

NE-1048 ANNUAL REPORT WORKSHEET (FY14)

Complete the form and email as an attachment to:

Pedram Rezamand at rezamand@uidaho.edu

Year: 10/01/2014 to 09/30/2015 Station: University of Connecticut

E-mail address of submitter of this form: Sheila.andrew@uconn.edu

Technical Members for this station (please submit 1 member name per line):

Sheila M. Andrew

Contributors:

John Riesen _____

Kirkland Kerr _____

For each of the sections below, **limit the response to 2-3 sentences (~100 words max)**. A concerted effort to be brief will assure that the most pertinent accomplishments will be included in the annual report. If a study was done in collaboration with another station, indicate the station abbreviation in parentheses after the sentence describing the study. For information on these objectives see :

<http://nimss.umd.edu/homepages/home.cfm?trackID=13717>

OBJECTIVE 1: Characterization of host mechanisms associated with mastitis susceptibility and resistance.

OBJECTIVE 2: Characterization and manipulation of virulence factors of mastitis pathogens for enhancing host defense.

A study has been initiated to determine the differences in gene expression of pro- and anti-apoptotic genes between lactating cows with and without a subclinical intramammary infection due to *Staphylococcus aureus*. A better understanding of milk neutrophil gene expression variation between healthy and *S. aureus* mastitis-affected dairy cattle will aid in targeting genes that result in delayed apoptosis and increased inflammation due to an intramammary infection with *S. aureus*.

OBJECTIVE 3: Assessment and application of new technologies that advance mastitis control, milk quality and dairy food safety.

Ultrasonography for detection of mastitis was evaluated in the bovine mammary gland. Histological and microbiological examination of 31 mammary parenchyma sections identified by as infected with *Staphylococcus aureus* or uninfected by ultrasonography. Histology and ultrasound outcomes were in agreement for a negative result and positive result 83% and 100%, respectively. Tissue culture and ultrasound outcomes were in agreement for a negative result and positive result 66.7% and 89.5%, respectively. These results suggest that ultrasonography has the potential to be used to detect tissue necrosis and infection status of the bovine mammary gland.

WORK PLANNED FOR THE COMING YEAR, LISTED BY OBJECTIVE:

PUBLICATION LIST: use as much space as necessary to complete the publication list below.

Peer-Reviewed Literature

Author Reply

Wichman, F., N. Udikovlk, S. Andrew, J. Handelsman. Reply to “The Natural Environment May Be the Most Important Source of Antibiotic Resistant Genes”. *Mbio* 5:01421-14.

Abstracts

Conference Proceedings

Poster Presentations

Alexander, E., J. Riesen, and S. Andrew. 2014.

Notestine, J., S.M. Andrew, and K. Kerr. 2015. Validation of Ultrasound Imaging for Detection of Mastitis in Dairy Cattle. University of Connecticut Frontiers in Undergraduate Research. April 9-10, 2015.

Undergraduate student Honor's Thesis

Notestine, J. 2015. Validation of Ultrasound Imaging for Detection of Mastitis in Dairy Cattle. University of Connecticut Undergraduate Honor's Thesis.

NE-1048 ANNUAL REPORT WORKSHEET (FY14)

Complete the form and email as an attachment to:

Pedram Rezamand at rezamand@uidaho.edu

Year: 10/01/2013 to 09/30/2014 Station: University of Georgia

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Technical Members for this station (please submit 1 member name per line):

Stephen C. Nickerson

Contributors:

F. M. Kautz _____ D. J. Hurley _____

L. O. Ely _____ _____

For each of the sections below, **limit the response to 2-3 sentences (~100 words max)**. A concerted effort to be brief will assure that the most pertinent accomplishments will be included in the annual report. If a study was done in collaboration with another station, indicate the station abbreviation in parentheses after the sentence describing the study. For information on these objectives see:

<http://nimss.umd.edu/homepages/home.cfm?trackID=13717>

OBJECTIVE 1: Characterization of host mechanisms associated with mastitis susceptibility and resistance. Dietary supplementation of OmniGen[®] for 60 days prepartum to dairy heifers promoted L-selectin expression on blood leukocytes, increased in vitro phagocytic ability of blood neutrophils and monocytes against *S. aureus* and *E. coli*, and stabilized reactive oxygen species (ROS) production by blood neutrophils compared with leukocytes from unsupplemented control heifers.

