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JDIP News

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Visit our website at:
http://www.jdip.org

JDIP News is published periodically to enhance intramural communications and ensure that JDIP participants and stakeholders are updated on news of relevance to our community.

Please direct any contributions, suggestions and comments via email to: Steen Erikson at erik0046@umn.edu

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IN THIS ISSUE:

JDIP Year 3 Proposal Status

Many of you have called or emailed asking about the status of the JDIP Year 3 proposals. We are currently performing the final review of the proposals and should have the Executive Committee's recommendations delivered to the External Advisory Board by the time you read this. We hope to have their approvals of the EC's recommendations shortly, and we can then notify the submitters of their status.

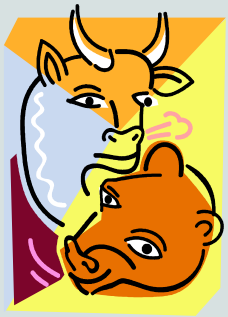
This has been a very challenging time for us as we work to recover from the tragic and untimely passing of Bob Schroeder. We all appreciate your patience as we try to regain some of our momentum and get this process back on track.

JDIP Grant Renewal Completed!

The renewal application for JDIP has been completed and submitted to the USDA! Many thanks go out to all of the members who worked countless hours preparing project summaries and future plans, participating in meetings to refine the application material, responding to requests for new and more information, and doing all of it with a sense of humor and complete support! Thank you all!

In addition to the renewal application, which weighed in at 324 pages total, we produced a CD with thousands of pages of supporting documentation. The CD is indexed so you can navigate your way through the documentation using Adobe Acrobat Reader. Some of the items that were included on the CD include numerous papers that were published in collaboration with JDIP, letters of support, some of the Core 5 web-based educational material, and a complete copy of the renewal application in PDF format.

If you'd like a copy of the CD, send a note to Steen Erikson (erik0046@umn.edu) and we'll send you one.



Happy Thanksgiving to all of our JDIP partners!
Have a safe and wonderful holiday.

Welcome New EAB Members!

A warm welcome and hearty thanks go out to our new External Advisory Board members. Their commitment and support is crucial to the operation of the JDIP organization.

Renewing/continuing members include: Larry Hutchinson (chair), Don Lein, David Kennedy, John Adams, Cynthia Wolf, Gerald Gerlach, Michael Carter, and Thomas Gomez.

From the Basic Sciences:

•Harley Moon. Professor Emeritus, Iowa State University, Ames, IA. Prof. Moon was the Frank Ramsey Chair in Pathology at the College of Veterinary Medicine at Iowa State University. He is a recognized worldwide as a leader in research on infectious diseases of livestock and has received numerous awards and honors for his work.

From Regulatory Agencies:

•Robert Ehlenfeldt. Department of Agriculture, Trade, and Consumer Protection, State of Wisconsin. Dr. Ehlenfeldt is the State Veterinarian and the Administrator of the office of Animal Health for the state of Wisconsin and US Animal Health Association's Johne's disease Committee Chair.

From Livestock and Industry Groups:

•Michael Payne. Program Director, California Dairy Quality Assurance Program. Dr. Payne is actively involved in Johne's disease educational efforts in California through his involvement in the California Johne's Disease Working Group and the Western Institute for Food Safety and Security.

•Greg Pruitt. Pfizer Animal Health. Associate Director, Global Regulatory Affairs and Market Support, Veterinary Medicine Research and Development, Pfizer Animal Health, Kalamazoo, MI.

From International Agencies:

•Douwe Bakker. Central Institute for Animal Disease Control, Lelystad, The Netherlands. Dr. Bakker is leader of the EU project on JD research, prevention and control that has recently (2006) been initiated and is organized in a similar fashion to JDIP.

The outstanding caliber and track-record of the above individuals, along with their documented willingness and commitment to continue to participate on the JDIP EAB and help develop the program through its formative years and beyond, are strong indicators that JDIP will stay true to its mission and capitalize on recent scientific advances while responding to emergent needs in the field of JD research, education, and extension.

