# ANNUAL REPORT
## DEPARTMENT OF ANIMAL AND RANGE SCIENCES
### Prepared: July 2007
#### Academic Year, July 2006 - June 2007
##### Research and Outreach, January-December (CY2006)

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I. GOALS/ACCOMPLISHMENTS

The mission of the Animal and Range Sciences Department is to conduct research, education, and extension to improve the efficiency and profitability of livestock agriculture and to improve management and conservation of rangeland resources. In fulfilling this mission the Department of Animal and Range Sciences is committed to:

Scholarly inquiry in basic and applied sciences as a foundation for the department’s instructional and service functions and to enhance the efficiency and profitability of North Dakota’s animal agriculture industry and conservation and management of ND’s rangelands;

Education of undergraduate and graduate students by providing both specialized knowledge and educational breadth in animal agriculture, animal science, range science, natural resource management and supporting disciplines;

Effective and timely transfer of research-generated knowledge and technology to the agricultural industry and the larger scientific and public sectors to benefit the state, the nation, and the world.

Although teaching, research, and extension are individually and equally important, each enhances the others. The maintenance of strong linkages between these three components is basic to the effective operation of the Department of Animal and Range Sciences.

A. Instruction and Student Success

1. Teaching initiatives and innovations

The department offers options of study in Animal Science Production/Business, Animal Science, Equine Studies, Range Science, and Veterinary Technology leading to a B.S. degree. In addition, M.S. and Ph.D. degrees are offered in Animal and Range Sciences with various emphases available. The department houses and participates in the Natural Resources Management multi-disciplinary program that offers B.S., M.S. and Ph.D. degrees. Department faculty also advise Pre-veterinary Medicine students when requested.

Office of Institutional Research and Analysis summaries for 2006-2007 indicate ARS faculty, including NRM and Veterinary Technology, generated 5,767 student credit hours for an FTE production of 9.99. This is an increase from the 2005-2006 FTE production of 8.72.

Most courses in Animal and Range Sciences involve computer usage in one form or another. Usage can be passive, for example visiting web sites for information, or active such as running software programs for developing livestock rations, marketing, livestock genetics, GIS mapping and imaging, and statistical analyses. Three departmental courses, one 200, one 300, and one 400 level are detailed as specific examples of computer integration into major classroom activities. ARSc 220, Production of Meat Animals, incorporates laboratory assignments in (1) Analysis of Dairy Records, (2) Computer Ration Balancing, and (3) Performance Record Analysis. ARSc 357, Animal Genetics, conducts laboratories in (1) Genetic statistical applications, (2) Selection mathematics, and (3) Collection and assimilation of genetic data to construct a practical selection index of animal breeding. ARSc 452, Geographic Information
Systems in Range Survey, provides software whereby students (1) Create data base systems, (2) Perform basic statistical analyses of data sets they collected in the field, and (3) Use satellite images in GIS software to map landscapes, overlay various GIS data bases, and monitor change in rangeland attributes.

The faculty in ARS make extensive use of Microsoft Powerpoint in presenting lecture information in courses. Most faculty also use the WEB (Blackboard) for placement of syllabi, course material, and readings. Faculty in Veterinary Technology now must observe and document each student in each of 229 essential laboratory tasks as part of AVMA accreditation.

2. Advising initiatives and innovations

Having a total of 400 students, departmental faculty are actively engaged in undergraduate and graduate advising. Advising not only consists of course scheduling and academic program tracking, but career planning and professional development as well. Numerous faculty serve as major advisors to graduate students and most faculty serve on graduate committees for students within and outside the department. The senior exit interviews (N = 12) conducted in Spring and Fall 2006, 11 (92%) rated departmental advising as excellent with 1 (8%) stating they did not use an advisor.

In the past year, undergraduate curriculum guides and fact sheets for each major option were revised and updated. In addition, a departmentally-based Graduate Student Handbook was revised and reprinted.

3. Curriculum development including new programs, deletion of programs, administrative changes

The Department of Animal and Range Sciences annually reviews the curricula of each academic program offered. In 2005, the Equine Studies Program added ARSc 461 Advanced Horsemanship to their curricula. Veterinary Technology offered a course, VET 482, Large Animal Techniques, focused primarily on cattle and horses. The Animal and Range Sciences "Science" option developed a 1 credit applied reproductive management laboratory techniques course, ARSc 463L, to supplement the present lecture course, ARSc 463, Physiology of Reproduction. New courses in Meat Science and Equine Studies are currently being developed for 2007.

