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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](mailto:erik0046@umn.edu)



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### 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.

**Executive Committee**

John Bannantine,  
USDA/NADC

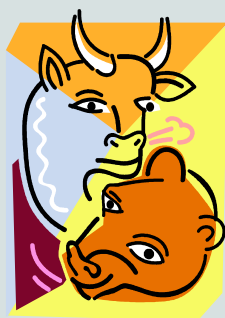
Ian Gardner, University  
of California, Davis

Yrjo Grohn, Cornell  
University

Peter Johnson,  
USDA/CSREES

Vivek Kapur (PI),  
University of Minnesota

Scott Wells, University  
of Minnesota



## 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](mailto:erik0046@umn.edu)) and we'll send you one.



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

**JDIP External Advisory Board**

John Adams  
(NATIONAL MILK PRODUCERS  
FEDERATION)

Douwe Bakker  
(CENTRAL INSTITUTE FOR  
ANIMAL DISEASE CONTROL,  
THE NETHERLANDS)

Michael A. Carter  
(USDA-APHIS-VS)

Robert Ehlenfeldt  
(DIVISION OF ANIMAL  
HEALTH, AGRICULTURE,  
TRADE AND CONSUMER  
PROTECTION, WISCONSIN)

Gerald F. Gerlach  
(HANOVER VETERINARY  
SCHOOL, GERMANY)

Thomas Gomez  
(USDA-APHIS-VS)

Lawrence Hutchinson, Chair  
(PENNSYLVANIA STATE  
UNIVERSITY)

David J. Kennedy  
(AUSVET ANIMAL HEALTH  
SERVICES PTY LTD, AUSTRALIA)

Donald Lein  
(CORNELL, EMERITUS)

Harley H. Moon  
(IOWA STATE UNIVERSITY)

Michael Payne  
(UNIVERSITY OF CALIFORNIA,  
CA DAIRY QUALITY  
ASSURANCE PROGRAM)

Greg Pruitt  
(PFIZER ANIMAL HEALTH)

Cynthia Wolf  
(AMERICAN SHEEP INDUSTRY  
ASSOCIATION)



## 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.

**JDIP Scientific Advisory Board**

John Bannantine  
(USDA-ARS-NADC)

Luiz Bermudez  
(OREGON STATE U)

Bill Davis  
(WASH. STATE U)

Ian Gardner  
(UC DAVIS)

Yrjo Grohn  
(CORNELL)

Murray Hines II  
(U. GEORGIA)

Vivek Kapur  
(U. MINNESOTA)

Jeannette McDonald  
(U WISC MADISON)

Michael Paustian  
(USDA-ARS-NADC)

Janet Payeur  
(USDA-APHIS)

Ynte Schukken  
(CORNELL U)

Srinand Sreevatsan  
(U. MINNESOTA)

Scott Wells  
(U. MINNESOTA)



## Ken Olson to Support Educational Activities for JDIP

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.



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

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](http://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](mailto: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 3<sup>rd</sup> Annual Conference.



Register now for JDIP's

**3<sup>rd</sup> 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 3<sup>rd</sup> Annual Conference Scheduled

The Texas A&M University College of Veterinary Medicine and Biomedical Sciences has graciously agreed to host our JDIP 3<sup>rd</sup> 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](http://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 3<sup>rd</sup> 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](mailto: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](http://www.jdip.org). Don't hesitate to contact [admin@jdip.org](mailto:admin@jdip.org) if you have any questions, or you can call or email Steen Erikson at [erik0046@umn.edu](mailto: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.



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

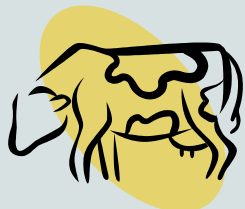
Greg Pruitt

Judith R. Stabel

Raymond W. Sweeney

Adel M. Talaat

Robert H. Whitlock



## 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



## 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'être* 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:

- o 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.
- o 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,
- o 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.

