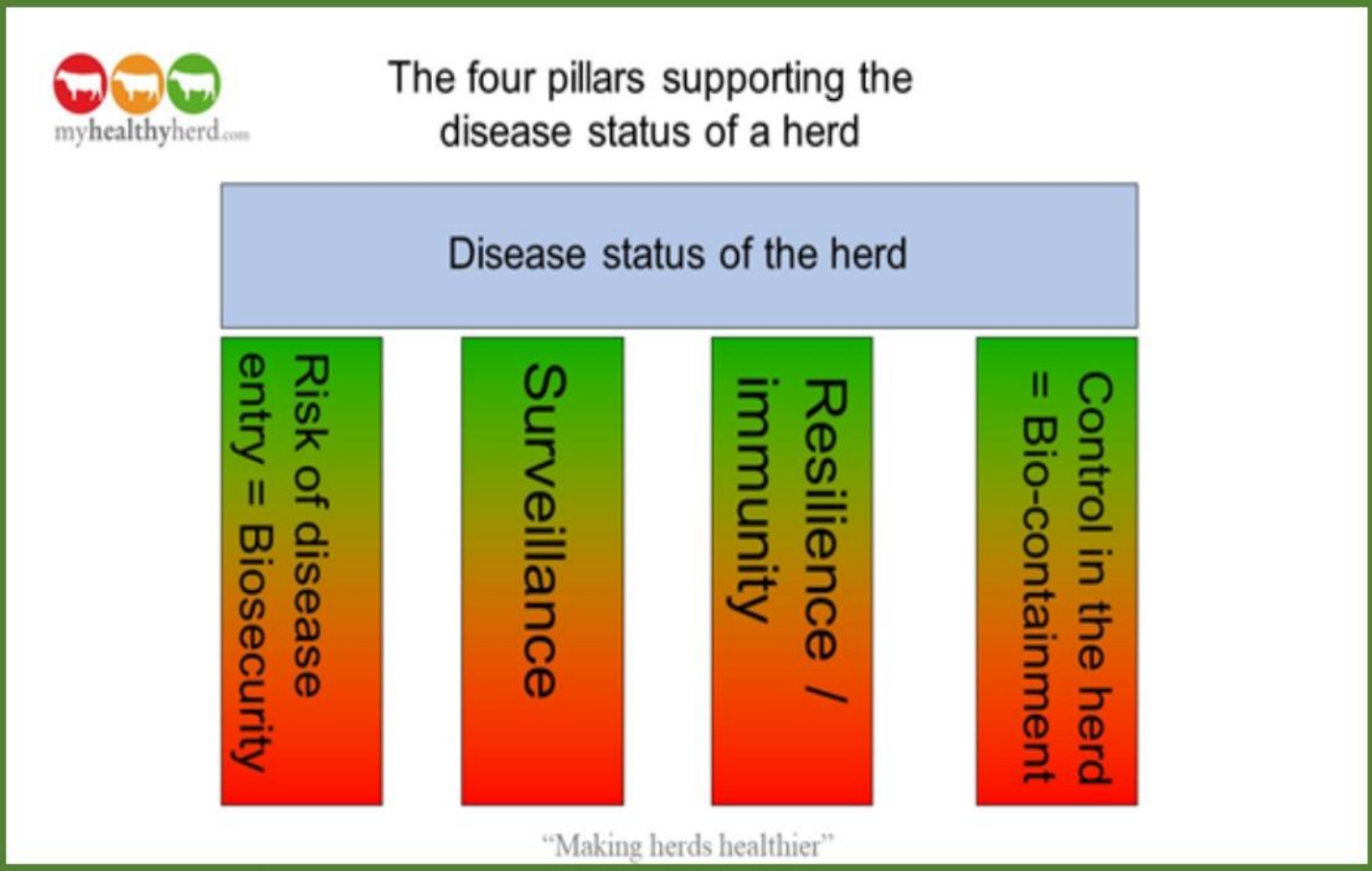
The Paratuberculosis Newsletter

Issue 2: July 2021

The official publication of the International Association for Paratuberculosis



CONTENTS

Note from the Editor

Welcome to the July Newsletter. The LOC of the 15th ICP have decided that abstracts will need to be resubmitted as the Colloquium will have been delayed for two years and there will have been a lot of Johne's research carried out in that period. Abstract submission opened on July 19th and will remain open until October 29th at https://www.icpdublin.com/abstract

I am delighted to have received from Peter Orpin and Dick Sibley an outline of MyHealthyHerd Control Programme. I am hoping to make articles like this a feature of future Paratuberculosis Newsletters. Also included in this issue are the financial report for the first two quarters of 2021 for the IAP, Paratuberculosis News, Database of Paratuberculosis articles published in the last five years, Upcoming Events, List of Johne's websites and the launch of the all new 2nd edition of "Paratuberculosis. Organism, Disease, Control", and a list of recent publications on paratuberculosis. The next newsletter will be published in October. If you have any interesting items, please send them to me at petermullowney29@gmail.com

Best wishes,

Peter Mullowney

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Cover Photographs (from http://www.myhealthyherd.co.uk/).

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IAP MEMBER SUPPORT AND RECOGNITION AWARDS

Call for the 15 ICP Edition Awards:

- Richard Merkal Memorial Fellowship
- Helping Hand

Richard Merkal Memorial Fellowship

The Association will provide funding for the participation of graduate students to attend each Colloquium of the Association. Selection will be based on potential for future contributions to the field and scientific merit of a submitted abstract. Funding will include air fare, lodging, general registration and a per diem for meals. All applicants must be members of the Association or sponsored by a member of the Association. The fellowships will not be open to applicants having residence in the same country in which the Colloquium is being held.

Award contents:

Each fellowship will include:

1) free full registration for the 15 ICP
2) Reimbursement for travel and lodging expenses, and a per diem for meals. (Maximum reimbursement not to exceed US$2000.)
3) Recognition at the ICP and acceptance of the abstract for an oral presentation in the appropriate session

Timetable:

Deadline for applications:	October 29, 2021
Announcement of awards:	February 1, 2022

Application for Richard Merkal Fellowship to attend the 15th International Colloquium on Paratuberculosis (15ICP) in Dublin, Ireland, June 13-16 2022

Name:
Educational Qualifications:
Current affiliation:
Institution:
Country:
Group leader:
Publications in Paratuberculosis Research:
Abstract of intended presentation: Abstract should be submitted through the ICP15 web portal and a copy included in the application document here.
STATEMENT OF PURPOSE (2 page limit): Importance of the results to be presented, and the candidate's goals for future work in the field of paratuberculosis.

Applications should be sent by e-mail addressed to the Secretary-Treasurer of the IAP (rsweeney@vet.upenn.edu). The application must be a single Word or PDF document with the candidate's name in the file title and shall include the completed forms with statement of purpose and a copy of the abstract.