4. Accreditation or other reviews

The Veterinary Technology Program was reviewed in 2005 for accreditation and was granted full accreditation for the next two years. The program is preparing for a fall 2007 review. This program has been fully accredited for 28 years.
5. **Activities in student recruitment/retention, enrollment management, and other student activities**

A new departmental website was developed in 2006. New websites were developed for the Equine Studies, Natural Resources Management, and Veterinary Technology programs in 2005 and updated in 2006. Brochures were developed for the Range Science option as well as student club brochures for the Range and Equine programs. Much of the recruiting efforts are conducted by the individual faculty in the department such as at “Little I” activities, Youth Range Camp, 4-H Horse Camp, etc.

6. **Distance education (including on-line) progress**

The ARS Department actively participates in distance education by currently providing five courses remotely.

**Summary of Distance Education Activity**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Location provided</th>
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<tbody>
<tr>
<td>ARSc 260</td>
<td>Horse Production</td>
<td>Tribal Colleges, Dickinson State Univ.</td>
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<tr>
<td>ARSc 453</td>
<td>Range &amp; Resource Watershed</td>
<td>Dickinson State Univ.</td>
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<tr>
<td>ARSc 456</td>
<td>Range Habitat Management</td>
<td>Dickinson State Univ.</td>
</tr>
<tr>
<td>ARSc 463</td>
<td>Physiology of Reproduction</td>
<td>Dickinson State Univ.</td>
</tr>
<tr>
<td>ARSc 790</td>
<td>Graduate Seminar</td>
<td>REC’s, Dickinson State Univ.</td>
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In addition, Dr. Mario Biondini has a completely web-based course, ARSc 452/652, Geographic Information Systems/Range Survey, that can be taken by any student at any time. The department is discussing offering all Equine lecture courses in a distance education format.

7. **Assessment**

The department received a response from the NDSU University Assessment Committee on a report submitted in January 2007 for 2006 assessment activities. The rating for the undergraduate program remained a “7” on a 0 to 10 basis. To improve this score it was suggested that multiple measures of student learning would be required. The Veterinary Technology Program received a score of “2”. The report stated that increased information provided an assessment and development of an assessment plan would improve the program’s score. The Veterinary Technology program met with the Chair of the University Assessment Committee to gather information on improving their assessment score.
B. Research/Creative Activity

1. Research and creative activities

Summary of Research and Scholarly Accomplishments – 2006

<table>
<thead>
<tr>
<th>Grants</th>
<th>Submitted</th>
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<th>Pending</th>
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<td>Journal Articles</td>
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<th>Graduate Research Assistants</th>
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<tr>
<td>Current</td>
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<td>Number</td>
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2. Grants/Contracts

Grants/Contracts (Includes Research, Extension and Instruction Grants)

Proposals funded


Luther, J., G. Lardy, C. Schauer, R. Maddock, E. Loe, M. Stam, J. Paterson. Overcoming challenges associated with natural beef and lamb production. USDA 4-ruminant consortium grant. Two years. Total $124,998. (Funding contingent on congressional approval, likely held up for one year).

Luther, J.S. (PI), C.S. Schauer, K. Vonnahme. The proposed use of sildenafil citrate for enhancing embryo survival and pregnancy rates in Rambouillet ewes outside the normal breeding season. SBARE - $10,745.

Maddock Carlin, K.R., L.P. Reynolds, J.S. Caton. Effects of maternal nutrition and selenium status on postnatal muscle growth and meat quality. USDA Cooperative State Research, Education, and Extension Service strengthening award. Funded $125,000. 01/07-12/08.


Park, C.S., PI: Lipotropes stimulate breast cancer cell death; NIH; $140,000; 08/01/04-01/31/07.

Park, C.S., PI: Nucleotides and immune function of newborn calf; ND-SBARE; $15,000; 07/01/06-06/30/07.
Park, C.S., PI: Canola and conjugated linoleic acid in milk; USDA-CSREES; $13,600; 06/01/03-10/31/06.