OBJECTIVE 2: Characterization and manipulation of virulence factors of mastitis pathogens for enhancing host defense. Assessment of >150 non-hemolytic staphylococcal isolates from heifers and cows from 3 herds, presumptively identified as coagulase-negative staphylococci (CNS) on blood agar demonstrated that 38% of isolates were actually *S. aureus* based on coagulase production, fermentation of mannitol, and the API staph test system, suggesting that a significant proportion of *S. aureus* are diagnosed as CNS, and additional testing be performed to correctly identify such isolates.

OBJECTIVE 3: Assessment and application of new technologies that advance mastitis control, milk quality and dairy food safety. Use of a bovine staphylococcal vaccine in dairy goats reduced the new

infection rate, increased spontaneous cures, and lowered herd SCC in a commercial dairy operation. Incorporation of Immunoboost® into a Lysigin® vaccine protocol for dairy heifers improved antistaphylococcal antibody titers up to 4 fold compared to Lysigin® alone.

WORK PLANNED FOR THE COMING YEAR, LISTED BY OBJECTIVE:

OBJECTIVE 1: Characterization of host mechanisms associated with mastitis susceptibility and resistance. Supplement the diets of dairy cows with OmniGen® for 60 days prior to drying off to determine if this practice will promote L-selectin expression on blood leukocytes, increase phagocytic ability of blood neutrophils and monocytes against *S. aureus* and *E. coli*, and stabilize reactive oxygen species (ROS) production by blood neutrophils in attempts to reduce new intramammary infections during the dry period.

OBJECTIVE 2: Characterization and manipulation of virulence factors of mastitis pathogens for enhancing host defense. Continue to assess all non-hemolytic staphylococcal isolates from heifers and cows that are presumptively identified as coagulase-negative staphylococci (CNS) to determine which isolates are actually *S. aureus* based on coagulase production, fermentation of mannitol, and the API staph test system, to demonstrate that a significant proportion of *S. aureus* are misdiagnosed as CNS.

OBJECTIVE 3: Assessment and application of new technologies that advance mastitis control, milk quality and dairy food safety. Test the combination of using 1) a bovine staphylococcal vaccine and 2) dietary supplementation with OmniGen® in dairy goats to reduce the prevalence of mastitis and SCC in a commercial dairy operation.

PUBLICATION LIST: use as much space as necessary to complete the publication list below.

Peer-Reviewed Literature

1. Kautz, F.M., S. C. Nickerson, and L. O. Ely. 2014. Use of a staphylococcal vaccine to reduce prevalence of mastitis and lower somatic cell counts in a registered Saanen dairy goat herd. *Research in Veterinary Science*. 97: 18-19.
2. Nace, E.L., S.C. Nickerson F.M. Kautz, S. Breidling, D. Wochele, L.O. Ely, and D.J. Hurley. 2014. Modulation of innate immune function and phenotype in bred dairy heifers during the periparturient period induced by feeding an immunostimulant for 60 days prior to delivery. *Veterinary Immunology and Immunopathology* 161:240-250.
3. Nickerson, S.C. and S.P. Oliver. 2014. How well have US dairy producers adopted mastitis control technologies for reducing herd somatic cell counts and improving milk quality? *The Professional Animal Scientist*. 30: 115-124.
4. Nickerson, S.C. 2014. Management strategies to reduce heat stress, prevent mastitis, and improve milk quality in dairy cows and heifers. UGA Cooperative Extension Bulletin No. 1426.
<http://extension.uga.edu/publications/detail.cfm?number=B1426>
5. Nickerson, S.C. and S.P. Oliver. 2014. Adoption of mastitis control technologies in the southeast to reduce mastitis and improve milk quality. UGA Cooperative Extension Bulletin No. 1433.
<http://extension.uga.edu/publications/detail.cfm?number=B1433>

6. Akers, R.M., A.V. Capuco, and S. C. Nickerson. 2014. Invited Review. Bovine Mammary Anatomy and Function. In *Ecology, Evolution and Behaviour of Wild Cattle: Implications for Conservation*". M. Melletti and J. Burton, eds. Chapter 5, pp. 51-56. Cambridge University Press. Cambridge, England.

Abstracts

1. Nace*, E.L., S.C. Nickerson, F. M. Kautz, S. Breidling, D. Wochele, L.O. Ely, and D.J. Hurley. 2014. Modulation of innate immune function and phenotype in bred dairy heifers during the periparturient period induced by feeding an immunostimulant 60 days prior to delivery. *J. Dairy Sci.* Abstract no. 92. Kansas City, MO. Page 46 in: *Journal of Animal Science*. Vol. 92, E-Supplement 2/*Journal of Dairy Science*. Vol. 97, E-Supplement 1.