Helping Hand Fellowships

The Association, based on the availability of funds and as determined by the Governing Board, will provide funding for individuals in need to participate in the Colloquium of The Association. Selection of these individuals will be based on the economic status of the individual's country of origin, a written statement of interest in paratuberculosis, potential for future contributions to the field, and scientific merit of a submitted abstract (Submission of a scientific abstract is required). Applicants may or not be members of the IAP.

Program specifications:
Each award will include:

1) free full registration for the 15 ICP
2) free IAP membership for 2022 and 2023
3) US$1000 stipend for travel expenses (payable at the conclusion of the 15 ICP)
4) Recognition at the General Membership Meeting at the 15ICP

Timetable:

Deadline for applications:	October 29, 2021
Announcement of awards:	February 1, 2022

Application for Helping Hand Fellowship to attend 15th International Colloquium on Paratuberculosis (15ICP) in Dublin, Ireland, July 13-16, 2022

Name:
Country of origin:
Date of Birth:
Educational Qualification:
Current affiliation:
Institution:
Country:
Group leader:
Ph.D Thesis Title (if applicable):
Area of Paratuberculosis Research:
Publications in Paratuberculosis Research:
STATEMENT OF PURPOSE (2 page limit): The applicant must provide a written statement (in English) explaining their interest and experience in paratuberculosis, what they know of the paratuberculosis situation in their country, and why they would like to attend the 15 ICP.
ABSTRACT (An abstract for a presentation at the 15 ICP concerning any aspect of paratuberculosis is required). Abstract should be submitted through the ICP15 web portal and a copy included in the application document here.

Applications should be sent by e-mail addressed to the Secretary-Treasurer of the IAP (rsweeney@vet.upenn.edu). The application must be a single Word or PDF document with the candidate's name in the file title and shall include the completed forms with statement of purpose and a copy of the abstract.

Myhealthyherd- Developing an online tool to tackle Johne's disease

Pete Orpin BVSc MRCVS, Dick Sibley BVSc FRCVS

Orcid ID 0000-0003-1675-9284

Introduction

In the UK we had an official program (CHeCs) which at that stage was based on annual whole herd blood tests. The costs of taking samples and then delivering an effective JD program with annual testing seemed prohibitive. There were no economic drivers within the dairy industry for demonstrating low prevalence as most animals were traded with no demonstrable disease provenance and there was no shortage of buyers. The farmers that embarked on annual JD testing were the problem herds. The risk of transmission was too high to be effectively controlled by Test and Cull approaches.

In 2001 the Foot and Mouth outbreak in the UK triggered the slaughter of 4 million cattle and these farms were all restocked by animals of unknown disease status. Unsurprisingly this led to dissemination of disease and in 2008 an epidemic of JD affected the UK dairy industry. A different approach would be required if we were to make progress.

Early work

In 2005 I undertook some work in my own practice looking at ways we could diagnose Johne's Disease in more cost-effective way[1]. Risk assessments have always been a key part of JD control but what seemed to stymie any progress was the cost of surveillance. Could we harness the power of the risk assessment to reduce the number of animals we could sample to establish disease status. This project had no funding. I had support from a local lab. We sampled 15 herds and at the same time quizzed the farmer about prior purchases. Farms with history of multiple purchases of animals had a 2.6x greater chance of testing positive and risk assessment appeared to be more sensitive than blood sampling in identifying highly infected herds.

At the same time the British Cattle Veterinary Association were looking for a new home for their Health Planning software. The cost of maintaining a CD based system with constant updates was prohibitive. After a discussion in the bar at BCVA with Professor Joe Brownlie and Dick Sibley Myhealthyherd was developed. We were teamed up with National Milk Records who kindly supported the programming cost for the first few years of development by provision of a talented programmer, Rob Dawkins. The program was developed as a web-based application to allow farmer, vet, program manager or lab access to the program at differing levels of permissions.

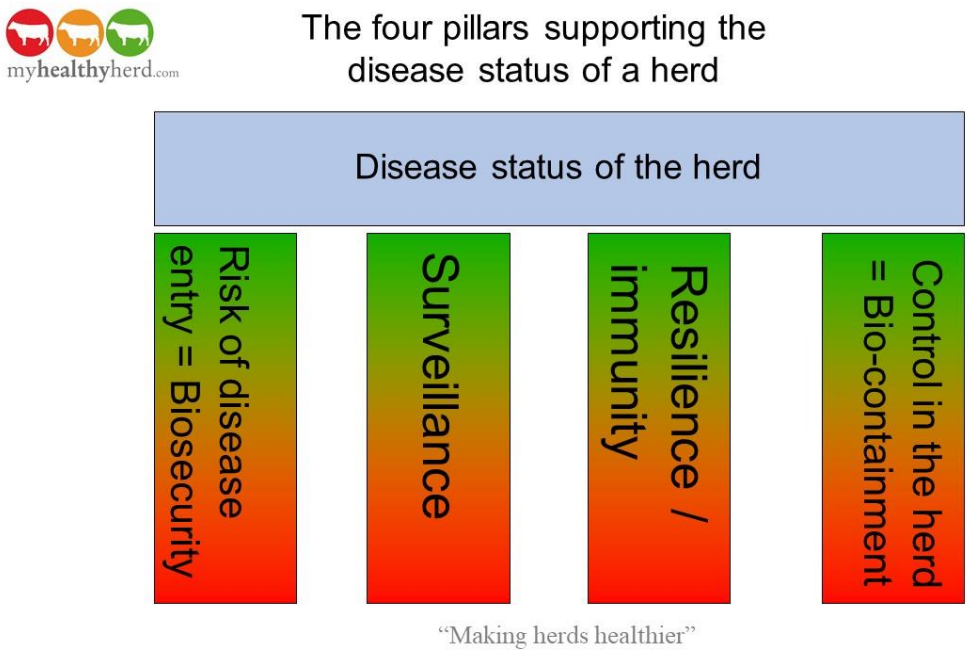
Myhealthyherd principles

What was eminently clear by now is the traditional system of disease management based on Test and Treat was not working. Herd medicine was incorrectly described as Preventive medicine. So often this was not the case. The vet would wait for disease to occur and use herd surveillance to identify the cause and then seek to deploy vaccines to manage the outcomes. This process worked to some extent for diseases with good tests (BVD, Leptospirosis etc) but completely failed with diseases with poor tests or long incubation periods (Bovine TB, Johne's , Neospora) . Why wait for disease? Surely disease could be predicted.

Dick and I had a planning day. Nothing sophisticated. A whole wall was covered with brown paper and armed with marker pens Myhealthyherd was developed. From this planning session it became blindingly obvious that risk assessments could be used to Predict and Prevent disease. We would base the program on these principles.

Development of the 4 pillars

In order to build a model we decided to use the traffic light system. We would avoid binary definitions of disease status. The status would be defined by risk levels. If you undertook robust (green) green surveillance and robust biosecurity risk management you could start to move to defining a robust disease status. That status could be made even more secure by building on the resilience pillar (vaccination, native resilience). Green does not mean disease freedom or zero risk. You can still get run over at a green traffic light, but the risks are so much lower. This avoids the problem with the farmer or vet pursuing disease freedom as the goal. This is patently very difficult to achieve with diseases such as JD.



