# The Paratuberculosis Newsletter Issue 2 | June 2020

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# **CONTENTS**

Vacancy for new Editor
Johne's Information Center
Paratuberculosis News
Recent Publications

Expanding Membership 15th ICP Upcoming Events

#### **Note from the Editor**

Updates about the 15th ICP, an overview of the Johne's Information Center, by Mike Collins, and a list of recent publications on paratuberculosis make up this edition of the newsletter. Following the resignation of the Editor, Kumi de Silva, I have agreed to produce a newsletter for the next four issues in June, September, December 2020 and March 2021.

Best wishes,

Peter Mullowney



#### Cover Photographs (Courtesy of Dr. Mike Collins).

The top photo shows a 4 year-old Royal White/White Dorper cross four months before developing severe clinical signs of Johne's disease. She is obviously healthy looking and pregnant.

The second photo shows the same animal about the time she was tested for Johne's disease. This animal was found to be shedding massive numbers of MAP in her feces by PCR on a fecal sample, and was also strongly positive by ELISA (VMRD kit). After necropsy, her intestines and associated lymph nodes were also strongly PCR-positive.



#### New Editor for the Paratuberculosis Newletter.

The International Association of Paratuberculosis is looking for a new editor for the Newsletter. The list of recent publications is most useful for keeping up with what is published in the field and has always been included in the newsletter as also have the annual accounts, but other topics to include would be up to the new editor. If you are interested please send an email to editor@paratuberculosis.net



#### **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. 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 don't 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.



#### 17th International Colloquium on Paratuberculosis.

The IAP Governing Board requests bids to host the 17th International Colloquium on Paratuberculosis, to be held in 2024. Bids will be presented to the Governing Board at their meeting just prior to the 15th ICP in Dublin, Ireland on April 5<sup>th</sup> 2021.

Any member wishing to present a bid, please notify the Secretary-Treasurer, Dr. Ray Sweeney, by email (rsweeney@vet.upenn.edu) before August 1, 2020. This initial letter of intent should indicate the proposed city for the meeting, the chair of the local organizing committee, and the name and contact information of the person who will present the bid.

If accepted for full presentation to the Board, below are listed some considerations to include in the presentation:

The main points to prepare and evaluate a bid for hosting an International Colloquium on Paratuberculosis will be:

- 1.- Date: Year (2024 for the 17th ICP, exceptions justified) and season (long days better).
- 2.- City, venue and accommodation: proximity, room comfort and fees, touristic points of interest and infrastructures.
- 3.- Colloquium duration and general program, invited speakers.
- 4.- Accessibility and local transportation: well-connected airport with low cost options, other public transportation alternatives.
- 5.- Budget: expected balance for the IAP
- 6.- Commitment: institution support, sponsors, government support
- 7.- Human resources available
- 8.- Abstract book and proceedings edition perspectives
- 9.- Other

Bidders must prepare a brief presentation (about 15 minutes) to be delivered to the Governing Board in its pre-Colloquium meeting. In some cases, if the bidding member is not able to travel, a bid presented by videoconference may be acceptable.



#### Topics for next newsletter.

I would like to include a series of articles on what being a member of IAP means to you. I have been a member since 8<sup>th</sup> Copenhagen 2005 and attended 9<sup>th</sup> Tsukuba, Japan in 2007, 10<sup>th</sup> Minneapolis 2009, 11<sup>th</sup> Sydney 2012, 12<sup>th</sup> Parma in 2014 and 13<sup>th</sup> Nantes in 2016. I have usually attended with my wife Una and have enjoyed the social aspect as much as the scientific. Because the conference is quite small it gives you a chance getting to know people from one conference to the next. The accompanying persons usually organise day trips while the scientific session is going on. The relaxed atmosphere allows you to learn of the progress of Johne's research in other countries. The varied locations of the Colloquia have allowed us to visit countries we would not otherwise have travelled to and we have usually travelled around either before or after the conference. I was unable to attend 14<sup>th</sup> Riviera Maya, Mexico in 2018 for family reasons but am greatly looking forward to 15<sup>th</sup> in Dublin in April 2021. If you would like to say what membership of ICP means to you or are interested in submitting any other contribution please send an email to editor@paratuberculosis.net





The <u>Johnes.org website</u> is devoted to Johne's disease education. The information on the website is targeted at veterinarians and animal owners. We deeply appreciate the financial support from our sponsors which makes it possible to ensure that the information is kept current and that news items are regularly posted.