Ken Olson to Support Educational Activities for JDIP

Kenneth E. Olson, Ph.D., PAS
Dairy Management, Inc.

JDIP is extremely pleased that Dr. Ken Olson will be participating in our Administrative Core to help facilitate communication with our external stakeholders. In this role, Ken will use his extensive industry contact to promote JDIP funded education programs with producers, veterinary practitioners, and other stakeholders. Ken will promote JDIPs technical and practical success in presentations to stakeholders and lay audiences, and through various print media in technical, educational, and industry trade journals. Additionally, he will act as liaison with these stakeholders to help JDIP continue to develop effective and practical programs that will address their greatest concerns about Johne's disease.

At the NIAA, Ken established and continues to lead the National Johne's Education Initiative that NIAA coordinates with a grant from USDA/APHIS/Veterinary Services. He has also established "Johne's Information Central", a website supporting the efforts of the National Johne's Education Initiative (www.johnesdisease.org).

Dr. Olson is past Chairman of the Board for the National Institute for Animal Agriculture (NIAA) and is an active member of several other boards. He is the principle in KEO Consulting working in the areas of dairy, animal health and animal welfare. He currently works with National DHIA coordinating special projects including implementation of the National Animal Identification System and conducting Quality Certification audits, the National Institute for Animal Agriculture coordinating a national Johne's Education Initiative and the Eradicate Scrapie initiative, Dairy Management, Inc. in the area of Animal Health Emergency Management communications and the Federation of Animal Science Societies (FASS) as an Education and Information Resource Consultant. Dr. Olson was a member of the faculty of the Animal Science Department at the University of Kentucky and later served as the national Dairy and Animal Health Specialist for the American Farm Bureau Federation. A native of Wisconsin, Dr. Olson received his B.S. from the University of Wisconsin – River Falls and his M.S. and Ph.D. degrees from the University of Wisconsin – Madison.

Contact Ken at kolson@animalagriculture.org
or by phone – office: (630) 237-4961, FAX: (630) 529-2874

The Texas A&M University, College of Veterinary Medicine and Biomedical Sciences will host JDIP's 3nd Annual Conference.

Register now for JDIP's

3nd Annual Conference
January 19–21, 2007
Texas A&M University
College Station, TX

The Conference will provide participants with an opportunity to learn about the current state of the program and ongoing research in Johne's Disease, as well as to network with other researchers.

The conference is open to JDIP members and non-members. There is no cost to participants for the conference sessions, continental breakfasts, lunches, or Saturday night dinner.

For details and to register, visit our web site at: http://www.jdip.org

JDIP 3rd Annual Conference Scheduled

The Texas A&M University College of Veterinary Medicine and Biomedical Sciences has graciously agreed to host our JDIP 3rd Annual Conference. We are actively engaged in the planning and organization of the conference and will keep the most current information on the jdip.org web site. You will also receive occasional emails with updates on the agenda, transportation options, and the results of the abstract review.

This year's organizing committee consists of Sangeeta Khare (Texas A&M University), Ian Gardner (University of California Davis), John Bannantine (USDA/NADC), Vivek Kapur (University of Minnesota), and Steen Erikson (University of Minnesota).

Submit Your Abstracts!

All JDIP members should have received the Call for Abstracts along with the 3rd Annual Conference announcement by email. If you are not on the email list and would like to be, please send a note to admin@jdip.org and you'll be added to the list.

Once again we will be able to provide students and postdocs with some competitive travel awards. There is a check box on the interactive pdf abstract submission form that you should check if you're interested in being considered for an award. Please note that you should also submit a brief biosketch along with your submission in order to be considered. All forms are available at www.jdip.org. Don't hesitate to contact admin@jdip.org if you have any questions, or you can call or email Steen Erikson at erik0046@umn.edu, (612) 624-6681.

Abstract Due Date:
5:00 p.m.
Friday, December 8, 2006

Notification will be provided to presenters and travel awardees on Tuesday, December 19, 2006.