The problem though with Johne's within the UK nearly all the pillars were absent. Uncontrolled movement of animals combined with the development of higher risk herds with larger maternity areas led to an explosion of JD.

Traditionally, infectious disease control had a strong emphasis on surveillance (testing to determine prevalence and identify infected animals) and less emphasis on the three other pillars. Simply testing large number of animals alone will not control disease. Testing without regard to biosecurity, biocontainment and resilience had failed to control both JD and Bovine tuberculosis internationally.

We have utilised this model for all infectious diseases and indeed it works very well for COVID 19. There are no surprises that the worst COVID affected areas were highly populated cities with mass movement of people all highly susceptible to disease. Politicians initially sought to control the

disease using 1-2 pillars with finally the most effective measures being found to be a combination of all 4 pillars (vaccination, lock downs, Track and Trace)

The program measured and analysed disease specific risks using algorithms to create a traffic light system of categorisation and then ranked individual risks to enable prioritisation of control. The program enabled the farmer and vet to identify farms at risk of developing diseases rather than simply monitoring disease once established. This promoted a "Predict and Prevent" approach to disease management, particularly useful for the control of chronic diseases with poor testing sensitivities such as Johne's Disease. Even farms with low prevalence, or where disease was not considered to be a problem, became engaged in preventive strategies, understanding the implications of their disease risks. The MHH program was used as the tool to deliver large funded regional health programs (Healthy Livestock Initiative, North West Development Agency). This flexible approach proved to be central to the development of NJMP[2].

The analysis of disease risks was enlightening. Any large-scale JD scheme needed to be applicable to the highly variable farming systems to ensure engagement and sustainability. For example, of 2293 herds using the system, 54% of herds had introduced groups of animals of unknown JD status in the last 10 years. Only 24% of farms never introduced cattle to the farm.[2,5] Any National scheme would have to adapt to, and manage those established trading patterns rather than attempt to change them.

Development of the Infectious disease module

The Disease Manager module was then created within Myhealthyherd which would allow either a vet, farmer of third party (with farmer permission) to contribute to the development of their own robust disease control plan. Ownership is a key element in success. The disease control plan must be developed with the skills and support of the local vet but has to be "owned" by the farmer.

"A one size all disease control plan" will never work. The only benefit of this approach is in the administration of what will become a failed scheme! No one farmer is the same. They all have differing levels of aspiration, resources and priorities. This has to be respected and managed.

The Disease Manager had to allow for this level of wide engagement. This approach has also been adopted by the UK framework for JD control, the National Johne's Management Plan[3,4]. This then sets the scene for "grading up". Farmers can start at a lower level with limited inputs and then with encouragement develop their infectious disease programs as confidence grows and priorities change.

The JD module was further enhanced by the addition of prevalence prediction tool allowing current test prevalence to be converted into a predicted true herd prevalence to drive further engagement. Farmers and vets often fail to grasp the importance of a single cow testing positive in a sample of 30 cows.

A further enhancement was the development of a Robustness Checker which could dynamically score the strength of the JD control plan developed by the vet. This allowed discussion to show the weaknesses in the plan.

Based on the options offered with the Myhealthyherd Johne's Management system, 6 control strategies were developed which would allow any farm to engage in the national framework: Biosecurity Protect and Monitor, Improved Farm Management (IFM), IFM and Strategic Testing, IFM

and Test and Cull, Breed to Terminal Sire and Firebreak Vaccination. The choice was veterinary driven and was dependent on farmer aspiration, resources, risks and prevalence.

Fig 2. Graphic demonstrating the Myhealthyherd NJMP module for JD control

The program has been further developed to allow practices to track and manage their own disease programs. Surveillance or risk assessments can be scheduled, and a red clock icon appears when they are overdue. This makes the management of multiple disease control programs eminently possible at practice of regional level.

Lab results can be uploaded into the system and clinically interpreted by the vet. This has allowed vets and farmers to access their results and data from anywhere they have an internet signal.

The web-based system with multiple levels of access allowed for the use of the program in regional schemes providing a greater insight into local risk factors.

Summary

Disease control is never easy. Delivering a program across multiple herds is even more challenging. The use of tools really helps but will never substitute for the enthusiasm and ability of the well trained vet!

References

1. **Orpin, P., Duthie, S. and Grove-White, D.H., 2005.** The use of targeted sampling and risk factor analysis to investigate the presence of Johne's disease in dairy herds. Cattle Practice, 13, pp.219-225.

2.Orpin P. G , Sibley R.J (2014) Predict and Prevent versus Test and Treat Veterinary Record 2014;**174**:16 403-405

3. Orpin, P., Sibley, R.J., Throup, S., Braddock, A. (2017) The National Johne's Management Plan: progress and future developments. Cattle Practice 25(2): 106-110

4. Sibley. R.J, Orpin P.G (2016) The National Johne's Management Plan: a national programme for the management of paratuberculosis in the UK dairy herd.5th ParaTB Forum

5. **Sibley R.J**. Biosecurity in the Dairy Herd In Practice 2010;**32**:7 274-280 doi:10.1136/inp.c3913

Useful websites

CHeCs www.checs.co.uk/

Proceedings Dairy UK Johne's meeting www.dairyuk.org

Action Johne's www.actionjohnes.org.uk

Myhealthyherd www.myhealthyherd.com

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Expanding membership.

As of June 2020, there are 178 members of the International Association of Paratuberculosis from 29 different countries. There are 39 countries with a population greater than 25 million that do not have a member. You will note later in the newsletter a list of recent publications on Paratuberculosis. There are a total of 63 publications, 14 United States of America; 4 Argentina, Germany, Ireland, Italy and Spain; 3 Australia, South Korea and United Kingdom; 2 Canada, India, Iran and Mexico and one each from Czech Republic, Estonia, France, Greece, Japan, Netherlands, New Zealand, Poland, Portugal, Slovenia, Switzerland and Tunisia. The authors of these articles will be written to inviting them to join if they are not already members and if they are from a country that does not have members asked to write a short paragraph for the next newsletter on the incidence of Johne's Disease and research carried out in their country. It would also be very helpful if each member could convince one of their co-workers to become a member of IAP.

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ICP 2021 DUBLIN
International Association for Paratuberculosis

15th International Colloquium for Paratuberculosis
13 -16 June 2022

Céad Míle Fáilte

(one hundred thousand welcomes)

@paratb2022 paratb2022

Unfortunately due to the global pandemic the conference that was due to take place in June 2020 was postponed to April 2021. The committee has decided to postpone once more to June 2022.This decision was taken due to continued restrictions on gatherings/travel in Ireland and internationally. We apologise for any inconvenience this may cause but the health and safety of our speakers, delegates, organisers, and sponsors is of paramount importance to us.

We would like to thank our speakers, delegates, organisers, and sponsors for their continued support of the conference. We believe that we had put together a highly informative and innovative conference programme for 2020/2021 to benefit policy-makers, scientists and industry stakeholders.