I originally created the website in 1996 with the help of folks who understood html coding better than I did. It was extensively expanded in 2000 with financial help from the Wisconsin Milk Marketing Board (now called the <u>Dairy Farmers of Wisconsin</u>) and the Wisconsin Department of Agriculture, Trade and Consumer Protection, Division of Animal Health. The design and functionality of the 2000 version of the website was created by <u>Distillery Design</u>. In 2010 the website's content was updated again by Dr. Elizabeth J.B. Manning, DVM, MPH, one of the site's coauthors.

The 2019 version of our site was created with the excellent help of the <u>Teaching & Research</u> <u>Application Development (TRAD) team</u>, University of Wisconsin, Department of Information

Technology (DoIT) which also hosts this website. None of this would have been possible without our sponsors and we give special thanks to our current platinum sponsor, <u>Zoetis</u>.

News items are added weekly and subscribers to Johnes.org are notified by email about the news posting. This feature is managed by <u>Constant Contact</u>, an email marketing service founded in 1995. This site currently has 489 subscribers.

In addition to the weekly news feature, the site contains information about Johne's disease in different animals under the main heading **Animal Type**. This includes dairy cattle, beef cattle, goats, sheep, deer and elk. For each of these kinds of animals there are the same eight subtopics: FAQs, Epidemiology, Pathology, Diagnosis, Control, Prevention, Certification, and Laws & Regulations. Under the category of **Other Animals** website visitors will find information related to MAP infections in bison, water buffalo, wild ruminants, zoo ruminants, and non-ruminants, including humans.

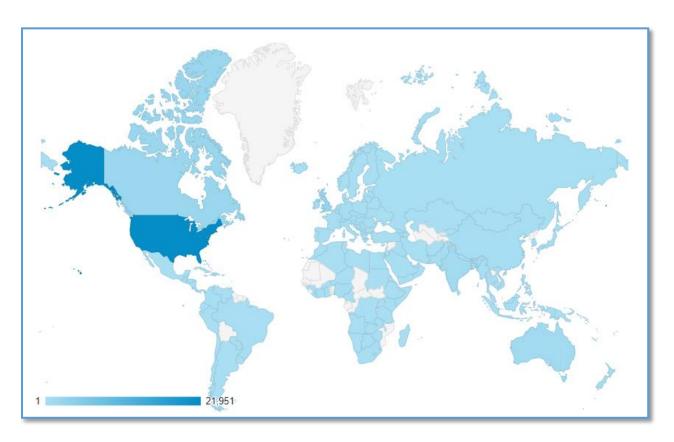
A significant portion of the site is found under the main heading "General Information". The outline below describes the content under this heading

- 1. **Johne's Disease:** A to Z is intended to provide an overview of the disease for non-experts and contains quite a bit of history, starting with Dr. Johne. As I age I find the historical information of considerable interest.
- 2. MAP Biology intrigues me as a microbiologist and has five subtopics
  - a. General Characteristics
  - b. Resistance
  - c. Survival Outside The Animal
  - d. Why So Resistant
  - e. Is MAP in Food and Water?
- 3. Antimicrobial Therapy discusses both in vitro and in vivo studies.
- 4. **Zoonotic Potential** attempts to give a balanced discussion of this controversial subject with many references, some of which are linked to the original publications.
- 5. **Article and Brochures** provides a variety of publications designed for animal owners and veterinarians.
- 6. **Presentations and Mini-lectures** provide videos. The Links page attempts to offer links to relevant information provided by international and national organizations.
- 7. **Links** helps visitors find additional sources of information with information about the IAP and link to our organization's site at the top of the page. This is followed by 2 other international organizations and nine national programs.