JDIP Establishes International Expert Committee to Develop Standardized Animal Models

The JDIP sponsored Animal Model Standardization Committee (AMSC) met at the Orlando International Airport Hyatt Regency Hotel in Orlando, Florida on July 27-28, 2006 to review the Johne's disease (JD) infection model literature and develop international standardized guidelines for experimental JD challenge models. Sixteen international JD researchers, most which have previously published JD infection studies in various species of animals, attended the meeting.

During the course of the meeting experimental challenge model parameters were discussed for both long-term and acute challenge models and standard guidelines were formulated for cattle, goats, sheep, deer and mice. Later the committee findings were condensed into a manuscript entitled "Experimental Challenge Models for Johne's Disease: A Review and Proposed International Guidelines" that discusses the important components of an efficient infection model, reviews the historical literature, proposes model parameter guidelines for each species and provides a list of knowledge gaps that were identified during the committee's deliberations. This manuscript was submitted to Veterinary Microbiology for publication on October 30, 2006.

Participants (left to right): Vivek Kapur, Greg Pruitt (front), Ray Sweeney (back), Ad Koets, Adel Talaat (front- kneeling), Judy Stabel (standing - back), Murray Hines, Ramon Juste (front - kneeling), Douwe Bakker, Jim McNair, Bob Whitlock (back - standing), Bill Davis (front), , Geoff de Lisle, Frank Griffin, Geart Benedictus

AMSC Participants

Douwe Bakker

Geart Benedictus

William C. Davis

Geoffrey W. de Lisle

Ian A. Gardner

Frank Griffin

Murray E. Hines II (chair)

Ramon A. Juste

Vivek Kapur

Ad Koets

Jim McNair

Greg Pruitt

Judith R. Stabel

Raymond W. Sweeney

Adel M. Talaat

Robert H. Whitlock

Revisiting JDIP Fundamental Assumptions and Guiding Principles

Many new members have come on board since the JDIP consortium came together in the late summer of 2003.

Having just submitted our competing renewal application, it was instructive to be reminded of the core beliefs or raison d'etre of JDIP. These key assumptions have guided our strategic decisions from the program's inception, and remain as relevant today as when first proposed. The three fundamental assumptions to which all members of JDIP subscribe are:

- The success of JDIP depends on the creation and maintenance of functional and flexible research teams that are interdisciplinary, multi-institutional, and use cutting-edge technology.
- JDIP must help reduce timelines for translating basic science research in JD into useful products and procedures by bringing together teams of interdisciplinary scientists who are supported by enabling core facilities. And,
- JDIP must strive to provide real-world solutions based on scientific excellence to help prevent or mitigate the losses associated with JD.

Based on these key assumptions, we have also developed and refined a set of principles to help us achieve our strategic objectives and guide us in the implementation of the program. These six Guiding Principles are:

1. We will organize ourselves along a translational pathway for the development of diagnostics, vaccines, and management strategies for preventing and controlling JD.
2. We will make funding and programmatic decisions based on the quality of science in order to help achieve mutually agreed upon goals.
3. We will support core activities based on community needs, quality of science, and the availability of expertise in order to provide maximum support to scientific projects and access as a community resource.
4. We understand that we will not be able to ensure equal distribution of funds, nor will we be able to include all the excellent research in JD at each of the participating institutions.
5. We will institute a mechanism for the regular evaluation of scientific programs and cores and reallocate our resources based on documented progress and programmatic needs.
6. We will strive to promote programs in scientific and career development, education, and extension relating to JD in response to stakeholder needs.

These principles represent the "core values" or the "DNA" of JDIP, and help guide us in the development and implementation of the management plan. They form a framework for responding to change and the natural evolution of the program. Given our track record and the documented successes of the program thus far, it is clear that the basic assumptions and guiding principles of JDIP have served us well, and have placed us firmly on the path to long-term success. Hence, it is not surprising that the members of JDIP remain committed to working together to move the field rapidly forward in the quest for science-based solutions to JD. Overall, we strongly believe that the primary benefit of coming together as a consortium is to enable collaborative research and a sharing of intellectual and physical resources that are critical to reducing the unusually long timelines for JD basic science research leading to useful products and procedures.