Thanks to everyone's efforts we attracted a high number of delegates from a wide range of countries and so it is the committee's decision to postpone the conference again so we can meet in person to share our knowledge on Paratuberculosis.

In October 2020, the Local Organising Committee was faced with the decision of having to postpone again or to have a virtual conference in April 2021. It was decided by the LOC to go for a live conference in June 2022. We were delighted that the organisers of the 16th ICP in Jaipur, India agreed to this and have postponed their Colloquium until 2024.

The ICP 2021 Committee invites you to the 15th IAP Colloquium in Dublin, Ireland in June 2022. Delegates attending the conference can be assured of a productive and memorable colloquium, discover Irish heritage, culture and music and of course, experience the world renowned hospitality of Ireland.

Call for Abstracts

Abstracts submitted/accepted for the 2020 conference have been cancelled. All authors are invited to re-submit new abstracts.

Abstract submission will open on the 19th July 2021. Abstracts must be submitted through the online system at https://www.icpdublin.com/abstract by clicking the "Submit Abstract" button before the deadline of midnight 29th October 2021. Notification of acceptance will be made on 16th February 2022.

Only contributions from registered participants will be published. One author at least per submitted paper must be registered for the Colloquium; abstracts for which no authors have registered will not be included in the abstracts book or programme.

Each presenting author may submit a maximum of 5 abstracts. Contributions will be reviewed by scientific sub committees. Instructions for poster or oral presentation will be included in the notification of acceptance.

Condition of Acceptance

1. Authors should ensure that the abstracts are written in acceptable standard English.
2. Please note that errors in the text will not be corrected; the content and literary standard of submitted abstracts is under the author's responsibility.
3. All abstracts will initially be reviewed, graded and accepted or rejected by the sub committees: they reserve the right to determine whether a submission is accepted as oral or poster presentation, or if it has to be set in another session. Notification of acceptance will be sent by the 16th February 2022

Guidelines for abstract preparation

1. Titles should clearly identify the contents of the abstract
2. Abstracts cannot exceed 300 words.
3. Please ensure the correct author is ticked as the presenting author.
4. Only abstracts submitted in English will be reviewed.

The abstract should contain the following:

1. Title
2. Authors
3. Affiliations
4. An introductory sentence indicating the purpose of the study
5. A brief description of methods
6. A summary of new and unpublished data
7. A conclusion

The following will not be permitted in the abstract submission

1. No images are accepted.
2. No bibliography.
3. No tables or graphs.

Topics

1. Diagnostics and detection
2. Host response and immunology
3. National Control programme
4. Pathogenomics, Genotyping and Map diversity
5. Epidemiology and Economics
6. Public health and Map in the environment

Abstract submission

The abstracts must be submitted through the online system closed midnight 29th October 2021

Themes

Please see descriptions of the abstract themes below.

National Control Programme theme

This theme invites abstracts from researchers and programme managers and seeks to address any aspect of control programmes, such as the design, management and evaluation of programmes including methods for managing programme expectations, measuring motivations for programme engagement and compliance and lessons learnt on how to achieve effective Johne's control. The scope of this theme includes the topics of stakeholder engagement and knowledge transfer innovations.

Diagnostics and Detection

The Scientific Subcommittee for the themed session on Diagnostics and Detection invites submitted abstracts on all aspects of this topic including: diagnostic test application and evaluation, matrix evaluation, novel diagnostic test development and evaluation, diagnostic test validation, investigation of novel diagnostic biomarkers, assessment of novel antigens.

Epidemiology and Economics

Abstracts should be sent to this stream if they deal with the epidemiology of paratuberculosis infection; the impacts of that infection in terms of animal or herd-level production; and/or the economic impacts of infection or control measures.

Host Response and Immunology Theme.

This theme invites abstracts that relate to any aspect of the innate or acquired immunological host response to M. avium subsp., paratuberculosis. These can include, but are not necessarily limited to, responses from any host species, the immunological responses to experimental and field vaccines, variation in immunological response to different Map strains, immunological correlates of disease outcome, and factors that influence immune responses to Map

Pathogenomics, Genotyping and Map diversity

The Pathogenomics, Genotyping and MAP diversity sub-theme will consider abstracts in the following areas:

- Application of MAP genomics to transmission studies
- 'Omics' investigations of pathogen biology
- Exploration of host-pathogen interactions
- MAP evolutionary studies

Public Health and MAP in the environment

Abstracts will be considered by the Public Health and MAP in the Environment Sub-Committee, for oral or poster presentation, on the following topics:

- Studies reporting new evidence for/against the involvement of MAP in human disease;
- Studies reporting the occurrence of viable MAP in animal-derived foods or environmental sources (drinking water, rivers, other) that were carried out to assess risk of human exposure to MAP;
- Studies describing environmental monitoring for MAP at farm level;

- Studies describing temporal and spatial distribution of MAP outside the farm environment and/or survival mechanisms used by MAP to persist in the environment;
- Studies describing methods capable of reducing MAP contamination on pasture or in slurry at farm level.
- Studies principally describing development of new detection methods for MAP, or validating new methods for detection of MAP in milk, should not be submitted to this Sub-Committee, but should instead be submitted to the Diagnostics and Detection Sub-Committee for consideration.

Please contact icp2022@abbey.ie if you have any questions

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Upcoming Events

15th International Colloquium for Paratuberculosis

13th – 16th June 2022 Dublin, Ireland

Seventh International Conference on Mycobacterium bovis

7th - 10th June, 2022 Galway, Ireland

World Buiatrics Congress 2020

The 31st WBC has been postponed to September 4th - 8th, 2022.

16th International Symposium of Veterinary Epidemiology and Economics

August 7-12, 2022 in Halifax, Nova Scotia, Canada.

16th ICP 2024 Jaipur, India

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Database of Paratuberculosis articles published in the last five years

A searchable database of all the articles included in the Paratuberculosis Newsletter for the last five years is now available at http://www.paratuberculosis.net/references.php .

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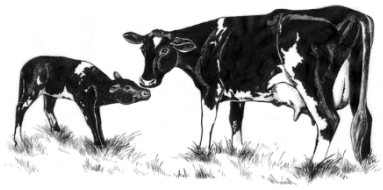

International Association for Paratuberculosis

112 Barnview Road
Kennett Square, PA 19348 USA

Financial Report- June 30, 2021

	Checking	Money Market	PayPal	Total
Open (1/1/21)	$40,216.76.	$14,350.74	$ 790.56	$ 55,358.06
Close Q2 (6/30/21)	$14,916.76	$44,367.05	$ 593.28	$ 59,877.09

INCOME

	1/1/21 to 6/30/21	7/1/21 to 12/31/21	Annual Total
Dues	$ 4,715.00	$	$
Interest	$ 2.06	$	$
Royalties	$ 14.25		
Total	**$ 4731.31**	**$**	**$**

EXPENSES

	1/1/20 to 6/30/20	7/1/20 to 12/31/20	Annual Total
PayPal /Wire fees	$ 212.28	$	$
Total	**$ 212.28**	**$**	**$**