A main heading titled **Images** offers users ready access to photos of animals with clinical Johne's disease, gross and microscopic pathology, and photos of MAP bacteria and cultures. There are 51 images in total as of June 2020 and most come from my personal collection. I encourage people to use these images to help educate others about Johne's disease, only asking that people using these images give credit to Johnes.org as the source of the image.

In total, Johnes.org has 89 pages of information. According to Google Analytics, it attracts over 3,000 visitors each month and has a global reach. The graphic below shows the country of origin for site

visitors over the past 12 months. Countries with the most visitors are the U.S., Canada, U.K., India, Australia, New Zealand, Egypt, and Ireland.



Building and managing this website is part of my retirement plan. It keeps me engaged in the field of paratuberculosis as I seek out newsworthy items to post and new content to add to the growing site. The site also attracts questions from animal owners and veterinarians via the "Ask An Expert" feature. Currently this generates 3-5 email inquiries per week and the occasional phone call. Now, 18 months into my retirement, I can confidently say this was the right decision for me. I enjoy the website work and it is gratifying to make the many resources I have accumulated on paratuberculosis available to the world.

Please recommend the site to veterinarians or animal breed associations who may benefit from this information. Sorry it is only in English. If you are already receiving notifications from me about Johnes.org, I hope you find the information useful but if you want to unsubscribe for any reason, please feel free to do so – no hard feelings. (3)

Errors naturally occur in building a site this large and I invite your feedback if you find things that should be corrected. Suggestions for improvement or additions are also welcome.

Michael T. Collins, DVM, PhD, DACVM



# 15th International Colloquium for Paratuberculosis 6<sup>th</sup> – 9<sup>th</sup> April 2021 Céad Míle Fáilte

(one hundred thousand welcomes)





In March 2020, in response to the global pandemic brought about by the COVID-19 virus the Committee of the 15th International Association for Paratuberculosis Colloquium 2020 made the hard decision to postpone ICP 2020 until 2021. The event was originally scheduled for  $14^{th}$  - $18^{th}$  June, 2020 in Dublin Castle. The  $15^{th}$  International Colloquium for Paratuberculosis is now re-scheduled for the  $6^{th}$  –  $9^{th}$  April 2021 in Dublin Castle.

The ICP 2021 Committee invites you to the 15<sup>th</sup> IAP Colloquium in Dublin, Ireland in April 2021. 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.

# **Registration Details**

Registration open: To register click here

Early Registration deadline: 17<sup>th</sup> December 2020 Online Registration closes: 31<sup>st</sup> March 2021

#### **Registration fees**

	Early Bird	Standard	On-site
Member	€495	€595	€695
Non Member	€595	€695	€795
Student	€395	€450	€495
Low to Middle Income countries	€395	€450	€495

#### The registration fee includes:

- Admission to all sessions and the exhibition
- Conference materials
- Tea, coffee and lunches throughout the conference
- Admission to the Welcome Reception in EPIC Immigration Museum on Tuesday the 6<sup>th</sup> April 2021.

# **Social Programme**

## **Welcome Reception**

Tuesday, 6<sup>th</sup> April 2021 at 19.30 EPIC Irish Emigration Museum, CHQ Building



We have an immersive and unforgettable evening planned in EPIC, The Irish Emigration Museum. The influence the Irish have had around the globe is impressive. EPIC tells the dramatic story of the people who have left the island of Ireland, how these people spread around the globe and how they influenced and shaped the world. Attendance to welcome reception is included in your registration fee and includes 45 minute guided tours of the museum along with canapes and a drinks reception.

### **Excursion to the Orchard Centre, Wicklow**

Wednesday, 7<sup>th</sup> April 2021 at 13:00 €40 per person





The half day excursion to the Orchard Centre gives delegates the opportunity to learn more about the history and heritage of the Hayden Family farm, the production of Baileys and more!