JDIP Core and Project Leaders

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Project 4: MAP Immunology and Vaccine Development
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NRI Application Support – Free for JDIP Members

The Epidemiology & Biostatistics Core (through its core leaders, Yrjo Grohn at Cornell and Ian Gardner at UC-Davis, and their PhD students and post-docs in epidemiology) are providing advice to JDIP members who are submitting grant applications to the Animal Protection and Biosecurity programs of the NRI (deadline: November 29, 2006).

Consulting for grant proposal preparation is available for:

1) the design of laboratory experiments, observational studies, and randomized trials including sample size calculations; and,

2) selecting statistical methods for data analysis.

There is no charge for this service. The E&B Core will attempt to respond to all inquiries within 24 to 48 hours, but as the deadline approaches it is likely that the time might increase as the number of requests increases.

To utilize this service, please contact:

University of California, VM: Medicine and Epidemiology
One Shields Avenue, Davis, CA 95616, U.S.A.
www.vetmed.ucdavis.edu

Locksley Messam
Phone: (530) 752-3134 (M: 8:30am-3:30pm, T: 8:30am-5:00pm, W: 8:30am-1:00pm PST)
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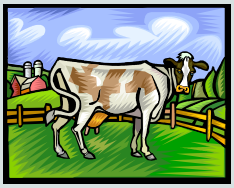

Core 2 Team Members:

Janet Payeur – USDA NVSL

Elizabeth Manning – University of Wisconsin

Srinand Sreevatsan - University of Minnesota

Robert Whitlock - University of Pennsylvania

JDIP JOHNE'S DISEASE INTEGRATED PROGRAM

UPDATE – JDIP REPOSITORY

The Core 2 repository for MAP isolates, plus fecal, milk and tissue samples has been making steady progress. Hundreds of characterized samples have been collected and are compiled into a web-accessible database: the "JDIP Sample Shop."

To make the JDIP Sample Shop user friendly and easy to navigate for JDIP participants, an automated registration system allows you to place an order for any samples you need using an on-line form. Samples can be selected by species, number of animals, quantity per animal, and infected/not infected status. Additional information on the samples, such as prior test results, is also available. You will be charged only the cost of sample shipment.

There are currently 281 individual MAP isolates from multiple species, sera from 409 individual animals from multiple species – including ELISA results, 204 sheep, goat and bovine fecal samples, and 385 goat and bovine milk samples in the repository. Tissues samples from 41 confirmed cases of Johne's disease in multiple species were recently added.

The JDIP Sample Shop has some other useful features, including an automatic confirmation email for each order placed and the automatic generation of a shipping form. Reporting will be generated to track usage, and an automatic "flag" will alert the Core team when inventory needs to be replenished.

And speaking of inventory, when your JDIP-supported research generates biological samples, please send on a few aliquots for the benefit of your colleagues. It's only through everyone's contributions that we can keep the repository current and well-stocked to support all of JDIP's endeavors.

Explore the JDIP Sample Shop at:
http://seeker.doit.wisc.edu/jdip

Upcoming meetings and conferences that may be of interest

- Conference of Research Workers in Animal Diseases
  Chicago, Illinois
  December 3 - 5, 2006
  http://www.cvmbs.colostate.edu/microbiology/crwad/index.htm

- JDIP 3rd Annual Conference
  The Texas A&M University
  College of Veterinary Medicine and Biomedical Sciences
  College Station, Texas
  January 19 – 21, 2007
  http://www.jdip.org

- 9th Annual ICP Meeting, International Association for Paratuberculosis
  Tsukuba International Congress Center, Tsukuba, Japan
  Monday October 29 - Friday November 2, 2007
  http://wwwsoc.nii.ac.jp/jsp3/9ICP/

- USAHA/AAVLD 111th annual meeting
  John Ascuaga's Nugget Casino Resort in Reno, Nevada
  October 18 - 24, 2007
  http://www.usaha.org/meetings/