Respectfully Submitted,

Raymond W. Sweeney, VMD

Secretary-Treasurer

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List of Johne's websites

Below is a list of websites that give information about paratuberculosis in different countries. If your organisation has a website that you would like to see included please send details to petermullowney29@gmail.com

Argentina

- Universidad Nacional de Mar Del Plata: Veterinary bacteriology research and diagnosis laboratory

Australia

- Animal Health Australia
- Australia and New Zealand Standard Diagnostic Procedures, April 2002

Austria

- Lymphatic fluid used for the first time to diagnose bovine paratuberculosis

Belgium

- Paratuberculosis control for milking herds

Brazil

- Animal Health Australia

Canada

- Johne's Education, Management and Assistance Program (Ontario)
- Beef Cattle Research Council
- Alberta Johne's Initiatives
- British Columbia Testing
- Canadian Johne's Disease Initiative

Chile

- Publications of Miguel Salgado

Colombia

- Universidad De Antioquia

Czech Republic

- Veterinary Research Institute

Denmark

- Statens Serum Institut

France

- World Organization for Animal Health (O.I.E)
- Bovine Paratuberculosis Control
- Biology, Epidemiology and Risk Analysis in animal health

Germany

- Frederic Loeffler Institute

Greece

- Department of Veterinary Medicine, University of Thessaly

India

- ICAR-Central Institute for Research on Goats

Ireland

- Animal Health Ireland
- Report of the Scientific Committee of the Food Safety Authority of Ireland (2009)

Italy

- Istituto Zooprofilattico Sperimentale della Lombardia

Japan

- National Institute of Animal Health (NARO)

Mexico

- Universidad Nacional Autonoma de Mexico

Netherlands

- VeeproHolland
- GD Animal Health

New Zealand

- Johne's Disease Research Consortium (New Zealand)
- New Zealand Deer Industry.

Norway

- Norwegian Veterinary Institute

Panama

- Indicisat

Saudi Arabia

- King Faisal University College of Veterinary Medicine

Slovenia

- Veterinary Faculty, National Veterinary Institute, Ljubljana

Spain

- produccionanimal.com Interview with Valentin Perez
- interview with Joseba Garrido, Director of the Animal Health Department of Neiker-Tecnalia

Switzerland

- Federal Food Safety and Veterinary Office

Thailand

- National Institute of Animal Health (NIAH)

United Kingdom

- National Johne's Management Plan (NJMP) (U.K.)
- National Animal Disease Information Service
- PBD Biotech
- Vetstream
- Kaz Strycharczyk, of Black Sheep Farm Health gives advice on Johne's in Farmer's Weekly
- Action Johnes
- Scottish Agricultural College
- My Healthy Herd

United States

- Johne's Information Center (University of Wisconsin-Madison)
- Human Paratuberculosis Foundation, Inc
- USDA Animal and Plant Inspection Service
- U.S. Voluntary Bovine Johne's Disease Control Program.
- The Mycobacterial Diseases of Animals (MDA) multi-state initiative (U.S.A.)
- Johne's on the Cattle Site
- Overview of Paratuberculosis By Michael T. Collins from Merck Manual
- Center for Food safety and Public Health (Iowa State)
- Hato Sano (Colorado State)
- The Cattle Site (Some interesting videos on Johne's)

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Recent publications to July 2021

Most of these articles were published between March 2021 and June 2021.

Aitken JM, Phan K, Bodman SE, Sharma S, Watt A, George PM, Agrawal G, Tie ABM. (2021)
A Mycobacterium species for Crohn's disease?
Pathology. 2021 Jun 19:S0031-3025(21)00234-8. doi: 10.1016/j.pathol.2021.03.003. Online ahead of print. PMID: 34158180

Alonso MN, Garcia VS, Moyano RD, Romero MA, Gugliotta LM, Travería GE, Romano MI, Gonzalez VDG. (2021)
New and rapid strategies for the diagnosis of bovine paratuberculosis "in situ" using latex particles.
J Immunol Methods. 2021 Jun 19; 496:113085. doi: 10.1016/j.jim.2021.113085. Online ahead of print. PMID: 34157319

Alonso N, Griffa N, Moyano RD, Mon ML, Colombatti Olivieri MA, Barandiaran S, Vivot MM, Fiorini G, Canal AM, Santangelo MP, Singh M, Romano MI. (2021)
Development of a lateral flow immunochromatography test for the rapid detection of bovine tuberculosis.
J Immunol Methods. 2021 Apr;491:112941. doi: 10.1016/j.jim.2020.112941. Epub 2020 Dec 13. PMID: 33321133

AlQasrawi D, Naser E, Naser SA. (2021)
Nicotine Increases Macrophage Survival through alpha7nAChR/NF-kappaB Pathway in Mycobacterium avium paratuberculosis Infection.
Microorganisms. 2021 May 18;9(5):1086. doi: 10.3390/microorganisms9051086. PMID: 34070119

AlQasrawi D, Qasem A, Naser SA. (2020)
Divergent Effect of Cigarette Smoke on Innate Immunity in Inflammatory Bowel Disease: A Nicotine-Infection Interaction.
Int J Mol Sci. 2020 Aug 13;21(16):5801. doi: 10.3390/ijms21165801. PMID: 32823518

Arteche-Villasol N, Gutiérrez-Expósito D, Vallejo R, Espinosa J, Elguezabal N, Ladero-Auñon I, Royo M, Del Carmen Ferreras M, Benavides J, Pérez V. (2021)
Early response of monocyte-derived macrophages from vaccinated and non-vaccinated goats against in vitro infection with Mycobacterium avium subsp. paratuberculosis.
Vet Res. 2021 May 12;52(1):69. doi: 10.1186/s13567-021-00940-y. PMID: 33980310

Bannantine JP, Bayles DO, Biet F. (2021)
Complete Genome Sequence of a Type III Ovine Strain of Mycobacterium avium subsp. paratuberculosis.
Microbiol Resour Announc. 2021 Mar 11;10(10):e01480-20. doi: 10.1128/MRA.01480-20. PMID: 33707341

Bannantine JP, Bayles DO. (2021)
Draft Genome Sequences of Two Bison-Type and Two Sheep-Type Strains of Mycobacterium avium subsp. paratuberculosis.
Microbiol Resour Announc. 2021 Jul 15;10(28):e0052621. doi: 10.1128/MRA.00526-21. Epub 2021 Jul 15. PMID: 34264114

Bay S, Begg D, Ganneau C, Branger M, Cochard T, Bannantine JP, Köhler H, Moyen JL, Whittington RJ, Biet F. (2021)
Engineering Synthetic Lipopeptide Antigen for Specific Detection of Mycobacterium avium subsp. paratuberculosis Infection.
Front Vet Sci. 2021 Apr 23;8:637841. doi: 10.3389/fvets.2021.637841. eCollection 2021. PMID: 33969035