2. Pighetti, G. M., C. S. Petersson-Wolfe, J. M. Bewley, S. C. Nickerson, S. Hill Ward, A. DeVries, P. D. Krawczel, R. A. Almeida, J. M. Fly, S. M. Schexnayder, L. E. Garkovich, L. M. Arnold, and S. P. Oliver. 2014. The status of milk quality at the start of the southeast quality milk initiative. *J. Dairy Sci.* Abstract no. 1041. Kansas City, MO. Page 519 in: *Journal of Animal Science*. Vol. 92, E-Supplement 2/*Journal of Dairy Science*. Vol. 97, E-Supplement 1.

3. Schexnayder, S. M. , P. D. Krawczel, L. E. Garkovich, J. M. Fly, C. S. Petersson-Wolfe, J. M. Bewley, S. Hill-Ward, G. M. Pighetti, R. A. Almeida, L. M. Arnold, S. C. Nickerson, A. DeVries, and S. P. Oliver. 2014. Initial assessment of producers' experiences, perceptions and attitudes about mastitis and bulk tank somatic cell count management in the Southeast. *J. Dairy Sci.* Abstract no. 1040. Kansas City, MO. Page 518 in: *Journal of Animal Science*. Vol. 92, E-Supplement 2/*Journal of Dairy Science*. Vol. 97, E-Supplement 1. Abstracts

Conference Proceedings

1. Nickerson, S.C. 2013. Invited Review. Managing mastitis in dairy heifers to improve overall herd health. Penn State Extension Dairy Cattle Nutrition Workshop. Pages 7-14. Grantville, PA.

2. Nickerson, S.C., E.L. Nace, D.J. Hurley, L.O. Ely, F.M. Kautz, J.D. Chapman, and K.P. Zanzalari. 2014. Innate immunity and periparturient well-being of late gestation Holstein heifers fed Omnigen-AF® for 60 days prepartum. PrinceAgri White Paper OG050814. Quincy, IL. 6 pages.

Poster Presentations

1. Pighetti, G. M., S. P. Oliver, R. A. Almeida, P. D. Krawczel, J. M. Fly, S. M. Schexnayder, C. S. Petersson-Wolfe, J. M. Bewley, L. E. Garkovich, D. M. Amaral-Phillips, L. M. Arnold, S. C. Nickerson, S. Hill-Ward, and A. DeVries. 2014. Southeast Quality Milk Initiative: Milk Quality in the Southeast USA. 2014. National Mastitis Council Annual Meeting Proceedings, pp. 209-210.

2. Schexnayder, S.M., L.E. Garkovich, J. M. Fly, P. D. Krawczel, C. S. Petersson-Wolfe, J. M. Bewley, S. Hill-Ward, G.M. Pighetti, R.A. Almeida, L. M. Arnold, D.M. Amaral-Phillips, S.C. Nickerson, A. DeVries, and S.P. Oliver. 2014. Southeast Quality Milk Initiative: Implementing Science-Based Recommendations to Control Mastitis & Improve Milk Quality in the Southeast Region of the United States of America. *M2-Magazine on Mastitis and Milk Quality for the Dairy Professional*. February 2014, Vol. 4, Issue 8, pp. 9-15.

3. Schexnayder, S.M., L.E. Garkovich, J. M. Fly, P. D. Krawczel, C. S. Petersson-Wolfe, J. M. Bewley, S. Hill-Ward, G.M. Pighetti, R.A. Almeida, L. M. Arnold, D.M. Amaral-Phillips, S.C. Nickerson, A. DeVries, and S.P. Oliver. 2014. Southeast quality milk initiative: Producers' experiences, perceptions, and attitudes about mastitis and bulk tank SCC management. In National Mastitis Council 53rd Annual Meeting Proceedings, p. 169-170. Verona, WI, USA.

NE-1048 ANNUAL REPORT WORKSHEET (FY16)

Complete the form and email as an attachment to:

Jeffery Bewley at jeffery.bewley@uky.edu

Year: 10/01/2015 to 09/30/2016 Station: Maryland

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Technical Members for this station (please submit 1 member name per line):

Kasey Moyes

Contributors:

For each of the sections below, **limit the response to 2-3 sentences (~100 words max)**. A concerted effort to be brief will assure that the most pertinent accomplishments will be included in the annual report. If a study was done in collaboration with another station, indicate the station abbreviation in parentheses after the sentence describing the study. For information on these objectives see :

<http://nimss.umd.edu/homepages/home.cfm?trackID=13717>

OBJECTIVE 1: Characterization of host mechanisms associated with mastitis susceptibility and resistance.