Reynolds, L.P. Co-recipient (one of numerous Co-Investigators), NSF-INBRE Grant, “IdeA Networks for Biomedical Research Excellence” – Director, Cell Biology Core Laboratory, and Mentor, “Effect of MCPA, 2,4-D and bromoxynil on lung development (Dr. Hilde van Gijssel); $174,675 total direct costs, August 2004-May 2009.


Schroeder, J.W. 2006-2009. Altering fatty acids in bovine milk fat using flaxseed in the diets of high producing dairy cattle. ND State Board of Ag Research and Extension - Agricultural Research Fund (Year two of two). $21,000. 100%.


Vonnahme, K. 2006. Effects of linseed meal feeding on onset of puberty in beef heifer calves. SBARE. $7,383.
Vonnahme, K. 2006. Impacts of maternal nutrition on offspring wool quality. SBARE $1,750.


Proposals submitted with decisions pending


Grygiel, C. NDSU Graduate School, Doctoral Education Enhancement Award, $15,000.

Grygiel, C. NDSU Graduate School, Masters Education Enhancement Award, $4,000.

Lardy, G., E. DeVuyst, S. Pryor, J.W. Schroeder. Feasibility of Large Dairy Co-located with the Blue Flint Ethanol Plant. $40,000. One Year.


Lardy, G.P., C. Wachenheim, and K. Odde. NDSU Beef Systems Center of Excellence. ND Beef Commission. One Year. $200,000. (Lardy’s Portion = $100,000).


Luther, J.S. (PI), G. Lardy, C.S. Schauer, E. Loe, M. Stamm and T. Paterson. Overcoming Challenges Associated with Natural Lamb and Beef Production. USDA Four-State Ruminant Consortium - $125,000.

Maddock, R.J., G. Lardy. Effect of field peas in feedlot diets on meat quality characteristics of cattle having divergent tenderness genotypes. Univ. of Idaho/CSREES. One year. Total $48,425.

Maddock, R.J., G. Lardy. Effect of high-levels of distiller’s grain in beef finishing diets on beef quality. ND Corn Council. One year. $74,136.


Park, C.S., PI: Effect of nutritionally directed compensatory mammary growth on epigenetic change of gene expression and lactation; NSF; $383,391; 10/01/07-09/30/09.

Park, C.S., PI: Methyl supplement and breast cancer cell death; American Institute for Cancer Research; $165,000; 06/01/07-05/31/09.


Schroeder, J.W. Market Analysis for Post-harvest Demand of North Dakota Dairy Products. North Dakota Dairy Promotion Commission and Midwest Dairy Association. $50,000. 100%.

Schroeder, J.W. and Chester-Jones, H. Optimizing Dry Field Peas in Diets for Pre-weaned Dairy Replacements. Cool Season Food Legumes (CSFL) research through the USDA-Cooperative State Research, Education, and Extension Services (CSREES). $29,546. 90%.

Proposals submitted but not funded

Biondini, M. National Science Foundation. Co-PI. CRI: Acquisition of Advance Computing Research Infrastructure at North Dakota State University. $1,582,862.

Biondini, M. USDA-DOE Biomass Program. Co-PI (C. Negri or Argonne NL PI). Genetic and environmental controls of phreatophytic deep rooting to optimize cellulosic biomass supply from poplar in marginal land. $700,000.


Park, C.S., PI: Methionine alters DNA methylation in mammary cells; NIH; $223,545.

Park, C.S., PI: Compensatory nutrition and epigenetic control of mammary gene expression; NSF; $354,700.

Park, C.S., PI: Mammary development; USDA; $285,000.


Vonnahme, K. 2006. By-product Protein Supplementation During Late Pregnancy in the Cow and Ewe: A Low Cost Means for Naturally Enhancing Offspring Feed Efficiency, Carcass Quality and Fertility. Submitted to SARE.


Vonnahme, K., J. S. Luther. C.S. Schauer, R. Fungston. By-product Protein Supplementation During Late Pregnancy in the Cow and Ewe: A Low Cost Means for Naturally Enhancing Offspring Feed Efficiency, Carcass Quality and Fertility. Submitted to SARE.

**Other funding not included above**

Luther, J.S. Agricultural Experiment Station, Dr. Ken Grafton - $13,200 for graduate student assistantship.

Luther, J.S. Department of Animal & Range Sciences Department - $8,000 for laparoscopic AI equipment.

Luther, J.S. North Dakota Lamb and Wool Producers Association - $500 for undergraduate student help and research.