#### Included in this excursion is:

- A welcome by Joe Hayden to the Orchard Centre Farm.
- Formal presentation by Joe on the History & Heritage of his family farm and include an overview of Animal Health Plan and the Dairy Farming Sustainability to include environmental control and carbon footprint measurements and reductions.
- Technical Farm Tour to view grass based production system and focus on quality values for production of cream for Baileys.
- Baileys Tasting Workshop.
- Hurling Skills Workshop.

Places to be booked in advance of the conference through the registration link.

#### **Gala Dinner**

Thursday 8<sup>th</sup> April 2021 at 19:30 Law Society of Ireland, Blackhall Place €50 per person



Delegates attending the Gala Dinner can be assured of an unforgettable evening of excellent food, fine wine, and an evening of cultural entertainment that only Dublin can offer! Tickets to be booked in advance of the conference through the registration link.

For more information and to book your registration visit www.icpdublin.com



# **Upcoming events**



7th International Conference on Mycobacterium bovis

June 2021 Galway, Ireland



15th International Colloquium for Paratuberculosis

6th - 9th April 2021 Dublin, Ireland



World Buiatrics Congress 2020

26 -30 September 2021 Madrid, Spain



16th International Symposium of Veterinary Epidemiology and Economics

9-13 Aug 2021 Halifax, Nova Scotia, Canada

16th ICP 2022 Jaipur, India

## **Recent publications to June 2020**

Abdissa K, Ruangkiattikul N, Ahrend W, Nerlich A, Beineke A, Laarmann K, Janze N, Lobermeyer U, Suwandi A, Falk C, Schleicher U, Weiss S, Bogdan C, Goethe R. (2020) <u>Relevance of inducible nitric oxide synthase for immune control of Mycobacterium avium subspecies paratuberculosis infection in mice.</u> Virulence. Dec; 11(1):465-481. doi: 10.1080/21505594.2020.1763055. PMID: 32408806 Free PMC article.

Acharya KR, Plain KM, Whittington RJ, Dhand NK. (2020) <u>Australian Veterinarians' Perceptions</u> <u>Regarding the Zoonotic Potential of Mycobacterium avium Subspecies Paratuberculosis.</u> Vet Sci. Mar 19;7(1):33. doi: 10.3390/vetsci7010033. PMID: 32204515 Free PMC article.

Agrawal G, Clancy A, Huynh R, Borody T.(2020) <u>Profound remission in Crohn's disease requiring no further treatment for 3-23 years: a case series.</u> Gut Pathog. Apr 9; 12:16. doi: 10.1186/s13099-020-00355-8. eCollection 2020. PMID: 32308741 Free PMC article.

Agrawal G, Clancy A, Sharma R, Huynh R, Ramrakha S, Borody T. (2020) <u>Targeted Combination Antibiotic Therapy Induces Remission in Treatment-Naïve Crohn's Disease: A Case Series.</u>
Microorganisms. Mar 6; 8(3):371. doi: 10.3390/microorganisms8030371. PMID: 32155771 Free PMC article.

Alegbeleye Oluwadara Oluwaseun, Anderson S. Sant'Ana (2020) <u>Manure-borne pathogens as an important source of water contamination: An update on the dynamics of pathogen survival/transport as well as practical risk mitigation strategies.</u> International Journal of Hygiene and Environmental Health Volume 227 June Article 113524

Alonso Maria Natalia , Wladimir Malaga, Michael Mc Neil, Mary Jackson, María Paz Santangelo (2020) Efficient method for targeted gene disruption by homologous recombination in Mycobacterium avium subspecie paratuberculosis Research in Microbiology In press, corrected proof Available online 10 April

Al Qasrawi D, Abdelli LS, Naser SA. (2020) <u>Mystery Solved: Why Smoke Extract Worsens Disease in Smokers with Crohn's Disease and Not Ulcerative Colitis? Gut MAP!</u> Microorganisms. May 2;8(5):666. doi: 10.3390/microorganisms8050666. PMID: 32370298 Free PMC article.