Maryland continues to study the effect of nutrient supply, i.e. glucose and amino acids, on immune response during mastitis in the liver and circulating neutrophils. Results have been published in the Journal of Dairy Science and results have been submitted to PLOS ONE

regarding the cross-talk between tissues during mastitis and revealed new mechanistic links between the liver and mammary gland during mastitis at the transcriptomic level. Maryland continues to collaborate with scientists at the USDA, Beltsville, to identify the distribution of vitamin E isoforms in various tissues as well as blood and milk and their use as antioxidants. Preliminary results have been presented at national and international meetings.

OBJECTIVE 2: Characterization and manipulation of virulence factors of mastitis pathogens for enhancing host defense.

OBJECTIVE 3: Assessment and application of new technologies that advance mastitis control, milk quality and dairy food safety.

Maryland continues to study alternative therapies for bovine mastitis via the use of PlyC endolysin and citrus derived oils. Results have been presented at national and international meetings and manuscripts are currently being prepared for submission to journals of high-impact factor for consideration for publication. Proposals have been submitted to the NIH Dual Purposed with Dual Benefit (\$1,753,152) and the Organic Agriculture Research and Extension Initiative (\$485,106) programs for procurement of funding to identify alternative therapies for mastitis. Maryland continues to collect data from dairy farms regarding their transition from conventional to robotic/automatic milking systems and how this may impact mastitis.

PUBLICATION LIST: use as much space as necessary to complete the publication list below.

Peer-Reviewed Literature

Maryland:

K.L. Ingvarsten and **K.M. Moyes**. 2015. Factors contributing to immunosuppression in the dairy cow during the periparturient period. *Jpn. J. Vet. Sci.* 63(Suppl. 1):S15-24.

T. Larsen and K.M. Moyes. 2015. Are free glucose and glucose-6-phosphate in milk indicators of specific physiological states in the cow? *Animal.* 9:86-93.

K.M. Moyes*[^]. 2015. TRIENNIAL LACTATION SYMPOSIUM: Nutrient partitioning during intramammary inflammation: lactation symposium A key to severity of mastitis and risk of subsequent disease? *J. Animal Sci.* 93:5586-5593.

M. Garcia, B.J. Bequette and K.M. Moyes. 2015. Hepatic metabolism of Holstein cows in early and mid-lactation is altered by nutrient supply and lipopolysaccharide in vitro. *J. Dairy Sci.* 98:7102-7114.

M. Garcia, T.H. Elsasser, Y. Qu, X. Zhu and K.M. Moyes. 2015. Glucose supplementation has minimal effects on blood neutrophil function and gene expression in vitro. *J. Dairy Sci.* 98:6139-6150.

M. Garcia, T.H. Elasser, L. Juengst, Y. Qu, B.J. Bequette and K.M. Moyes.

2016. Short Communication: Amino acid supplementation and stage of lactation alter apparent utilization of nutrients by blood neutrophils from lactating dairy cows in vitro. J. Dairy Sci. In Press.

Books

Abstracts

Maryland:

Y. Qu, S. Kahl, E.E. Connor, T. H. Elsasser and **K.M. Moyes**. 2015. The effect of lipopolysaccharide (LPS) and phorbol 12-myristate 13-acetate (PMA) on whole blood oxidative response as assessed by luminol-amplified chemiluminescence in dairy cows. J. Dairy Sci. 98(Suppl 2):318.

M.A. Crookenden, C.G. Walker, A. Heiser, J.J. Loor, **K.M. Moyes**, J. Kay, S. Meier, A. Murray, V.S.R. Dukkupati and J.R. Roche. 2015. Neutrophil function is dysregulated over the transition period J. Dairy Sci. 98(Suppl 2):274.

S. Linden, P. Sharma, **K.M. Moyes** and D.C. Nelson. 2015. The efficacy of PlyC endolysin as an alternative therapy for *Streptococcus uberis* (*S. uberis*) mastitis in vitro. J. Dairy Sci. 98(Suppl 2):569.

M. Garcia, T.H. Elsasser, Y. Qu, L. Juengst, B.J. Bequette and **K.M. Moyes**. 2015. Amino acid supplementation and lipopolysaccharide (LPS) challenge alters bovine blood polymorphonuclear leukocytes (PMNL) response in vitro. J. Dairy Sci. 98(Suppl 2):27.

Y. Qu, T. H. Elsasser, J. Newbold, E. E. Connor and **K.M. Moyes**. 2015. The determination of the concentrations of isoforms of vitamin E in tissues, milk and blood via high-performance liquid chromatography (HPLC) after short-term feeding in dairy cows. J. Dairy Sci. 98(Suppl 2):742.

