

Advanced Technologies in Gene Expression

Biomedical Microbial Products



YEAR 3

# Recent final year projects



Rapid detection of pathogenic *Listeria*

Use of probiotics to control veterinary pathogens

Using genomics to design antibiotic targets

Antibiotic resistance in pathogens of veterinary and medical importance

Computer modelling to simulate microbial growth patterns

Survival of flu virus in water

Immune response to meningitis

Salmonella infection in poultry

Vaccination against persistent tuberculosis

*E. coli* infections in birds

Controlling *Clostridium difficile* in farm animals

# Graduation at Guildford Cathedral



# The ideal graduate

Competent &  
Confident

Critical  
thinker

Communicator

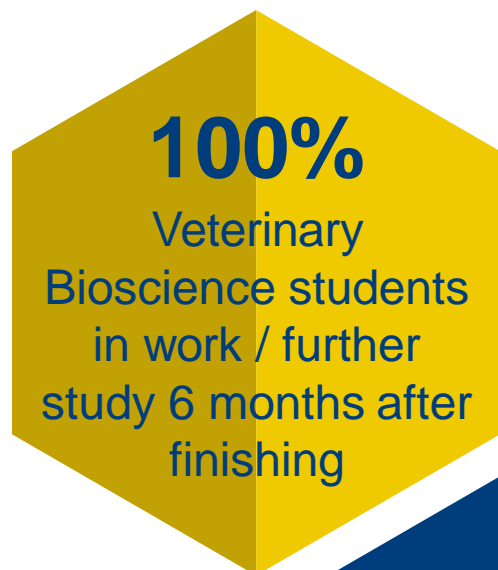
Team  
player

Life-long  
learner

Employability  
skills



# Employability



- » Veterinary research (including Ph.D)
- » Public health
- » Pharmaceutical industry
- » Animal nutrition industry
- » Government (e.g Department for Environment, Food and Rural Affairs: DEFRA – APHA, PI, VMD)
- » Food Standards Agency
- » EU – policy/legislation



## Examples of graduate destinations

Ecology and Conservation

Veterinary Medicine Degree

Animal Health Trust

Pirbright Institute

Royal Veterinary College

Sainsbury's Agriculture R&D Team

# Why study Veterinary Biosciences at Surrey?

- » Unique course
- » State-of-the-art teaching laboratories
- » Library and Learning Centre
- » Placement opportunities
- » Academics at the forefront of their fields
- » Personal tutors
- » Great location
- » Excellent employment prospects