Luther, J.S. Research Administration, Philip Bjoudak - $2,690 for a rectal ultrasound probe.

Luther, J.S. ND EPSCOR, David Givers - $2,690 for a rectal ultrasound probe.

Luther, J.S. Agricultural Experiment Station, Dr. Ken Grafton - $2,690 for a rectal ultrasound probe.

Luther, J.S. Department of Animal & Range Sciences - $2,690 for a rectal ultrasound probe.

Luther, J.S. Agricultural Experiment Station, Dr. Ken Grafton – $500 for a liquid nitrogen tank.

Luther, J.S. Department of Animal & Range Sciences, Dr. Don Kirby - $500 for a liquid nitrogen tank.

Luther, J.S. North Dakota Sheep AI and Semen Collection Project – Generated $900 from ram semen collection.

Moore, B.L. Shorthorn, Simmental and Angus semen and natural service donations - $9,300 valuation.

Moore, B.L. Simmental female donation - $4,000.

Park, C.S., PI: Calf immune study; Land O’ Lakes, Inc.; $8,000 equivalent nursing formula (04/01/06-12/31/06).
Active Research Projects

Anderson, V.L. and G.P. Lardy. Effect of Field Peas in Feedlot diets on feedlot performance, carcass quality, ruminal digestion, net returns, and taste panel response. USDA Cool Season Food Legume Research Program (04/05-03/07). Collaborator as a Post-doctoral scientist.

Barker, W. Multispecies Grazing at Ekre Grassland Preserve.


Barker, W. Computerized Data Bank of NDSU Herbarium Records.


Danielson, R. Coordination of Beef-Sim (production/economic simulation program for beef producers) modeling program as a part of the ND Beef Systems Center of Excellence Project.


Grazul-Bilska, A.T. PI; USDA, NRICGP, “Role of gap junctions in regulation of luteal function”; $137,700 direct cost ($170,000 total cost); September 2001- December 2006.
Grazul-Bilska, A.T. Co-PI, Cleveland Clinic Foundation grant; “Assessment of oocyte maturation, fertilization and embryo development obtained from sheep after autotransplantation of frozen-thawed whole ovaries”, $25,000, 2004-2006.


Grygiel, C. (PI) and M. Biondini (Co-PI). Patch Dynamics Processes and the Restoration of Prairie Landscapes. Grant, 12-31-06.


Lardy, G. Effect of field pea level on growth, performance, carcass characteristics, and meat quality attributes in steers fed high grain finishing diets.

Lardy, G. Effect of field pea level on ruminal fermentation and digestibility in steers fed high concentrate finishing diets.

Lardy, G. Factors affecting sale price of North Dakota feeder calves.

Lardy, G. Effect of increasing level of dried distillers grains plus solubles on forage intake, ruminal fermentation, and digestibility in steers fed moderate quality forage.

Lardy, G. Effect of forage type on weight gain and body condition score in beef cows in swath grazing systems in South Central North Dakota.
Lardy, G. Effect of swathed forage type on ruminal fermentation and digestion in beef steers.

Lardy, G. Concurrent administration of Mannheimia haemolytica bacterin and counterpart five-way virals effects on immune response compared to Mannheimia haemolytica bacterins administered separately.

Lardy, G. Effects of Flax Seed Supplementation on Reproduction, Health and Milk Composition in Early Lactation Dairy Cows.


Luther, J.S. and J.D. Kirsch. Impact of commercially available PG600 versus PMSG on fertility in ewes subjected to LAI. Funds Generated from the North Dakota Sheep AI and Semen Collection Project. April, 2006 to February, 2012.


Maddock, R. Lamb Slaughter and Carcass Data Collection for Fetal Programming. Collaborator. Role of harvest and tissue collection of lambs from existing project. PI’s are Caton, Vohnamme. No budget for my role.


Maddock, R. Finishing cattle on forage and flax supplements. Collaborator. Role of harvesting beef and collecting samples for tenderness and fatty acid composition. PI’s are Scott Kronber. No budget for my role.

Moore, B.L. PI, Hair Sheep Evaluation, ARSc, continuing.

Park, C.S. PI. Mammary Growth. NIH-NCI. 08/01/04-01/31/07.

Park, C.S. PI. Lactation Study. Hatch. 10/01/05-09/30/06.