**Core 1: Epidemiology & Biostatistics**

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Yrjo Grohn (co-leader)  
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[ytg1@cornell.edu](mailto:ytg1@cornell.edu)

**Core 2: Diagnostics & Strain Differentiation**

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**Core 3: Genomics, Antibodies & Proteomics**

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[mpaustia@nadc.ars.usda.gov](mailto:mpaustia@nadc.ars.usda.gov)

**Core 4: Animal Models & Facilities**

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[mhinesii@uga.edu](mailto:mhinesii@uga.edu)

**Core 5 / Project 5: Extension & Communications**

Jeannette McDonald (co-leader)  
608-263-5170  
[mcdonal7@wisc.edu](mailto:mcdonal7@wisc.edu)  
Ernest Hovingh (co-leader)  
814-863-2160  
[eph1@psu.edu](mailto:eph1@psu.edu)

**Core 6: Administration**

Vivek Kapur  
612-625-7712  
[vkapur@umn.edu](mailto:vkapur@umn.edu)

**Project 1: Epidemiology and Transmission**

Ynte Schukken  
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[Yhs2@cornell.edu](mailto:Yhs2@cornell.edu)

**Project 2: Diagnostics and Strain Differentiation**

Srinand Sreevatsan  
612-625-3769  
[Sreev001@umn.edu](mailto:Sreev001@umn.edu)

**Project 3: MAP Biology and Pathogenesis**

Luiz Bermudez  
541-737-6538  
[luiz.bermudez@oregonstate.edu](mailto:luiz.bermudez@oregonstate.edu)

**Project 4: MAP Immunology and Vaccine Development**

William Davis  
509-335-6051  
[davisw@vetmed.wsu.edu](mailto:davisw@vetmed.wsu.edu)

## 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](http://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)

E-mail: [lmessam@ucdavis.edu](mailto:lmessam@ucdavis.edu)

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Phone: 607-253-4086

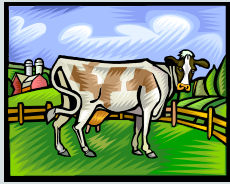
E-Mail: [cw245@cornell.edu](mailto:cw245@cornell.edu)

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## 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."

### Core 2 Team Members:

Janet Payeur – USDA  
NVSL

Elizabeth Manning –  
University of Wisconsin

Srinand Sreevatsan -  
University of Minnesota

Robert Whitlock -  
University of  
Pennsylvania

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.cvmb.colostate.edu/microbiology/crwad/index.htm>
- JDIP 3<sup>rd</sup> 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>
- 9<sup>th</sup> Annual ICP Meeting, International Association for Paratuberculosis  
Tsukuba International Congress Center, Tsukuba, Japan  
Monday October 29 - Friday November 2, 2007  
<http://www.soc.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	<a href="http://www.aabp.org">http://www.aabp.org</a>
American Dairy Science Association	<a href="http://www.adsa.org">http://www.adsa.org</a>
American Society for Microbiology	<a href="http://asm.org/">http://asm.org/</a>
American Veterinary Medical Association	<a href="http://avma.org">http://avma.org</a>
Conference of Research Workers in Animal Diseases	<a href="http://www.cvmb.colostate.edu/microbiology/crwad/index.htm">http://www.cvmb.colostate.edu/microbiology/crwad/index.htm</a>
Infectious Diseases Society of America	<a href="http://www.idsociety.org">http://www.idsociety.org</a>
International Association for Paratuberculosis	<a href="http://paratuberculosis.org/">http://paratuberculosis.org/</a>
JDIP: Johne's Disease Integrated Program	<a href="http://www.jdip.org">http://www.jdip.org</a>
JDIP Sample Shop	<a href="http://seeker.doit.wisc.edu/jdip/Default.aspx">http://seeker.doit.wisc.edu/jdip/Default.aspx</a>
National Johne's Education Initiative	<a href="http://johnesdisease.org/">http://johnesdisease.org/</a>
National Veterinary Services Laboratory	<p>Approved labs for fecal culture:  <a href="http://www.aphis.usda.gov/vs/nvsl/labcertification/johnesculture.htm">http://www.aphis.usda.gov/vs/nvsl/labcertification/johnesculture.htm</a></p> <p>Approved labs for serology:  <a href="http://www.aphis.usda.gov/vs/nvsl/labcertification/johnesserology.htm">http://www.aphis.usda.gov/vs/nvsl/labcertification/johnesserology.htm</a></p>
United States Animal Health Association	<a href="http://www.usaha.org">http://www.usaha.org</a>
University of Wisconsin Johne's Information Center	<a href="http://www.johnes.org">http://www.johnes.org</a>
USDA Johne's disease website	<a href="http://www.aphis.usda.gov/vs/nahps/johnes/">http://www.aphis.usda.gov/vs/nahps/johnes/</a>
USDA-APHIS-VS–National Center for Animal Health Surveillance	<a href="http://www.aphis.usda.gov/vs/ceah/ncahs/index.htm">http://www.aphis.usda.gov/vs/ceah/ncahs/index.htm</a>

## 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.

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