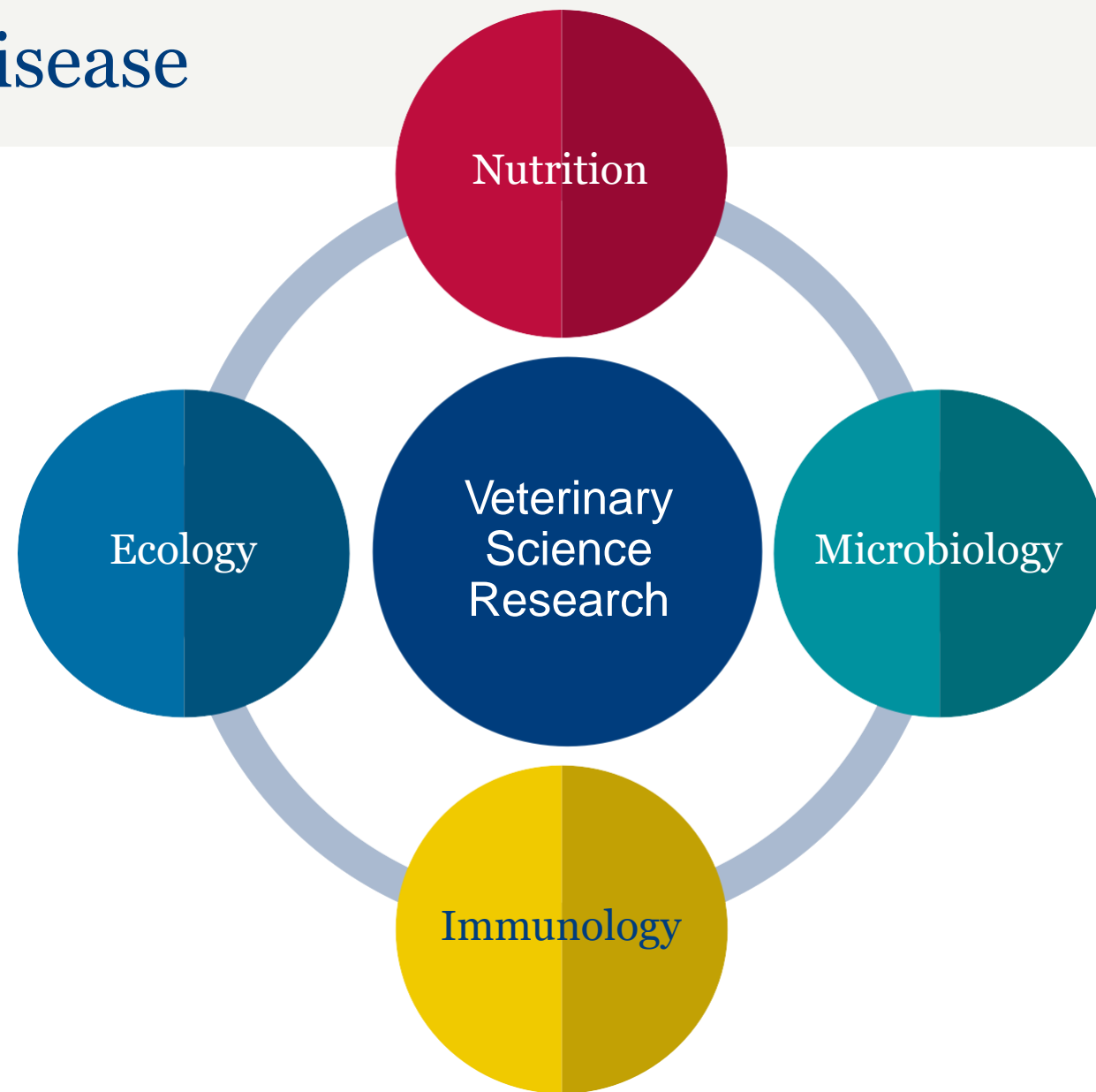
Mix of  
lectures &  
practicals

# Why study Veterinary Biosciences at Surrey?

	Nutrition & Public Health	Veterinary Biosciences	Ecology & Wildlife
<b>1</b>	Biochemistry: the molecules of life Biochemistry: A conceptual overview	Cell Biology, Biomedical Bacteriology, Microbiology	Physiology, Molecular Biology and Genetics
		Veterinary Anatomy and Physiology	
<b>2</b>	Biochemistry: Enzymes and Metabolism	Introduction to Immunology	From genes to biological function
	Animal Nutrition Food Microbiology	Cellular Microbiology Microbial Communities	Animal Biology Animal Ecology
<b>3</b>	Research Project		
	Pharmacology Food Security Epidemiology of Infectious Diseases	Veterinary Immunology Animal Infectious Diseases	Man & the Environment Animal Diversity Animal Behaviour