Park, C.S. PI. Calf Health. ND-SBARE. 07/01/05-12/31/06.
Park, C.S. PI. Milk Composition. NC Region Canola Council USDA-CSREE. 
07/01/03 - 06/30/06.


Reynolds, L.P. (Co-PI), Hatch ND01705, “Reproductive efficiency in farm animals.”


Reynolds, L.P. (PI), PHS Grant NICHD 45784-01-05 "Nutrition, fetal growth, and placental angiogenesis"; $1,210,000 total direct costs; April 2005-March 2010.

Reynolds, L.P. (Co-PI), NSF-INBRE Grant, “IdeA Networks for Biomedical Research Excellence” – Director, Cell Biology Core Laboratory, and Mentor, “Effect of MCPA, 2,4-D and bromoxynil on lung development (Dr. Hilde van Gijssel); $174,675 total direct costs, August 2004-May 2009.

Reynolds, L.P. (Co-PI), Specific Cooperative Agreement, USDA Sheep Experiment Research Station, Dubois ID, “Birth weight and production characteristics in sheep; and Effects of elevated dietary selenium and nutrient intake on development of key maternal and fetal nutrient transferring tissues in pregnant ewe lambs” (Caton JS, Lewis G, Reynolds LP, Taylor JB).

Reynolds, L.P. Collaborator, USDA, NRI Competitive Research Grant “Placental efficiency in the ewe: Characterization of the angiogenic profile and vasoactive properties during placentome conversion;” $110,000 total costs (PI: Kimberly A. Vonnahme).

Reynolds, L.P. Collaborator, USDA, NRI Competitive Research Grant “Effect of maternal undernutrition and high selenium during gestation on growth and vascularization of key nutrient transferring tissues;” $422,000 total costs (PI: Joel S. Caton).


Schroeder, J.W. (PI) Embryo Bank Phase – Adding value to beef production systems with dairy embryo transfer. ND State Board of Ag Research and Extension – Ag. Res. Fund. 1/1/03-6/30/07.

Schroeder, J.W. (PI) Altering conjugated linoleic acid in bovine milk fat for nutraceutical application using flaxseed in feeding high producing dairy cattle. ND State Board of Ag Research and Extension – Agricultural Research Fund (second year funding) 1/07 – 12/09.


Sedivec, K. Impacts of sheep grazing on leafy spurge infested rangeland.

Sedivec, K. Effects of grazing and farming on CRP lands: soil structure, plant community dynamics, and herbage production.

Sedivec, K. Effects of grazing and farming on pheasant recruitment and nesting success on CRP lands in western North Dakota.

Sedivec, K. Evaluation of different monitoring techniques on western rangelands of North Dakota.

Sedivec, K. Impacts of tree removal and fire on bur oak regeneration in hardwood forests of North Dakota.

Sedivec, K. Effects of grazing management on the plant communities within the transitional grasslands.

Sedivec, K. Impacts of different long-term management strategies on soil physiology and plant community dynamics in the northern mixed grass prairie.

Sedivec, K. Evaluating beef cow performance of swath grazed crested wheatgrass, big bluestem, and foxtail millet.

Sedivec, K. (PI) M. Biondini (Co-PI). Effects of Fire on Grazed Prairie Grasslands. Grant. 9-30-07.
Vonnahme, K. Fall 2004-current—Effect of flax on proliferation and vascularization of the jejunum, uterus and bone of ovariectomized ewes. Animal work is complete. I am the project director. Part of Mr. Matt O’Neil (co-advised with Dr. Greg Lardy) research thesis.

Vonnahme, K. Fall 2004- current—Effect of protein supplementation during gestation on female offspring feed efficiency and onset of puberty in cattle. Animal work is currently being done. This is a collaborative project with Dr. Greg Lardy and Dr. Rick Funston (UNL—North Platte). A peer reviewed manuscript is underway.

Vonnahme, K. Fall 2004- current-- Placental Efficiency in the Ewe: angiogenic and vasoactivity during placentome conversion. Animal work is complete. I am project director. This will be part of Ms. Wendy Arndt’s thesis project. This is a USDA funded project.