Amirizadehfard S, Mahzounieh M, Safarpour A, Nejabat M, Nazari N. (2020) <u>Genomic Detection of Mycobacterium avium subspecies paratuberculosis in Blood Samples of Patients with Inflammatory Bowel Disease in Southern Iran.</u> Iran J Med Sci. May; 45(3):214-219. doi: 10.30476/ijms.2020.72403.0. PMID: 32546888

Bo M, Niegowska M, Frau J, Sechi G, Arru G, Cocco E, Sechi LA. (2020) <u>IL-2 and Mycobacterial Lipoarabinomannan as Targets of Immune Responses in Multiple Sclerosis Patients.</u> Microorganisms. Apr 1; 8(4):500. doi: 10.3390/microorganisms8040500. PMID: 32244639 Free PMC article.

Brahma D, Narang D, Chandra M, Singh ST. (2020) <u>Comparison of multiplex and ordinary PCR for diagnosis of paratuberculosis and tuberculosis in blood samples (buffy coat) of cattle and buffaloes.</u> Iran J Vet Res. Winter; 21(1):52-56. PMID: 32368226 Free PMC article.

Brock, Jonas, Martin Lange, Simon J. More, David Graham, Hans-Hermann Thulke (2020) Reviewing age-structured epidemiological models of cattle diseases tailored to support management decisions: Guidance for the future. Preventive Veterinary Medicine Volume 174 January Article 104814

Cheng Z, Liu M, Wang P, Liu P, Chen M, Zhang J, Liu S, Wang F. (2020) <u>Characteristics and Epidemiological Investigation of Paratuberculosis in Dairy Cattle in Tai an, China.</u> Biomed Res Int. Mar 13; 2020:3896754. doi: 10.1155/2020/3896754. eCollection 2020. PMID: 32258119 Free PMC article.

Cochard Thierry, Mxime Branger, Philip Supply, Srinand Sreevatsan, Franck Biet (2020) MAC-INMV-SSR: a web application dedicated to genotyping members of Mycobacterium avium complex (MAC) including Mycobacterium avium subsp. paratuberculosis strains. Infection, Genetics and Evolution Volume 77 January Article 104075

de Moraes Pereira H, Santos HP, de Oliveira EAA, Rocha TB, Araújo ÍMS, Soares DM, Junior FG, de Albuquerque PPF, Mota RA. (2020) <u>High prevalence of subclinical paratuberculosis in buffaloes</u> (<u>Bubalus bubalis</u>) in <u>Maranhão</u>, <u>Brazil</u>. Braz J Microbiol. Apr 14. doi: 10.1007/s42770-020-00267-4. Online ahead of print. PMID: 32291741

DeKuiper JL, Cooperider HE, Lubben N, Ancel CM, Coussens PM. (2020) Mycobacterium avium Subspecies paratuberculosis Drives an Innate Th17-Like T Cell Response Regardless of the Presence of Antigen-Presenting Cells. Front Vet Sci. Mar 17; 7:108. doi: 10.3389/fvets.2020.00108. eCollection 2020. PMID: 32258066 Free PMC article.

Dibaj Ramin, Hasan Shojaei, Tahmineh Narimani (2020) <u>Identification and molecular characterization</u> <u>of mycobacteria isolated from animal sources in a developing country.</u> Acta Tropica Volume 204 April Article 105297

Echeverr G, Escobar H, Changoluisa D, Ron L, Proaño A, Proañ O-Pérez F, Zumárraga MJ, de Waard JH. (2020) <u>Prevalence of paratuberculosis in dairy cattle in Ecuador.</u> Int J Mycobacteriol. Jan-Mar; 9(1):1-6. doi: 10.4103/ijmy.ijmy\_175\_19. PMID: 32474480

Elad D, Lysnyansky I, Falk R, Blum SE, Weisbelith L, Mikula I, Shwimmer A. (2020) From six to zero per cent Mycobacterium avium subsp. paratuberculosis milk ELISA positivity in three years - probably induced by Mycobacterium vaccae. J Dairy Res. May; 87(2):204-207. doi: 10.1017/S0022029920000278. Epub 2020 Apr 20. PMID: 32308162