# Our research: Probiotics and Vitamin D as an alternative disease mitigation in wildlife



# Our research: Bovine tuberculosis: *M. bovis*

**£1 billion**  
is the projected  
economic  
burden

Badgers  
contribute  
significantly to  
the spread in  
cattle

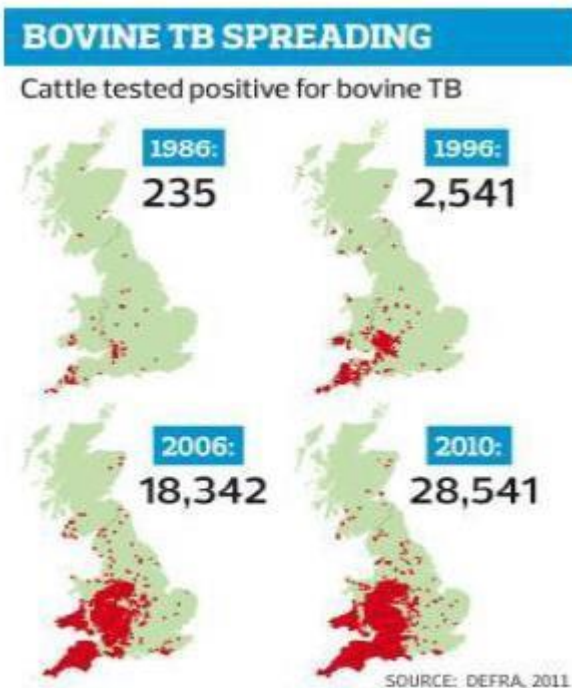


Fig 1. Spread of BTB in Great Britain 1986-2010 (red=affected premises)

## Current controls:

- » Biosecurity: at pasture?
- » Culling: social perturbation?
- » Vaccine BCG: feasible?



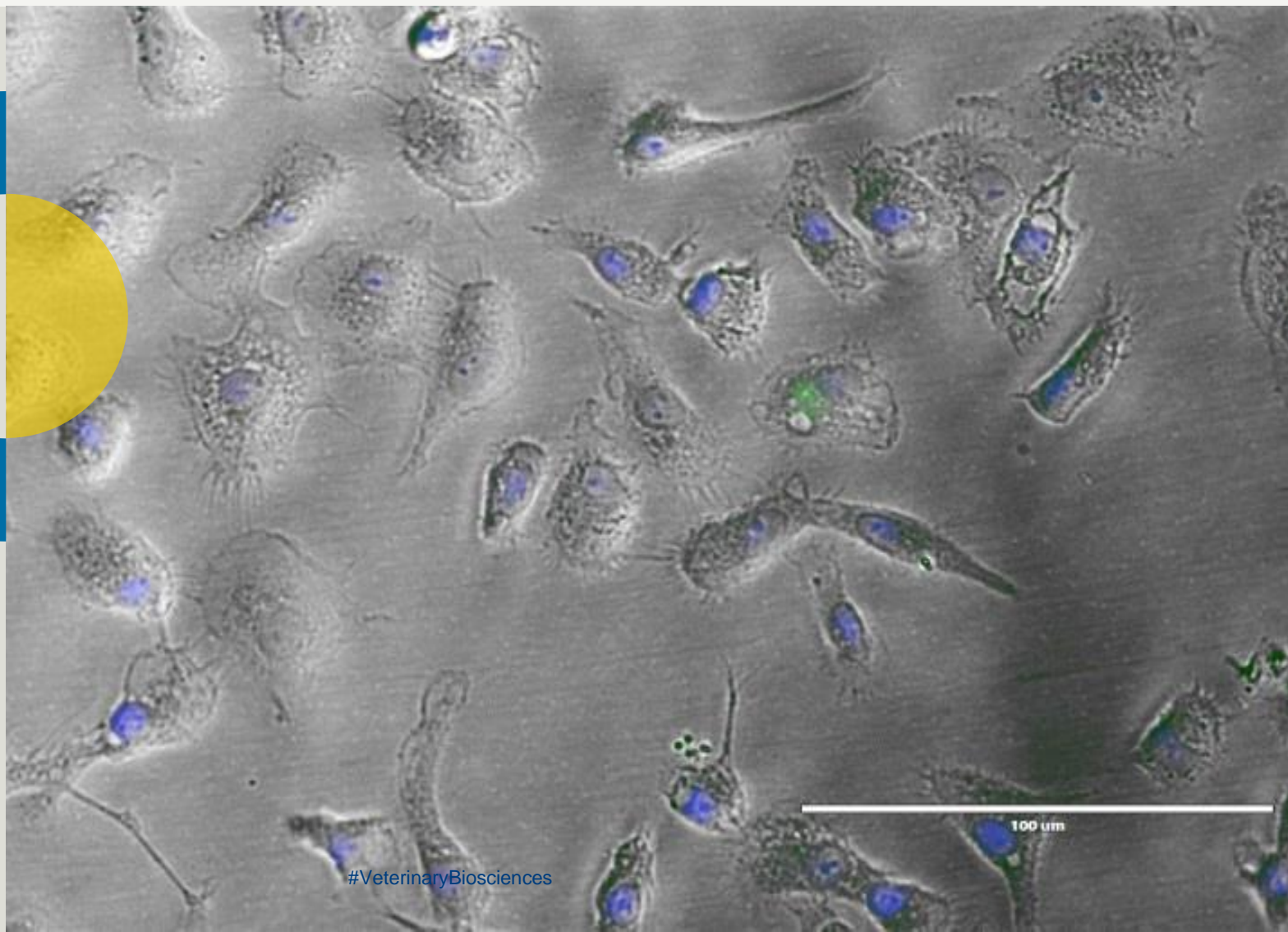
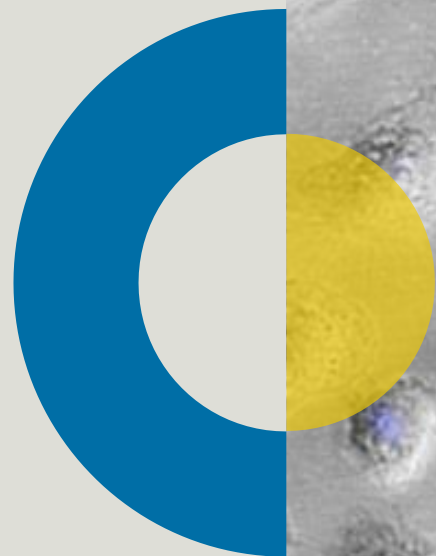
<http://ubiome.com/pages/probiotics-guide>