K.L. Ingvarsen and **K.M. Moyes**. 2015. Factors contributing to immunosuppression in the dairy cow during the periparturient period. Jpn. J. Vet. Sci. 63(Suppl 1):S48.

K.L. Ingvarsen and **K.M. Moyes**. 2015. Disease prevention in dairy cows through nutrition. Jpn. J. Vet. Sci. 63 (Suppl 1):S51.

Conference Proceedings

Maryland:

C.M. Scholte, D.C. Nelson, T.H. Elsasser, S. Kahl, E.E. Connor, Y. Qu and **K.M. Moyes**. 2016.
Recombinant bacteriophage endolysin, PlyC, is non-toxic and does not alter blood neutrophil oxidative response in lactating dairy cows. in *Natl. Mastitis Counc. Ann. Mtg. Proc.*, Glendale, AZ. Natl. Mastitis Counc., Inc., Madison, WI.

Poster Presentations

Maryland: See abstracts and proceedings

NE-1048 ANNUAL REPORT WORKSHEET (FY14)

Complete the form and email as an attachment to:

Pedram Rezamand at rezamand@uidaho.edu

Year: 10/01/2013 to 09/30/2014 Station: Cornell – NY Ag Experiment Station

E-mail address of submitter of this form: pm389@cornell.edu_____

Technical Members for this station (please submit 1 member name per line):

Frank Welcome

Ynte Schukken

Paolo Moroni

Contributors:

Brenda Werner _____

Gloria Gioa _____

For each of the sections below, **limit the response to 2-3 sentences (~100 words max)**. A concerted effort to be brief will assure that the most pertinent accomplishments will be included in the annual report. If a study was done in collaboration with another station, indicate the station abbreviation in parentheses after the sentence describing the study. For information on these objectives see :

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OBJECTIVE 1: Characterization of host mechanisms associated with mastitis susceptibility and resistance.

A number of projects are currently being done under this objective. This includes the host response mechanisms to lactococci infections and *Staphylococcus aureus*.

OBJECTIVE 2: Characterization and manipulation of virulence factors of mastitis pathogens for enhancing host defense. Research at Cornell University is focused around antimicrobial resistance and virulence factors of environmental streptococci. Antimicrobial resistance of *Lactococcus lactis* and *Lactococcus garvieae* is being investigated

Contribution of mammary epithelial cells to the immune response during early stages of a bacterial infection to *Staphylococcus aureus* and efficacy of vaccination on *Staphylococcus aureus* and coagulase-negative staphylococci intramammary infection dynamics in 2 dairy herds

OBJECTIVE 3: Assessment and application of new technologies that advance mastitis control, milk quality and dairy food safety.

Use of Maldi for identification of different microorganism cause of mastitis

WORK PLANNED FOR THE COMING YEAR, LISTED BY OBJECTIVE:

Objective 1

Work in New York will continue on the host response to clinical and chronic environmental streptococci infections and relationship between mastitis and reproduction status.

Objective 2

Work in New York will continue on antimicrobial resistance of the most important mastitis pathogens. We plan to complete a number of publication on antimicrobial resistance and epidemiology of *Lactococcus lactis* and *Lactococcus garvieae* but also with Mycoplasma.

OBJECTIVE 3: Assessment and application of new technologies that advance mastitis control, milk quality and dairy food safety.

Our objective for the next year is to develop and validate a molecular diagnostic assay combining conventional PCR and sequencing to quickly confirm and identify mycoplasma but also use of MALDI for identification of other Strepto

PUBLICATION LIST: use as much space as necessary to complete the publication list below.