Ezanno P., M. Andraud, G. Beaunée, T. Hoch, S. Widgren (2020) <u>How mechanistic modelling supports</u> <u>decision making for the control of enzootic infectious diseases.</u> Epidemics In press, journal preproofAvailable online 20 June 2020Article 100398

Facciuolo A, Lee AH, Gonzalez Cano P, Townsend HGG, Falsafi R, Gerdts V, Potter A, Napper S, Hancock REW, Mutharia LM, Griebel PJ. (2020) <u>Regional Dichotomy in Enteric Mucosal Immune</u> <u>Responses to a Persistent Mycobacterium avium ssp. paratuberculosis Infection.</u> Front Immunol. May 29;11:1020. doi: 10.3389/fimmu.2020.01020. eCollection 2020. PMID: 32547548

Fanelli A, Buonavoglia D, Pleite CMC, Tizzani P. (2020) <u>Paratuberculosis at European scale: an overview from 2010 to 2017.</u> Vet Ital. Apr 24; 56(1). doi: 10.12834/VetIt.1829.9692.3. PMID: 32343090 Free article.

Fawzy A, Zschöck M, Ewers C, Eisenberg T. (2020) <u>Development of a hierarchical typing approach for Mycobacterium avium subsp. paratuberculosis (MAP) and characterization of MAP field cultures from Central Germany.</u> J Appl Microbiol. May 19. doi: 10.1111/jam.14722. Online ahead of print. PMID: 32426861

Fiocchi Claudio, Dimitrios Iliopoulos (2020) What's new in IBD therapy: An "omics network" approach. Pharmacological Research Volume 159September Article 104886

Gabriel Alonzo A., Cecile Leah T. Bayaga, Eiric A. Magallanes, Richard Paolo M. Aba, Karen May N. Tanguilig (2020) <u>Fates of pathogenic bacteria in time-temperature-abused and Holder-pasteurized human donor-, infant formula-, and full cream cow's milk.</u> Food Microbiology Volume 89 August Article 103450

Gómez-Guillamón F, Díaz-Cao JM, Camacho-Sillero L, Cano-Terriza D, Alcaide EM, Cabezón Ó, Arenas A, García-Bocanegra I. (2020) <u>Spatiotemporal monitoring of selected pathogens in Iberian ibex</u> (<u>Capra pyrenaica</u>). Transbound Emerg Dis. Apr 17. doi: 10.1111/tbed.13576. Online ahead of print. PMID: 32303109

Gopi B, Singh RV, Kumar S, Kumar S, Chauhan A, Kumar A, Singh SV. (2020) <u>Single-nucleotide</u> polymorphisms in CLEC7A, CD209 and TLR4 gene and their association with susceptibility to paratuberculosis in Indian cattle. J Genet.; 99:14. PMID: 32366737 Free article.

Hassan Abdulwahed Ahmed, Izhar U. H. Khan, Sebastian Ganz, Axel Wehrend, Michael Bülte (2020) Assessing efficacy of N-Acetyl-l-Cysteine—Sodium Hydroxide on bacterial viability and enhanced recovery of Mycobacterium avium subsp. paratuberculosis from bovine colostrum. Journal of Microbiological Methods Volume 175 August Article 105968

Hemati Z, Haghkhah M, Derakhshandeh A, Chaubey KK, Singh SV. (2020) <u>Novel recombinant Mcetruncated protein based ELISA for the diagnosis of Mycobacterium avium subsp. paratuberculosis infection in domestic livestock.</u> PLoS One. Jun 1; 15(6):e0233695. doi: 10.1371/journal.pone.0233695. eCollection 2020. PMID: 32479551

Jain Mukta, Amit Kumar Singh, Manju Singh, Saurabh Gupta, Jagdip Singh Sohal (2020) Comparative evaluation of Mycobacterium avium subspecies paratuberculosis (MAP) recombinant secretory proteins as DTH marker for paratuberculosis. Journal of Microbiological Methods In press, journal pre-proof Available online 18 June Article 105987