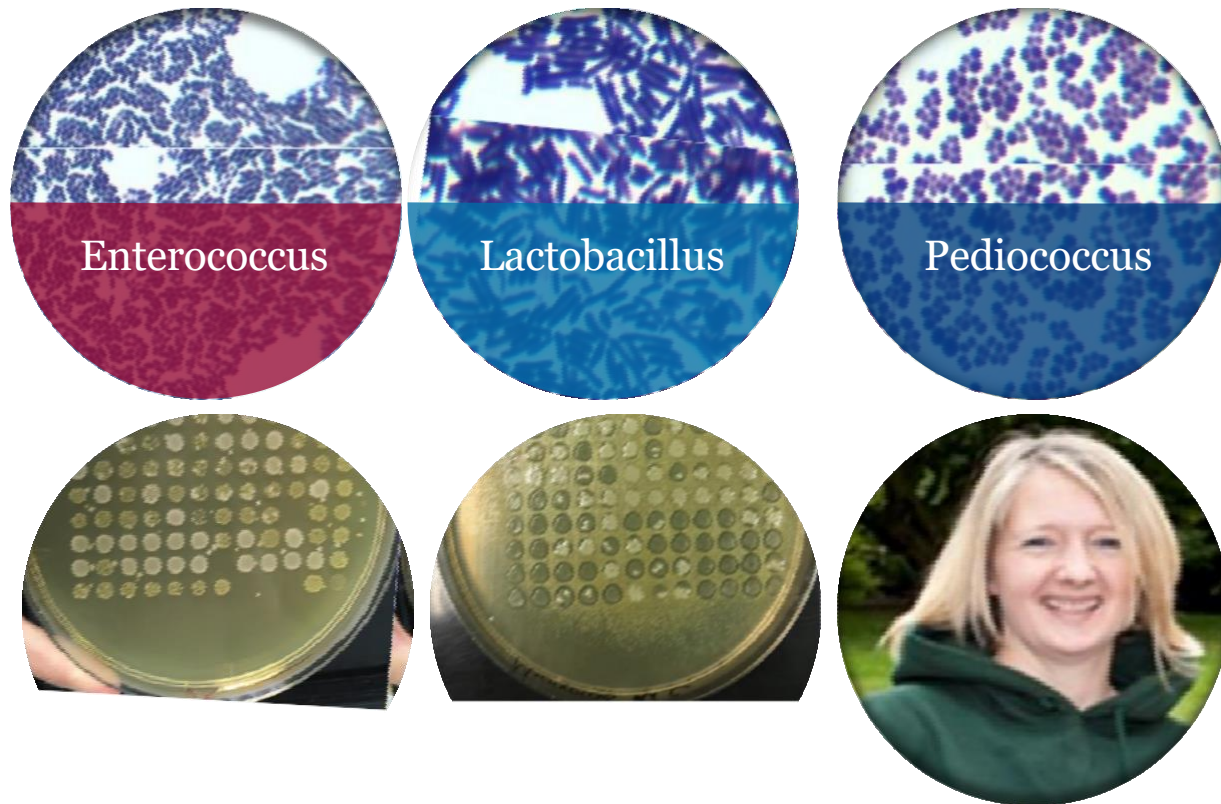
Nutrition as a  
viable wide-scale  
intervention to  
reduce the  
transmission of  
bovine TB from  
badgers to cattle