Peer-Reviewed Literature

- 1: Locatelli C, Piepers S, De Vlieghe S, Barberio A, Supré K, Scaccabarozzi L, Pisoni G, Bronzo V, Haesebrouck F, Moroni P. Effect on quarter milk somatic cell count and antimicrobial susceptibility of *Staphylococcus rostri* causing intramammary infection in dairy water buffaloes. *J Dairy Sci.* 2013 Jun;96(6):3799-805. doi: 10.3168/jds.2012-6275. Epub 2013 Mar 30. PubMed PMID: 23548306.
- 2: Fadda ME, Pisano MB, Scaccabarozzi L, Mossa V, Deplano M, Moroni P, Liciardi M, Cosentino S. Use of PCR-restriction fragment length polymorphism analysis for identification of yeast species isolated from bovine intramammary infection. *J Dairy Sci.* 2013;96(12):7692-7. doi: 10.3168/jds.2013-6996. Epub 2013 Oct 11. PubMed PMID: 24119798.
- 3: Modesto P, Peletto S, Pisoni G, Cremonesi P, Castiglioni B, Colussi S, Caramelli M, Bronzo V, Moroni P, Acutis PL. Evaluation of internal reference genes for quantitative expression analysis by real-time reverse transcription-PCR in somatic cells from goat milk. *J Dairy Sci.* 2013;96(12):7932-44. doi: 10.3168/jds.2012-6383. Epub 2013 Oct 11. PubMed PMID: 24119819.
- 4: Cremonesi P, Zottola T, Locatelli C, Pollera C, Castiglioni B, Scaccabarozzi L, Moroni P. Identification of virulence factors in 16S-23S rRNA intergenic spacer genotyped *Staphylococcus aureus* isolated from water buffaloes and small ruminants. *J Dairy Sci.* 2013;96(12):7666-74. doi: 10.3168/jds.2013-6917. Epub 2013 Oct 17. PubMed PMID: 24140323.
- 5: Locatelli C, Scaccabarozzi L, Pisoni G, Bronzo V, Casula A, Testa F, Allodi S, Pollera C, Toni F, Moroni P. *Helcococcus kunzii* and *Helcococcus ovis* isolated in dairy cows with puerperal metritis. *J Gen Appl Microbiol.* 2013;59(5):371-4. PubMed PMID: 24201149.
- 6: Brenaut P, Lefèvre L, Rau A, Laloë D, Pisoni G, Moroni P, Bevilacqua C, Martin P. Contribution of mammary epithelial cells to the immune response during early stages of a bacterial infection to *Staphylococcus aureus*. *Vet Res.* 2014 Feb

12;45:16. doi: 10.1186/1297-9716-45-16. PubMed PMID: 24521038; PubMed Central PMCID: PMC3937043.

7: Schukken YH, Bronzo V, Locatelli C, Pollera C, Rota N, Casula A, Testa F, Scaccabarozzi L, March R, Zalduendo D, Guix R, Moroni P. Efficacy of vaccination on *Staphylococcus aureus* and coagulase-negative staphylococci intramammary infection dynamics in 2 dairy herds. *J Dairy Sci.* 2014;97(8):5250-64. doi: 10.3168/jds.2014-8008. Epub 2014 Jun 2. PubMed PMID: 24881797.

8: Capra E, Cremonesi P, Cortimiglia C, Bignoli G, Ricchi M, Moroni P, Pesce A, Luini M, Castiglioni B. Simultaneous identification by multiplex PCR of major *Prototheca* spp. isolated from bovine and buffalo intramammary infection and bulk tank. *Lett Appl Microbiol.* 2014 Dec;59(6):642-7. doi: 10.1111/lam.12326. Epub 2014 Oct 20. PubMed PMID: 25196253.

9: Werner B, Moroni P, Gioia G, Lavín-Alconero L, Yousaf A, Charter ME, Carter BM, Bennett J, Nydam DV, Welcome F, Schukken YH. Short communication: Genotypic and phenotypic identification of environmental streptococci and association of *Lactococcus lactis* ssp. *lactis* with intramammary infections among different dairy farms. *J Dairy Sci.* 2014 Nov;97(11):6964-9. doi: 10.3168/jds.2014-8314. Epub 2014 Sep 18. PubMed PMID: 25242419.

10: J. A. Hertl ,1 Y. H. Schukken , F. L. Welcome , L. W. Tauer , and Y. T. Gröhn. Pathogen-specific effects on milk yield in repeated clinical mastitis episodes in Holstein dairy cows. *J Dairy Sci.* 2014 Mar;97(3):1465-80. doi: 10.3168/jds.2013-7266. Epub 2014 Jan 11. PMID: 24418269

11: J.A. Hertl , Schukken YH, Welcome FL, Tauer LW, Gröhn YT. Effects of pathogen-specific clinical mastitis on probability of conception in Holstein dairy cows. *J Dairy Sci.* 2014 Nov;97(11):6942-54. doi: 10.3168/jds.2014-8203. Epub 2014 Aug 28. PMID: 25173468

12: Cha E, Kristensen AR, Hertl JA, Schukken YH, Tauer LW, Welcome FL, Gröhn YT. Optimal insemination and replacement decisions to minimize the cost of pathogen-specific clinical mastitis in dairy cows. *J Dairy Sci.* **2014**;97(4):2101-17. doi: 10.3168/jds.2013-7067. Epub **2014** Feb 15. PMID: 24534495

Abstracts

Conference Proceedings

Moroni P. and Virkler P. Mycoplasma mastitis: what we have learned. New York State Fall Veterinary Conference. October 11-12, 2014. Ithaca, NY.