Jones Alison, Oona Y-C. Lee, David E. Minnikin, Mark S. Baird, Juma'a R. Al Dulayymi (2020) <u>A re-investigation of the mycolic acids of Mycobacterium avium.</u> Chemistry and Physics of Lipids Volume 230 August Article 104928

Lin WC, Ptak CP, Chang CY, Ian MK, Chia MY, Chen TH, Kuo CJ. (2020) <u>Autochthonous Lactic Acid Bacteria Isolated from Dairy Cow Feces Exhibiting Promising Probiotic Properties and in vitro Antibacterial Activity against Foodborne Pathogens in Cattle.</u> Front Vet Sci. May 15; 7:239. doi: 10.3389/fvets.2020.00239. eCollection 2020. PMID: 32500086

Luo Lucy , Jeroen De Buck (2020) <u>Inducing cellular immune responses with a marked Mycobacterium avium subsp. paratuberculosis strain in dairy calves.</u> Veterinary Microbiology Volume 244 May Article 108665

Mallikarjunappa S, Schenkel FS, Brito LF, Bissonnette N, Miglior F, Chesnais J, Lohuis M, Meade KG, Karrow NA. (2020) <u>Association of genetic polymorphisms related to Johne's disease with estimated breeding values of Holstein sires for milk ELISA test scores.</u> BMC Vet Res. May 27; 16(1):165. doi: 10.1186/s12917-020-02381-9. PMID: 32460776 Free PMC article.

Mathie Heather A., Kirsty Jensen, Joanne M. Stevens, Elizabeth J. Glass, Jayne C. Hope (2020)

<u>Quantifying Mycobacterium avium subspecies paratuberculosis infection of bovine monocyte</u>

<u>derived macrophages by confocal microscopy.</u> Journal of Microbiological Methods Volume 168

January Article 105779

Park HS, Back YW, Son YJ, Kim HJ. (2020) <u>Mycobacterium avium subsp. paratuberculosis MAP1889c Protein Induces Maturation of Dendritic Cells and Drives Th2-biased Immune Responses.</u> Cells. Apr 11; 9(4):944. doi: 10.3390/cells9040944. PMID: 32290379 Free PMC article.

Pigoli C., M. Oltolina, E. Bonacina, G. Sironi, L. R. Gibelli (2020) <u>Mycobacterium avium subsp.</u>
<u>Paratuberculosis Infection in a Scimitar-horned Oryx (Oryx dammah).</u> Journal of Comparative Pathology Volume 174 January Page 166

Roche S. M., M. Von Massow, D. Renaud, D. A. Shock, D. F. Kelton (2020) <u>Cost-benefit of implementing a participatory extension model for improving on-farm adoption of Johne's disease control recommendations</u>. Journal of Dairy Science Volume 103, Issue 1 January Pages 451-472

Sanchez MP, Guatteo R, Davergne A, Saout J, Grohs C, Deloche MC, Taussat S, Fritz S, Boussaha M, Blanquefort P, Delafosse A, Joly A, Schibler L, Fourichon C, Boichard D. (2020) <u>Identification of the ABCC4</u>, <u>IER3</u>, and <u>CBFA2T2</u> candidate genes for resistance to paratuberculosis from sequence-based <u>GWAS in Holstein and Normande dairy cattle</u>. Genet Sel Evol. Mar 17; 52(1):14. doi: 10.1186/s12711-020-00535-9. PMID: 32183688 Free PMC article.

Shabana II, Aljohani AA. (2019) <u>Sero-surveillance of Mycobacterium avium subspecies</u> <u>paratuberculosis infection in ruminants in Medina.</u> J Adv Vet Anim Res. Dec 14; 7(1):69-76. doi: 10.5455/javar.2020.g395. eCollection 2020 Mar. PMID: 32219112 Free PMC article.

Shaughnessy RG, Farrell D, Stojkovic B, Browne JA, Kenny K, Gordon SV. (2020) <u>Identification of microRNAs in bovine faeces and their potential as biomarkers of Johne's Disease.</u> Sci Rep. Apr 3; 10(1):5908. doi: 10.1038/s41598-020-62843-w. PMID: 32246047 Free PMC article.