JD ON THE WEB

Johne's Disease-related Websites

Organization	URL
American Association of Bovine Practitioners	http://www.aabp.org
American Dairy Science Association	http://www.adsa.org
American Society for Microbiology	http://asm.org/
American Veterinary Medical Association	http://avma.org
Conference of Research Workers in Animal Diseases	http://www.cvmbs.colostate.edu/microbiology/crwad/index.htm
Infectious Diseases Society of America	http://www.idsociety.org
International Association for Paratuberculosis	http://paratuberculosis.org/
JDIP: Johne's Disease Integrated Program	http://www.jdip.org
JDIP Sample Shop	http://seeker.doit.wisc.edu/jdip/Default.aspx
National Johne's Education Initiative	http://johnesdisease.org/
National Veterinary Services Laboratory	Approved labs for fecal culture: http://www.aphis.usda.gov/vs/nvsl/labcertification/johnesculture.htm Approved labs for serology: http://www.aphis.usda.gov/vs/nvsl/labcertification/johnesserology.htm
United States Animal Health Association	http://www.usaha.org
University of Wisconsin Johne's Information Center	http://www.johnes.org
USDA Johne's disease website	http://www.aphis.usda.gov/vs/nahps/johnes/
USDA-APHIS-VS–National Center for Animal Health Surveillance	http://www.aphis.usda.gov/vs/ceah/ncahs/index.htm

JD IN PRINT

Johne's Disease-related Publications – August, 2006 - October, 2006

- **Bach H, Sun J, Hmama Z, Av-Gay Y.** Mycobacterium avium ssp paratuberculosis PtpA is an endogenous tyrosine phosphatase secreted during infection. Infect Immun. 2006 Sep 18

- **Bannantine, J. P., and M. L. Paustian.** 2006. Identification of diagnostic proteins in Mycobacterium avium subspecies paratuberculosis by a whole genome analysis approach. Methods Mol Biol 345:185-96.

- **Behr MA, Schurr E.** Mycobacteria in Crohn's disease: a persistent hypothesis. Inflamm Bowel Dis. 2006 Oct;12(10):1000-4.

- **Benedictus, A., R. H. Whitlock, J. M. Widmann, R. Sweeney, T. Fyock, M. Linde, R. M. Mitchell, and Y. H. Schukken.** 2006. Calculation of transmission parameters of Mycobacterium avium subspecies paratuberculosis infections in a dairy herd going through a control program. Pre Vet Med (in press).

- **Berger S, Hinz D, Bannantine JP, Griffin JF.** Isolation of high-affinity single-chain antibodies against Mycobacterium avium subsp. paratuberculosis surface proteins from sheep with Johne's disease. Clin Vaccine Immunol. 2006 Sep;13(9):1022-9.

- **Berger ST, Griffin FT.** A comparison of ovine monocyte-derived macrophage function following infection with Mycobacterium avium ssp. avium and Mycobacterium avium ssp. paratuberculosis. Immunol Cell Biol. 2006 Aug;84(4):349-56. Epub 2006 Feb 23.

- **Berger, S., D. Hinz, J. P. Bannantine, and J. F. Griffin.** Sept. 2006. Isolation of high-affinity single-chain antibodies against Mycobacterium avium subsp. paratuberculosis surface proteins from sheep with Johne's disease. Clin Vaccine Immunol 13:1022-9.

- **Borody TJ, Heifets LB.** Severe recurrent Crohn's disease of ileocolonic anastomosis and antimicrobial (anti-mycobacterial) therapy. Gut. 2006 Aug;55(8):1211. No abstract available.

- **Cho D, Collins MT.** Comparison of the proteosomes and antigenicities of secreted and cellular proteins produced by Mycobacterium paratuberculosis. Clin Vaccine Immunol. 2006 Oct;13(10):1155-61.

- **Choi, Y. K., W. O. Johnson, M. T. Collins, and I. A. Gardner.** 2006. Bayesian inferences for receiver operating characteristic curves in the absence of a gold standard. Journal of Agricultural Biological and Environmental Statistics 11:210-229.