Beinhauerova M, Beinhauerova M, McCallum S, Sellal E, Ricchi M, O'Brien R, Blanchard B, Slana I, Babak V, Kralik P. (2021)
Development of a reference standard for the detection and quantification of Mycobacterium avium subsp. paratuberculosis by quantitative PCR.
Sci Rep. 2021 Jun 2;11(1):11622. doi: 10.1038/s41598-021-90789-0. PMID: 34078951

Bhat AM, Malik HU, Chaubey KK, Hussain T, Mir AQ, Nabi SU, Gupta S, Singh SV. (2021)
Bio-typing of Mycobacterium avium subspecies paratuberculosis isolates recovered from the Himalayan sheep and goats.
Trop Anim Health Prod. 2021 Mar 31;53(2):237. doi: 10.1007/s11250-021-02682-7. PMID: 33791865

Blanco Vázquez C, Balseiro A, Alonso-Hearn M, Juste RA, Iglesias N, Canive M, Casais R. (2021)
Bovine Intelectin 2 Expression as a Biomarker of Paratuberculosis Disease Progression.
Animals (Basel). 2021 May 12;11(5):1370. doi: 10.3390/ani11051370. PMID: 34065919

Borujeni M.P., Hajikolaei M.R.H., Ghorbanpoor M., Sahar H. E., Bagheri S., Roveyshedzadeh S. (2021)
Comparison of Mycobacterium avium subsp. paratuberculosis infection in cattle, sheep and goats in the Khuzestan Province of Iran: Results of a preliminary survey
Veterinary Medicine and Science ; doi:10.1002/vms3.559

Bridges N, van Winden S. (2021)
The Occurrence of Mycobacterium avium Subspecies paratuberculosis Positive Milk Antibody ELISA Results in Dairy Cattle under Varying Time Periods after Skin Testing for Bovine Tuberculosis.
Animals (Basel). 2021 Apr 23;11(5):1224. doi: 10.3390/ani11051224. PMID: 33922705

Conde C, Price-Carter M, Cochard T, Branger M, Stevenson K, Whittington R, Bannantine JP, Biet F. (2021)
Whole-Genome Analysis of Mycobacterium avium subsp. paratuberculosis IS900 Insertions Reveals Strain Type-Specific Modalities.
Front Microbiol. 2021 May 10;12:660002. doi: 10.3389/fmicb.2021.660002. eCollection 2021. PMID: 34040595

Corneli S, Di Paolo A, Vitale N, Torricelli M, Petrucci L, Sebastiani C, Ciullo M, Curcio L, Biagetti M, Papa P, Costarelli S, Cagiola M, Dondo A, Mazzone P. (2021)
Early Detection of Mycobacterium avium subsp. paratuberculosis Infected Cattle: Use of Experimental Johnins and Innovative Interferon-Gamma Test Interpretative Criteria.
Front Vet Sci. 2021 May 14;8:638890. doi: 10.3389/fvets.2021.638890. eCollection 2021. PMID: 34055946

Dhand NK, Plain KM, Green AC, Martinez E, Eppleston J, Ly A, Arif S, Emery D. (2021)
Factors influencing the effectiveness of the Gudair vaccine for controlling Johne's disease in sheep flocks in Australia.
Prev Vet Med. 2021 May 31;193:105394. doi: 10.1016/j.prevetmed.2021.105394. Online ahead of print. PMID: 34119857

Didkowska A, Ptak M, Opałczyńska K, Wojciechowska M, Olech W, Anusz K. (2021)
A Serological Survey of Paratuberculosis in the Polish European Bison (Bison bonasus) Population in 2018–2021
Animals Volume 11 Issue 7 10.3390/ani11072094

Fiorentina P, Martino C, Mancini Y, De Iorio MG, Williams JL, Minozzi G. (2021)
Using Omics Approaches in the Discovery of Biomarkers for Early Diagnosis of Johne's Disease in Sheep and Goats.
Animals (Basel). 2021 Jun 27;11(7):1912. doi: 10.3390/ani11071912. PMID: 34199073

Folegatti PM, Flaxman A, Jenkin D, Makinson R, Kingham-Page L, Bellamy D, Ramos Lopez F, Sheridan J, Poulton I, Aboagye J, Tran N, Mitton C, Roberts R, Lawrie AM, Hill AVS, Ewer KJ, Gilbert S. (2021)
Safety and Immunogenicity of Adenovirus and Poxvirus Vectored Vaccines against a Mycobacterium Avium Complex Subspecies.
Vaccines (Basel). 2021 Mar 16;9(3):262. doi: 10.3390/vaccines9030262. PMID: 33809415

Garvey M. (2020)
Mycobacterium Avium Paratuberculosis: A Disease Burden on the Dairy Industry.
Animals (Basel). 2020 Oct 1;10(10):1773. doi: 10.3390/ani10101773. PMID: 33019502

Ghielmetti G, Landolt P, Friedel U, Morach M, Hartnack S, Stephan R, Schmitt S. (2021)
Evaluation of Three Commercial Interferon-γ Assays in a Bovine Tuberculosis Free Population.
Front Vet Sci. 2021 Jun 10;8:682466. doi: 10.3389/fvets.2021.682466. eCollection 2021. PMID: 34179172

Goethe E, Gieseke A, Laarmann K, Lührs J, Goethe R. (2021)
Identification and Characterization of Mycobacterium smegmatis and Mycobacterium avium subsp. paratuberculosis Zinc Transporters.
J Bacteriol. 2021 Mar 15;203(11):e00049-21. doi: 10.1128/JB.00049-21. Online ahead of print. PMID: 33722846

Green AC, Plain KM, Eppleston J, Martinez E, Emery D, Dhand NK. (2021)
Continuity in ovine Johne's disease vaccination practices despite a decline in clinical disease.
Aust Vet J. 2021 Jun 2. doi: 10.1111/avj.13092. Online ahead of print. PMID: 34080178

Greenstein RJ, Su L, Grant IR, Foddai ACG, Turner A, Nagati JS, Brown ST, Stabel JR. (2021)
Comparison of a mycobacterial phage assay to detect viable Mycobacterium avium subspecies paratuberculosis with standard diagnostic modalities in cattle with naturally infected Johne disease.
Gut Pathog. 2021 May 6;13(1):30. doi: 10.1186/s13099-021-00425-5. PMID: 33957980

Hodgeman R, Mann R, Savin K, Djitro N, Rochfort S, Rodoni B. (2021)
Molecular characterisation of Mycobacterium avium subsp. paratuberculosis in Australia.
BMC Microbiol. 2021 Apr 1;21(1):101. doi: 10.1186/s12866-021-02140-2. PMID: 33789575

Hodnik JJ, Ježek J, Starič J. (2020)
A review of vitamin D and its importance to the health of dairy cattle.
J Dairy Res. 2020 Aug;87(S1):84-87. doi: 10.1017/S0022029920000424. Epub 2020 Jul 30. PMID: 33213577

Jenvey CJ, Shircliff AL, Obando Marrero E, Stabel JR. (2021)
Prediction of Johne's disease state based on quantification of T cell markers and their interaction with macrophages in the bovine intestine.
Vet Res. 2021 Apr 13;52(1):55. doi: 10.1186/s13567-021-00925-x. PMID: 33849661