Poster Presentations

Locatelli C., Barberio A., Bronzo V., and Moroni P. Enhanced detection of multidrug resistance Escherichia coli from mastitis through selection to cephalosporin resistance. Proceeding of the 53rd National Mastitis Council Annual Meeting pp.207-208. January 26-28, 2014, Fort Worth, Texas.

Barberio A., Locatelli C., Muliari R, Bonamico S., Bronzo V., and Moroni P. Susceptibility To Main Antibiotics Of Gram-Negative Bacteria From Bovine Mastitis In Italian Herds. Proceeding of the 52nd National Mastitis Council Annual Meeting pp.181-182. January 22-24, 2013, San Diego, California.

NE-1048 ANNUAL REPORT WORKSHEET (FY15)

Complete the form and email as an attachment to:

Pedram Rezamand at jeffrey.bewley@uky.edu

Year: 10/01/2014 to 09/30/2015 Station: Virginia Tech_____

E-mail address of submitter of this form: milk@vt.edu _____

Technical Members for this station (please submit 1 member name per line):

Christina Petersson-Wolfe_____

Isis Kanevsky-Mullarky_____

Contributors:

For each of the sections below, **limit the response to 2-3 sentences (~100 words max)**. A concerted effort to be brief will assure that the most pertinent accomplishments will be included in the annual report. If a study was done in collaboration with another station, indicate the station abbreviation in parentheses after the sentence describing the study. For information on these objectives see :

<http://nimss.umd.edu/homepages/home.cfm?trackID=13717>

OBJECTIVE 1: Characterization of host mechanisms associated with mastitis susceptibility and resistance.

We continue to build on our knowledge of the in-vitro immune response to *S. aureus*. We are completing memory recall experiments in vitro to evaluate the lymphocyte population following stimulation by dendritic cells loaded with live or irradiated *Staphylococcus aureus*. When we compare lymphocytes collected from naïve (no previous history of *S. aureus* infection) and memory (history of *S. aureus* mastitis) cows, we found that irradiated *S. aureus* loaded DC resulted in an increase in CD4+ effector cell percent populations only in naïve animals and CD8+ effector cell percent populations only in memory animals, though this has not reached statistical significance. Our findings show a differential IFN γ production in response to stimulation of immune cells with irradiated as compared with live

Staphylococcus aureus. We believe these changes support our ability to manipulate the mammary immune environment that may favor Th17 cell polarization.

OBJECTIVE 2: Characterization and manipulation of virulence factors of mastitis pathogens for enhancing host defense.

We are currently evaluating potential vaccine targets through an intramammary challenge model. Our challenge studies suggest that though there are no differences in CFU, SCC, or rectal temperatures between animals vaccinated with LSA or ISA and those that did not receive vaccination, there are changes in immune cell profiles. Immune cells isolated from milk and analyzed by flow cytometry for presence of neutrophils and lymphocytes indicated modification of cell percentages with vaccination. Vaccination with LSA resulted in increased CD8 cells in milk whereas ISA lead to an increase in CD4 percentages.

OBJECTIVE 3: Assessment and application of new technologies that advance mastitis control, milk quality and dairy food safety.

We are continuing our work in the area of disease detection with the use of daily milk component and animal activity monitoring. In the past year, we completed a study examining changes in milk components and animal activity in early lactation for animals that experienced naturally-occurring mastitis. Our results show changes in rest bouts, rest time, step activity and milk yield prior to onset of clinical signs. Early detection of disease may lead to reduced economic losses associated with mastitis. We also completed a study that looked at the changes in animal activity around the onset of naturally-occurring diseases in the transition period.

WORK PLANNED FOR THE COMING YEAR, LISTED BY OBJECTIVE:

Objective 1: We will continue to analyze the data from our challenge study to determine the changes in cell populations following challenge with irradiated *S. aureus* and continue to explore this line of research.

Objective 3: We will continue our work in this area and furthermore, will look at the use of NSAIDs during naturally-occurring disease.

PUBLICATION LIST: use as much space as necessary to complete the publication list below.

Peer-Reviewed Literature

Kanevsky-Mullarky, I., A. Nedrow, S. Garst, W. Wark, M. Dickenson, C. Petersson-Wolfe and R. Zadoks. 2014. Comparison of virulence factors in *Klebsiella pneumoniae* strains associated with multiple or single cases of mastitis. *J. Dairy Sci.* Apr;97(4):2213-8.