3. Articles/books/publications

Refereed papers published


Grazul-Bilska AT, Pant D, Luther JS, Borowicz PP, Navanukraw C, Caton JS, Ward MA, 
Redmer DA, Reynolds LP. 2006. Pregnancy rates and gravid uterine parameters in single, twin 
and triplet pregnancies in naturally bred ewes and ewes after transfer of in vitro produced 

Redmer. 2006. Expression of endothelial nitric oxide synthase (eNOS) in the ovine ovary 

17β on expression of mRNA for seven angiogenic factors and their receptors in the endometrium 
of ovariectomized (OVX) ewes. Endocrine.

Escherichia coli O157:H7 fecal shedding in North Dakota feedlot cattle over the fall and early 
spring. J. Food Prot. 69:1154-1158.

C. Gilbery, and J. S. Caton. 2006. Effects of concentrated separator by-product on intake, site of 
digestion, microbial efficiency, and nitrogen balance in ruminants fed forage-based diets. J. 

Lardy. 2006. Characterizing the Ensiling Properties of Wet Sugarbeet Pulp and the Addition of 

Lardy. 2006. Characterizing the Ensiling Properties of Wet Sugarbeet Pulp and the Addition of 
Liquid Feedstuffs or Urea. J. Sugar Beet Res. 43:85-97.

canola seed supplementation on intake, digestion, duodenal protein supply, and microbial 


Luther JS, Grazul-Bilska AT, Kirsch JD, Weigl RM, Kraft KC, Navanukraw C, Pant D, 
Reynolds LP, Redmer DA. 2006. The effects of progestin and PMSG treatments on estrus 
synchronization and pregnancy rates after timed artificial insemination in ewes. Small Ruminant 
Res. ; doi:10.1016/j.smallrumres.2006.10.015.

Luther JS, Grazul-Bilska AT, Kirsch JD, Weigl RM, Kraft KC, Navanukraw C, Pant D, 
Reynolds LP, Redmer DA. 2006. The effect of GnRH, eCG and progestin type on estrous 
synchronization following laparoscopic AI in ewes. Small Rum. Res. [In Press for 2006].


Books/book chapters

Maddock, R. “United States Production of Dried Sausages” in Dried and Semi-dried Sausages, published by Blackwell. (invited)


Edited works


Proceedings


Sedivec, K.K. 2006. Getting the most out of your native pasture. 2006 Manitoba Grazing School, Manitoba Forage Council, Selkirk, Manitoba, Canada.


Abstracts


Hargiss, C., D. Kirby, E. DeKeyser, and M. Ell. Regional assessment of seasonal wetland plant communities using the index of plant community integrity. Society for Wetland Scientists annual meeting, Cairns, Australia.


Hines, R., K.K. Sedivec, J.S. Lind, M.V. Goertel, W.T. Barker, and J. Bennington. 2006. Inventory and comparison of wildlife species diversity, richness, and evenness by plant community on military training bases in North Dakota. 2006 ITAM Workshop. Manhattan, KS. p. 120.


Kirby, D.R., R. Limb, E. DeKeyser, and P. Nyren. Drought and grazing intensity impacts on northern mixed-grass prairie. Society for Range Management annual meeting, Vancouver, BC.


Mita, D., D. Kirby, and E. DeKeyser. Influence of landscape structure on the index of plant community integrity (IPCI) of seasonal and temporary wetlands in the prairie pothole region of North Dakota. Society for Range Management annual meeting, Vancouver, BC.

Mita, D., D. Kirby, and E. DeKeyser. Analysis of landscape structure variability for developing a wetland condition prediction model. Society for Wetland Scientists annual meeting, Cairns, Australia.


**Department reports**


Extension/outreach publications


Schroeder, J.W. Dairy Connections. Quarterly newsletter circulated to all North Dakota dairy producers and many of their service providers. (Copies available on request)


Schroeder, J.W. 2006. Fact Sheet – Managing High-quality Holstein Steers


Popular articles


Hammer, C.  Tri-State Livestock News:
- Preventing Disease from Entering Your Herd. August 2006.
- Understanding Your Horse’s Eyes and Ears. May 2006.
- Feeding Senior Horses. March 2006.
- Caring for the Pregnant Mare. January 2006.