- **de Juan L, Alvarez J, Romero B, Bezos J, Castellanos E, Aranaz A, Mateos A, Dominguez L.** Comparison of four different culture media for isolation and growth of type II and type I/III Mycobacterium avium subsp. paratuberculosis strains isolated from cattle and goats. Appl Environ Microbiol. 2006 Sep;72(9):5927-32.

- **de Lisle GW, Cannon MC, Yates GF, Collins DM.** Use of a polymerase chain reaction to subtype Mycobacterium avium subspecies paratuberculosis, an increasingly important pathogen from farmed deer in New Zealand. N Z Vet J. 2006 Aug;54(4):195-7.

- **Eamens GJ, Turner MJ, Whittington RJ.** Sampling and repeatability of radiometric faecal culture in bovine Johne's disease. Vet Microbiol. 2006 Aug 26

- **Eda S, Bannantine JP, Waters WR, Mori Y, Whitlock RH, Scott MC, Speer CA.** A highly sensitive and subspecies-specific surface antigen enzyme- linked immunosorbent assay for diagnosis of Johne's disease. Clin Vaccine Immunol. 2006 Aug;13(8):837-44.

- **Godden S, McMartin S, Feirtag J, Stabel J, Bey R, Goyal S, Metzger L, Fetrow J, Wells S, Chester-Jones H.** Heat-treatment of bovine colostrum. II: effects of heating duration on pathogen viability and immunoglobulin G. J Dairy Sci. 2006 Sep;89(9):3476-83.

- **Gumber S, Taylor DL, Whittington RJ.** Protein extraction from Mycobacterium avium subsp. paratuberculosis: Comparison of methods for analysis by sodium dodecyl sulphate polyacrylamide gel electrophoresis, native PAGE and surface enhanced laser desorption/ionization time of flight mass spectrometry. J Microbiol Methods. 2006 Aug 15

- **Gumber S, Whittington RJ.** Comparison of BACTEC 460 and MGIT 960 systems for the culture of Mycobacterium avium subsp. paratuberculosis S strain and observations on the effect of inclusion of ampicillin in culture media to reduce contamination. Vet Microbiol. 2006 Aug 14

- **Harris NB, Payeur JB, Kapur V, Sreevatsan S.** Short-sequence-repeat analysis of Mycobacterium avium subsp. paratuberculosis and Mycobacterium avium subsp. avium isolates collected from animals throughout the United States reveals both stability of loci and extensive diversity. J Clin Microbiol. 2006 Aug;44(8):2970-3.

- **Hendrick SH, Duffield TF, Leslie KE, Lissemore KD, Archambault M, Bagg R, Dick P, Kelton DF.** Monensin might protect Ontario, Canada dairy cows from paratuberculosis milk-ELISA positivity. Prev Vet Med. 2006 Oct 17;76(3-4):237-48. Epub 2006 Jun 19.

- **Hendrick SH, Kelton DF, Leslie KE, Lissemore KD, Archambault M, Bagg R, Dick P, Duffield TF.** Efficacy of monensin sodium for the reduction of fecal shedding of Mycobacterium avium subsp. paratuberculosis in infected dairy cattle. Prev Vet Med. 2006 Aug 17;75(3-4):206-20. Epub 2006 May 2.

- **Herthnek D, Bolske G.** New PCR systems to confirm real-time PCR detection of Mycobacterium avium subsp. paratuberculosis. BMC Microbiol. 2006 Oct 4;6:87.

- **Hines, M. E., S. Stiver, D. Giri, L. Whittington, C. Watson, J. Johnson, J. Musgrove, M. Pence, D. Hurley, C. Baldwin, I. A. Gardner, and S. Aly.** 2006. Efficacy of spheroplastic and cell wall competent vaccines for Mycobacterium avium subsp. paratuberculosis in experimentally-challenged baby goats. Veterinary Microbiology (accepted).