Neal S., W. Wark, S. Garst, R. James, M. McGilliard, C. Petersson-Wolfe, and I. Kanevsky-Mullarky. 2015 Impact of feeding whole as compared to cell-free colostrum on calf immune status. I. The neonatal period. *J. Dairy Sci.* 98(6):3729- 40.

Abstracts

Conference Proceedings

Schexnayder, S., L. E. Garkovich, J. M. Fly, P. D. Krawczel, C. S. Petersson-Wolfe J. M. Bewley, S. C. Nickerson, S. Hill Ward, G. M. Pighetti, R. A. Almeida, L. M. Arnold, D. M. Amaral-Phillips, A. DeVries and S. P. Oliver. 2014. Southeast Quality Milk Initiative: Producers' Experiences, Perceptions, and Attitudes about Mastitis and Bulk Tank SCC Management. National Mastitis Council Annual Meeting, Fort Worth, TX.

Griffith A., M. McGilliard, and C. S. Petersson-Wolfe. 2014. Changes in Activity and Milk Components Around Onset of Clinical Mastitis. National Mastitis Council Annual Meeting, Fort Worth, TX.

Garst, S. N., C. S. Petersson-Wolfe and I. Kanevsky-Mullarky. 2014. Gamma-Irradiated *Staphylococcus aureus* Fails to Protect Against Subsequent Intramammary Infection. National Mastitis Council Annual Meeting, Fort Worth, TX.

Lehtimäki M., W. Wark, I. Kanevsky-Mullarky. 2014. Lymphocyte response to *Staphylococcus aureus* secreted factors lead to interferon gamma production and neutrophil activation. 30th Annual Graduate Research Symposium. Blacksburg VA.

Poster Presentations

Pighetti, G. M., S. P. Oliver, R. A. Almeida, P. D. Krawczel, J. M. Fly, S. M. Schexnayder, C. S. Petersson-Wolfe, J. M. Bewley, L. E. Garkovich, D. M. Amaral-Phillips, L. M. Arnold, S. C. Nickerson, S. Hill Ward and A. DeVries. 2014. Southeast Quality Milk Initiative: Milk Quality in the Southeast USA. National Mastitis Council Annual Meeting, Fort Worth, TX.

NE-1048 ANNUAL REPORT WORKSHEET (FY15)

Year: 10/01/2014 to 09/30/2014 Station: Kentucky_____

E-mail address of submitter of this form: jbewley@uky.edu_____

Technical Members for this station (please submit 1 member name per line):

Jeffrey Bewley_____

Contributors:

Amanda Stone_____

Michelle Arnold_____

Derek Nolan_____

Jessica Lowe_____

Elizabeth Eckelkamp

For each of the sections below, **limit the response to 2-3 sentences (~100 words max)**. A concerted effort to be brief will assure that the most pertinent accomplishments will be included in the annual report. If a study was done in collaboration with another station, indicate the station abbreviation in parentheses after the sentence describing the study. For information on these objectives see :

<http://nimss.umd.edu/homepages/home.cfm?trackID=13717>

OBJECTIVE 1: Characterization of host mechanisms associated with mastitis susceptibility and resistance.

N/A

OBJECTIVE 2: Characterization and manipulation of virulence factors of mastitis pathogens for enhancing host defense.

N/A

OBJECTIVE 3: Assessment and application of new technologies that advance mastitis control, milk quality and dairy food safety.

The University of Kentucky has been working on a study to examine the potential for multiple precision dairy technologies use in mastitis detection. Additionally, multiple decision support tools have been developed to examine mastitis economics. A study was completed comparing mastitis in compost bedded pack barns to sand Freestall barns.

WORK PLANNED FOR THE COMING YEAR, LISTED BY OBJECTIVE:

Objective 3: Continued assessment of precision dairy technologies and development of decision support tools.

PUBLICATION LIST: use as much space as necessary to complete the publication list below.

Peer-Reviewed Literature

Abstracts

Nolan, D.T., Saghaian, S. 2015. A Comparison of Market Exit Prices between Kentucky Dairy Producers and Average United States Dairy Producers. Report 87. Southern Agriculture Economics Association Annual Meeting. Atlanta, GA. (Oral)

Nolan, D.T., J.M. Bewley. 2015. The effect of somatic cell score on milk yield of dairy cattle in the southeastern United States. Abstract 93. Dairy Science Association Annual Meeting. Orlando, FL. (Oral)

Conference Proceedings

Poster Presentations