Keewan E., Beg S., Naser S.A. (2021)
Anti-TNF-α agents Modulate SARS-CoV-2 Receptors and Increase the Risk of Infection Through Notch-1 Signaling
Front. Immunol., 06 May 2021 | https://doi.org/10.3389/fimmu.2021.641295

Khamassi Khbou M, Romdhane R, Sassi L, Amami A, Rekik M, Benzarti M. (2020)
Seroprevalence of anti-Mycobacterium avium subsp. paratuberculosis antibodies in female sheep in Tunisia.
Vet Med Sci. 2020 Aug;6(3):393-398. doi: 10.1002/vms3.243. Epub 2020 Jan 30. PMID: 31999893

Khosravi M, Nouri M, Mohammadi A, Mosavari N, Constable PD. (2021)
Preparation of immunomagnetic beads coupled with a rhodamine hydrazine immunosensor for the detection of Mycobacterium avium subspecies paratuberculosis in bovine feces, milk, and colostrum.
J Dairy Sci. 2021 Jun;104(6):6944-6960. doi: 10.3168/jds.2020-18819. Epub 2021 Apr 2. PMID: 33814150

Kiser JN, Wang Z, Zanella R, Scraggs E, Neupane M, Cantrell B, Van Tassell CP, White SN, Taylor JF, Neibergs HL. (2021)
Functional Variants Surrounding Endothelin 2 Are Associated With Mycobacterium avium Subspecies paratuberculosis Infection.
Front Vet Sci. 2021 May 5;8:625323. doi: 10.3389/fvets.2021.625323. eCollection 2021. PMID: 34026885

Köhler H, Liebler-Tenorio E, Hughes V, Stevenson K, Bakker D, Willemsen P, Bay S, Ganneau C, Biet F, Vordermeier HM. (2021)
Interferon-gamma Response of Mycobacterium avium subsp. paratuberculosis Infected Goats to Recombinant and Synthetic Mycobacterial Antigens.
Front Vet Sci. 2021 Mar 26;8:645251. doi: 10.3389/fvets.2021.645251. eCollection 2021. PMID: 33842578

Kostoulas P, Gardner IA, Elschner MC, Denwood M J, Meletis L, Nielsen SS. (2021)
Examples of proper reporting for evaluation (Stage 2 validation) of diagnostic tests for diseases listed by the World Organisation for Animal Health.
Rev Sci Tech. 2021 Jun;40(1):287-298. doi: 10.20506/rst.40.1.3225. PMID: 34140743

Kuenstner L, Kuenstner J.T. (2021)
Mycobacterium avium ssp. paratuberculosis in the Food Supply: A Public Health Issue
Frontiers in Public Health | www.frontiersin.org 1 July 2021 | Volume 9 | Article 647448

Lim J, Park HT, Ko S, Park HE, Lee G, Kim S, Shin MK, Yoo HS, Kim D. (2021)
Genomic diversity of Mycobacterium avium subsp. paratuberculosis: pangenomic approach for highlighting unique genomic features with newly constructed complete genomes.
Vet Res. 2021 Mar 18;52(1):46. doi: 10.1186/s13567-021-00905-1. PMID: 33736686

Lozano-Cavazos EA, Velázquez-Morales JV, Santillán-Flores MA, Tarango-Arámbula LA, Olmos-Oropeza G, Martínez-Montoya JF, Cortez-Romero C. (2021)
SEROPREVALENCE OF ANTIBODIES AGAINST MYCOBACTERIUM AVIUM SUBSP. PARATUBERCULOSIS AND ITS RELATIONSHIP TO AGE AND SEX OF TEXAS WHITE-TAILED DEER (ODOCOILEUS VIRGINIANUS) IN COAHUILA, MEXICO.
J Wildl Dis. 2021 Apr 1;57(2):321-326. doi: 10.7589/JWD-D-20-00045. PMID: 33822156

Lucena AN, Garza-Cuartero L, McAloon C, Mulcahy G, Zintl A, Perez J, Wolfe A. (2021)
Apoptosis levels in bovine Johne's disease ileal lesions and association with bacterial numbers.
Vet Pathol. 2021 Jun 30:3009858211025790. doi: 10.1177/03009858211025790. Online ahead of print. PMID: 34190009

Marete A, Ariel O, Ibeagha-Awemu E, Bissonnette N. (2021)
Identification of Long Non-coding RNA Isolated From Naturally Infected Macrophages and Associated With Bovine Johne's Disease in Canadian Holstein Using a Combination of Neural Networks and Logistic Regression.
Front Vet Sci. 2021 Apr 22;8:639053. doi: 10.3389/fvets.2021.639053. eCollection 2021. PMID: 33969037

Martucciello A., Galletti G., Pesce A., Russo M., Sannino E., Arrigoni N. , Ricchi M., Tamba M., Brunetti R., Ottaiano M., Iovane De Carlo E. (2021)
Short communication: Seroprevalence of paratuberculosis in Italian water buffaloes (Bubalus bubalis) in the region of Campania
J. Dairy Sci. VOLUME 104, ISSUE 5, P6194-6199, MAY 01, 2021

Matthews C, Cotter PD, O' Mahony J. (2021)
MAP, Johne's disease and the microbiome; current knowledge and future considerations.
Anim Microbiome. 2021 May 7;3(1):34. doi: 10.1186/s42523-021-00089-1. PMID: 33962690

Mõtus K, Rilanto T, Viidu DA, Orro T, Viltrop A. (2021)
Seroprevalence of selected endemic infectious diseases in large-scale Estonian dairy herds and their associations with cow longevity and culling rates.
Prev Vet Med. 2021 Jul;192:105389. doi: 10.1016/j.prevetmed.2021.105389. Epub 2021 May 27. PMID: 34062370

Moyano RD, Imperiale BR, Romero M, Santangelo MP, Alvarado Pinedo MF, Travería G, Romano MI. (2021)
Genetic diversity of Mycobacterium avium sp. paratuberculosis by mycobacterial interspersed repetitive Unit-Variable number tandem repeat and multi-locus short-sequence repeat one-sentence summary: Genetic diversity of Mycobacterium avium sp. paratuberculosis isolates.
Int J Mycobacteriol. 2021 Jan-Mar;10(1):51-59. doi: 10.4103/ijmy.ijmy_229_20. PMID: 33707372

Nag R, Markey BK, Whyte P, O'Flaherty V, Bolton D, Fenton O, Richards KG, Cummins E. (2021)
A Bayesian inference approach to quantify average pathogen loads in farmyard manure and slurry using open-source Irish datasets.
Sci Total Environ. 2021 Sep 10;786:147474. doi: 10.1016/j.scitotenv.2021.147474. Epub 2021 Apr 30. PMID: 33965832

Noh S., Kim J., Park C., Min J., Lee T., (2021)
Fabrication of an Electrochemical Aptasensor Composed of Multifunctional DNA Three-Way Junction on Au Microgap Electrode for Interferon Gamma Detection in Human Serum
Biomedicines 2021, 9(6), 692; https://doi.org/10.3390/biomedicines9060692