- **Hostetter J, Zhang W, Simutis F.** Mycobacterium avium subspecies paratuberculosis infection of cattle does not diminish peripheral blood-derived macrophage mycobactericidal activity. Immunol Lett. 2006 Sep 15;107(1):76-9. Epub 2006 Jul 7.

- **Jeyanathan M, Alexander DC, Turenne CY, Girard C, Behr MA.** Evaluation of in situ methods used to detect Mycobacterium avium subsp. paratuberculosis in samples from patients with Crohn's disease. J Clin Microbiol. 2006 Aug;44(8):2942-50.

- **Kemp R, Caldow G, Strain S.** Herd prevalence of Johne's disease. Vet Rec. 2006 Oct 21;159(17):572. No abstract available.

- **Keun, S. S., S. U. Lee, Y. H. Park, W. C. Davis, L. K. Fox, and G. A. Bohach.** 2006. Long-term enterotoxin exposure induces soluble factor mediated immunosuppression by bovine CD4 and CD8 T cells. Infection and Immunity (accepted for publication)

- **Kostoulas P, Leontides L, Billinis C, Florou M.** Application of a semi-dependent latent model in the Bayesian estimation of the sensitivity and specificity of two faecal culture methods for diagnosis of paratuberculosis in sub-clinically infected Greek dairy sheep and goats. Prev Vet Med. 2006 Sep 15;76(1-2):121-34. Epub 2006 Jun 23.

- **Kostoulas P, Leontides L, Enoe C, Billinis C, Florou M, Sofia M.** Bayesian estimation of sensitivity and specificity of serum ELISA and faecal culture for diagnosis of paratuberculosis in Greek dairy sheep and goats. Prev Vet Med. 2006 Sep 15;76(1-2):56-73. Epub 2006 Jun 27.

- **Kovich DA, Wells SJ, Friendshuh K.** Evaluation of the Voluntary Johne's Disease Herd Status Program as a source of replacement cattle. J Dairy Sci. 2006 Sep;89(9):3466-70.

- **Kruze J, Salgado M, Paredes E, Mella A, Collins MT.** Goat paratuberculosis in Chile: first isolation and confirmation of Mycobacterium avium subspecies paratuberculosis infection in a dairy goat. J Vet Diagn Invest. 2006 Sep;18(5):476-9.

- **Lombard JE, Byrem TM, Wagner BA, McCluskey BJ.** Comparison of milk and serum enzyme-linked immunosorbent assays for diagnosis of Mycobacterium avium subspecies paratuberculosis infection in dairy cattle. J Vet Diagn Invest. 2006 Sep;18(5):448-58.

- **Losinger WC.** Welfare effects of reduced milk production associated with Johne's disease on Johne's-positive versus Johne's-negative dairy operations. J Dairy Res. 2006 Aug;73(3):378-84. Epub 2006 Jul 7.

- **Marsh IB, Whittington RJ.** Genomic diversity in Mycobacterium avium: Single nucleotide polymorphisms between the S and C strains of M. avium subsp. paratuberculosis and with M. a. avium. Mol Cell Probes. 2006 Aug 30; [Epub ahead of print]

- **Metzger-Boddien C, Khaschabi D, Schonbauer M, Boddien S, Schlederer T, Kehle J.** Automated high-throughput immunomagnetic separation-PCR for detection of Mycobacterium avium subsp. paratuberculosis in bovine milk. Int J Food Microbiol. 2006 Aug 1;110(3):201-8. Epub 2006 Jul 11.

- **Mitchell, R. M., R. H. Whitlock, S. M. Stehman, A. Benedictus, P. Chapagain, Y. H. Grohn, and Y. T. Schukken.** 2006. Mathematical modeling of Mycobacterium avium subsp. paratuberculosis (MAP) on commercial US dairy farms. Pre Vet Med (in press).

- **Morris CA, Hickey SM, Henderson HV.** The effect of Johne's disease on production traits in Romney, Merino and Merino x Romney-cross ewes. N Z Vet J. 2006 Oct;54(5):204-9.

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