# Our research: Probiotics as immunostimulants



# Our research: Probiotics as antimycobacterials

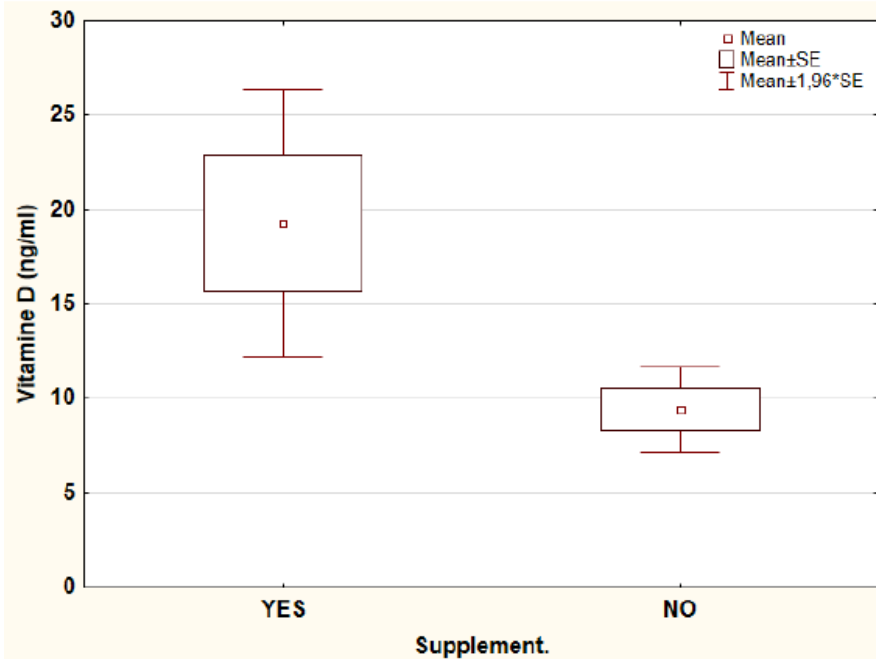


ID	Species
A7	<i>Enterococcus faecalis</i>
A23	<i>Weissella cibaria</i>
A37	<i>Weissella paramesenteroides</i>
B4	<i>Pediococcus pentosaceus</i>
C34	<i>Enterococcus faecalis</i>
D4	<i>Lactobacillus reuterii</i>
E24	<i>Pediococcus acidilactici</i>
F7	<i>Pediococcus lolii</i>
I32	<i>Pediococcus acidilactici</i>
M16	<i>Pediococcus acidilactici</i>
N43	<i>Weissella paramesenteroides</i>
P5	<i>Lactobacillus plantarum</i>