Shoyama FM, Janetanakit T, Bannantine JP, Barletta RG, Sreevatsan S. (2020) <u>Elucidating the Regulon of a Fur-like Protein in Mycobacterium avium subsp. paratuberculosis (MAP).</u> Front Microbiol. Apr 23; 11:598. doi: 10.3389/fmicb.2020.00598. eCollection 2020. PMID: 32390963 Free PMC article.

Stabel JR, Bannantine JP, Hostetter JM. (2020) <u>Comparison of Sheep, Goats, and Calves as Infection Models for Mycobacterium avium subsp. paratuberculosis.</u> Vet Immunol Immunopathol. Jul; 225:110060. doi: 10.1016/j.vetimm.2020.110060. Epub 2020 May 5. PMID: 32413513

Takagi Hiroko, Masayoshi Sato, Kazuyuki Fujii, Isao Shibuya, Katsuya Inagaki (2020) Mo1094 OPS-2071 heals T cell mediated colitis, murine Crohn's disease model, with anti-inflammatory and anti-bacterial activity. Gastroenterology Volume 158, Issue 6, Supplement 1 May Page s-786

Taniguchi Y, Sakakibara SI, Fujihara M, Yagi A, Fujiyoshi S. (2020) <u>The association between detection of Mycobacterium avium subsp. paratuberculosis DNA in feces and histopathological classification.</u> J Vet Med Sci. May 15; 82(5):541-545. doi: 10.1292/jvms.18-0724. Epub 2020 Mar 11.PMID: 32161236 Free PMC article.

Tenailleau Quentin M., Caroline Lanier, Corinne Gower-Rousseau, Damien Cuny, Florent Occelli (2020) <u>Crohn's disease and environmental contamination: Current challenges and perspectives in exposure evaluation.</u> Environmental Pollution Volume 263, Part B August Article 114599

Varela-Castro L, Torrontegi O, Sevilla IA, Barral M. (2020) <u>Detection of Wood Mice (Apodemus sylvaticus) Carrying Non-Tuberculous Mycobacteria Able to Infect Cattle and Interfere with the Diagnosis of Bovine Tuberculosis.</u> Microorganisms. Mar 6; 8(3):374. doi: 10.3390/microorganisms8030374. PMID: 32155849 Free PMC article.

Velázquez-Morales JV, Santillán-Flores MA, Gallegos-Sánchez J, Cuca-García JM, Navarro-Maldonado MDC, Rojas-Martínez RI, Cortez-Romero C. (2019) <u>Detection of Mycobacterium avium subsp.</u> <u>paratuberculosis in reproductive tissue and semen of naturally infected rams.</u> Anim Reprod. Nov 18; 16(4):930-937. doi: 10.21451/1984-3143-AR2018-0147. PMID: 32368273 Free PMC article.

Verdugo Cristobal , Carla Cardemil, Pamela Steuer, Miguel Salgado (2020) <u>Bayesian latent class</u> <u>estimation of sensitivity and specificity parameters of the PMS-PCR test for the diagnosis of cattle sub-clinically infected with Mycobacterium avium subsp. paratuberculosis.</u> Preventive Veterinary MedicineIn press, journal pre-proof Available online 23 June 2020Article 105076

Villamil F. J., E. Yus, B. Benavides, J. Casal, F. J. Diéguez (2020) <u>Short communication: Risk factors associated with Mycobacterium avium ssp. paratuberculosis introduction into dairy herds in Galicia, northwestern Spain.</u> Journal of Dairy Science In press, corrected proof Available online 10 June

Wiszniewska-Łaszczych A, Liedtke KG, Szteyn JM, Lachowicz T. (2020) <u>The Effect of Mycobacterium avium subsp. Paratuberculosis Infection on the Productivity of Cows in Two Dairy Herds with a Low Seroprevalence of Paratuberculosis.</u> Animals (Basel). Mar 15;10(3):490. doi: 10.3390/ani10030490. PMID: 32183458 Free PMC article.