Pallás-Guzmán G, Quezada-Tristán T, Chávez-Gris G, Maldonado-Castro E, Chávez-González L, García-Munguía C (2021)
Mycobacterium avium ssp. paratuberculosis identification and seroprevalence in sheep flocks in Aguascalientes
Abanico veterinario versión On-line ISSN 2448-6132versión impresa ISSN 2007-428X Abanico vet vol.11 Tepic ene./dic. 2021 Epub 21-Mayo-2021

Park HT, Park WB, Kim S, Lim JS, Nah G, Yoo HS. (2021)
Revealing immune responses in the Mycobacterium avium subsp. paratuberculosis-infected THP-1 cells using single cell RNA-sequencing.
PLoS One. 2021 Jul 2;16(7):e0254194. doi: 10.1371/journal.pone.0254194. eCollection 2021. PMID: 34214113

Phillips IL, Danelishvili L, Bermudez LE. (2021)
Macrophage Proteome Analysis at Different Stages of Mycobacterium avium Subspecies paratuberculosis Infection Reveals a Mechanism of Pathogen Dissemination.
Proteomes. 2021 Apr 30;9(2):20. doi: 10.3390/proteomes9020020. PMID: 33946162

Proietti E, Fuhler GM, Peppelenbosch MP. (2021)
Mycobacterium Avium Subspecies Paratuberculosis Infection and Biological Treatment of IBD: Cause or Consequence?
J Crohns Colitis. 2021 Mar 18:jjab027. doi: 10.1093/ecco-jcc/jjab027. Online ahead of print. PMID: 33735385

Rodríguez-Hernández P, Rodríguez-Estévez V, Arce L, Gómez-Laguna J. (2021)
Application of Volatilome Analysis to the Diagnosis of Mycobacteria Infection in Livestock.
Front Vet Sci. 2021 May 24;8:635155. doi: 10.3389/fvets.2021.635155. eCollection 2021. PMID: 34109231

Shandilya UK, Sharma A, Mallikarjunappa S, Guo J, Mao Y, Meade KG, Karrow NA. (2021)
CRISPR-Cas9-mediated knockout of TLR4 modulates Mycobacterium avium ssp. paratuberculosis cell lysate-induced inflammation in bovine mammary epithelial cells.
J Dairy Sci. 2021 Jul 9:S0022-0302(21)00727-X. doi: 10.3168/jds.2021-20305. Online ahead of print. PMID: 34253365

Sousa T, Costa M, Sarmento P, Manso MC, Abreu C, Bull TJ, Cabeda J, Sarmento A. (2021)
DNA-based detection of Mycobacterium avium subsp. paratuberculosis in domestic and municipal water from Porto (Portugal), an area of high IBD prevalence.
AIMS Microbiol. 2021 May 17;7(2):163-174. doi: 10.3934/microbiol.2021011. eCollection 2021. PMID: 34250373

Stabel JR, Bannantine JP. (2021)
Reduced tissue colonization of Mycobacterium avium subsp. paratuberculosis in neonatal calves vaccinated with a cocktail of recombinant proteins.
Vaccine. 2021 May 27;39(23):3131-3140. doi: 10.1016/j.vaccine.2021.04.051. Epub 2021 May 7. PMID: 33966908

Stabel JR, Waters WR, Bannantine JP, Palmer MV. (2021)
Comparative cellular immune responses in calves after infection with Mycobacterium avium subsp. paratuberculosis, M. avium subsp. avium, M. kansasii and M. bovis.
Vet Immunol Immunopathol. 2021 Jul;237:110268. doi: 10.1016/j.vetimm.2021.110268. Epub 2021 May 19. PMID: 34023615

Tamba M, Pallante I, Petrini S, Feliziani F, Iscaro C, Arrigoni N, Di Sabatino D, Barberio A, Cibin V, Santi A, Ianniello M, Ruocco L, Pozzato N. (2021)
Overview of Control Programs for EU Non-regulated Cattle Diseases in Italy.
Front Vet Sci. 2021 Apr 26;8:665607. doi: 10.3389/fvets.2021.665607. eCollection 2021. PMID: 33981747

Taylor E, Beckmann M, Markey B, Gordon S, Hewinson G, Rooke D, Mura Luis (2021)
Metabolomic changes in Mycobacterium avium subsp. Paratuberculosis (MAP) inoculated Holstein-Friesian cattle suggest metabolites indicative of MAP exposure
Animal - science proceedings Volume 12, Issue 1, April 2021, Page 152

Ueno Y, Ogawa Y, Takamura Y, Nagata R, Kawaji S, Mori Y. (2021)
Complete Genome Sequence of Mycobacterium avium subsp. paratuberculosis Strain 42-13-1, Isolated in Japan.
Microbiol Resour Announc. 2021 Apr 15;10(15):e00084-21. doi: 10.1128/MRA.00084-21. PMID: 33858919

Vasanthi B., Pavithra S., Vijayarani K., Venkataramanan R., Kumanan K. (2021)
Protective Efficacy of Chitosan Coupled Johne's Disease Vaccine
Agricultural Science Digest - A Research Journal ; doi:10.18805/ag.d-5218

Vázquez C.B., Balseiro A., Alonso-Hearn M., Juste R.A., Iglesias N., Canive M., Casais R. (2021)
Bovine Intelectin 2 Expression as a Biomarker of Paratuberculosis Disease Progression
Animals 2021, 11(5), 1370; https://doi.org/10.3390/ani11051370

Viale MN, Colombatti Olivieri MA, Alonso N, Moyano RD, Imperiale B, Morcillo N, Santangelo MP, Davis W, Romano MI. (2021)
Effect of the deletion of lprG and p55 genes in the K10 strain of Mycobacterium avium subspecies paratuberculosis.
Res Vet Sci. 2021 Sep;138:1-10. doi: 10.1016/j.rvsc.2021.05.019. Epub 2021 May 28. PMID: 34087563

Weber M, Gierschner P, Klassen A, Kasbohm E, Schubert JK, Miekisch W, Reinhold P, Köhler H. (2021)
Detection of Paratuberculosis in Dairy Herds by Analyzing the Scent of Feces, Alveolar Gas, and Stable Air.
Molecules. 2021 May 11;26(10):2854. doi: 10.3390/molecules26102854. PMID: 34064882

Wichert A, Einax E, Hahn N, Klassen A, Donat K. (2021)
Detection of Mycobacterium avium Subspecies Paratuberculosis in Pooled Fecal Samples by Fecal Culture and Real-Time PCR in Relation to Bacterial Density.
Animals (Basel). 2021 May 29;11(6):1605. doi: 10.3390/ani11061605. PMID: 34072327

Yirsaw A, Baldwin CL. (2021)
Goat γδ T cells.
Dev Comp Immunol. 2021 Jan;114:103809. doi: 10.1016/j.dci.2020.103809. Epub 2020 Aug 11. PMID: 32795585

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