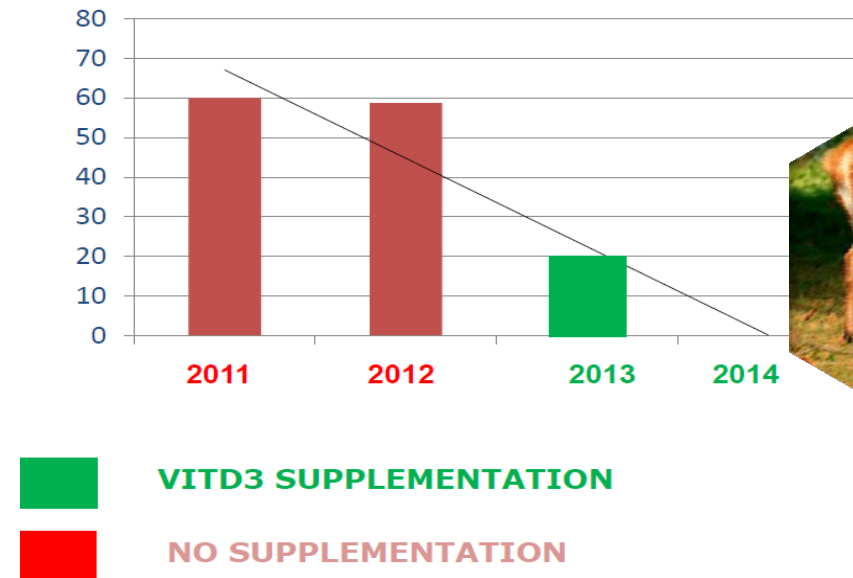


# Our research: Association between Vitamin D supplementation and severity of tuberculosis in wild boar and red deer

## SERUM TOTAL VITD LEVELS



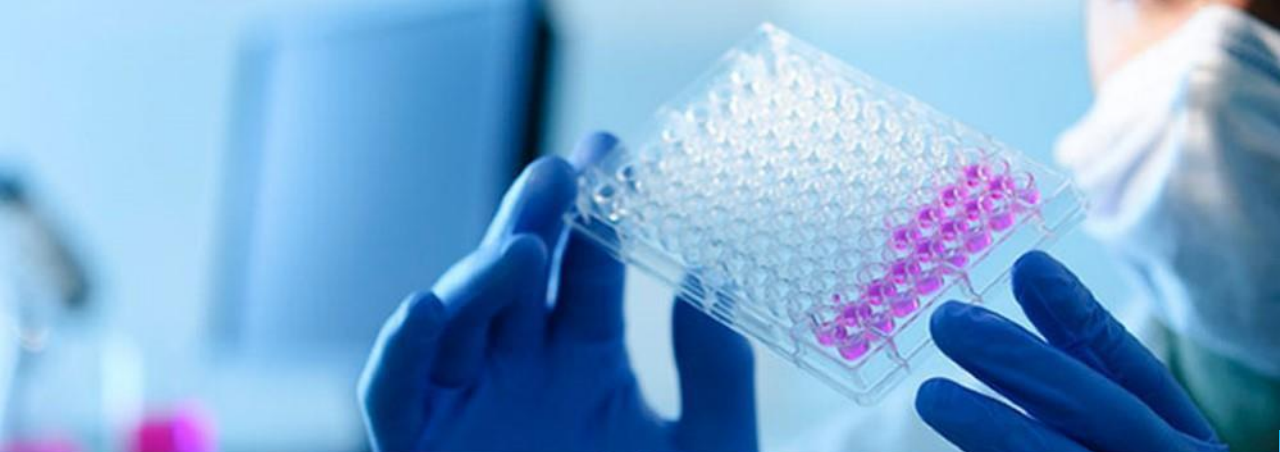
## TB INCIDENCE



# Love animals but don't want to work as a vet?

## This is the course to study, if:

- » You are passionate about science
- » You want to improve the health and welfare of animals, people and the environment
- » You are excited about prevention as well as cure of infectious diseases
- » You are fascinated by farm production and food security
- » You want to do research that moves veterinary medicine forward
- » You'd like to work with vets and zoologists.



**Thank you**