Lardy, G.
- Ethanol Byproducts and Cattle Feeding, Dickinson Press.
- Still Not Enough Moisture, Print (Fargo Forum).
- Blistering Drought Ravages Farmland on the Plains, Print (NY Times).
- Drought Information from NDSU Extension, Print Service Helps Ranchers Cope.
- Exceptionally Dry, Print (Fargo Forum).
- List Cow Wintering and Feeding on NDSU Feedlist, Print.
- Sunflower Silage May be an Option for Drought-Stressed Sunflower Crop, Print.
- Water Quality and Quantity is a Concern during Drought, Print.
- NDSU to Hold Drought Meeting in Fort Yates, Print.
- NDSU Sets Drought Meeting, Print.
- Feedlist Connects Forage Buyers and Sellers, Print.
- Developing Replacement Heifers, Print (Progressive Farmer).
- Feeding Barley to Beef Cattle, Print (Angus Journal).
- Don’t forget the3 Benefits of Crossbreeding for your Commercial Customers, Hereford E-news.
- Interest in Hybrid Bulls Growing, Print.
- Handling, Storing Colostrum Important for Cattle Producers, Print.
- Increasing Omega 3 Fatty Acids in Beef by Feeding Flax, Print (Feedlot Magazine).
- Consolidation in the Beef Industry, Hereford E-news.
- Don’t Ignore Crossbreeding When Buying Bulls, Print.
- Preparing for the Upcoming Calving Season, Hereford E-news.


Luther, J.S., Editor. The North Dakota Sheep Industry. October/November 2006: No. 44.


Stoltenow, C. Anthrax Unified Document, April 1, 2006, Unified anthrax recommendations for ND, SD, MN, and MB, Canadian Embassy Web Site, Washington, DC.

Stoltenow, C.  Modified Live Vaccines in your health program, August 3, 2006, BEEF eNewsLetter.

4.  Presentations

(Includes all extension and outreach oral presentations)

Barker, W.
Other (n = 1)
- Kevin Sedivec and I discussed natural resource management at Camp Grafton South for the local leasees grazing cattle on Camp Grafton South, at a workshop.

Berg, E.
Scholarly (n = 2)

Biondini, M.
Scholarly (n = 2)

Grazul-Bilska, A.
Scholarly (n = 2)
- Effects of undernutrition and overnutrition on in vitro fertilization (IVF) and early embryonic development in sheep, SSR meeting, Omaha, NE, Presenter.
- Effects of nutrition on oocyte quality in sheep. Meeting with scientists from the USDA laboratory, Grand Forks. Presenter.

Grygiel, C.
Scholarly (n = 6)
- Stewardship of the Earth’s Natural Resources for a Sustainable Heritage, August 28, 2006
- Natural Resources Management - Humankind in Partnership with the Earth, October 18, 2006

Hammer, C.
Other (n = 4)
- Minot, ND, Winter Horse Clinic: Care of the Older Horse, Horse Slaughter Legislation
- Fergus Falls, MN, Vaccination and Deworming
- Fargo, ND, Equine Center Tour and Riding Demonstration (Richland County 4-H)
- Fargo, ND, Equestrian Opportunities: Not Just Horsing Around (Marketplace for Entrepreneurs)
Lardy, G.

Other (n = 54)
- Bismarck, ND, North Dakota Natural Beef Specifications and Recommendations, (40 enrolled) Speaker.
- Crookston, MN, Feeding Ethanol and Biodiesel Byproducts, (115) Speaker.
- Bismarck, ND, Feeding Ethanol Byproducts, (80) Speaker
- Devils Lake, ND, Cow Nutrition, (75) Speaker
- Lisbon, ND, Wintering Beef Cows, (15) Speaker
- Bagley, MN, Byproduct Feeds, (50) Speaker
- Bagley, MN, Drought Management Issues, (50) Speaker
- Fargo, ND, Using Ethanol and Biodiesel Byproducts in Livestock Rations, (60) Speaker
- Fargo, ND, Factors Affecting Feeder Calf Value in North Dakota, (25) Speaker & Co-Organizer
- Carrington, ND, Using Ethanol Byproducts in “forage-Based Diets, (55) Speaker
- Dickinson, ND, Effect of Health Programs on Value of North Dakota Feeder Calves, (12) Speaker
- Beulah, ND, Cow Calf Nutrition Following Drought Conditions, (40), Speaker
- Fargo, ND, Cattleman’s College, (150) Speaker & Co-Organizer
- St. Paul, MN, Protein Supplementation of Grazing Livestock, (65) Speaker
- Washburn, ND, Focus on Ethanol, (40) Speaker & Co-Organizer
- Washburn, ND, Beef Systems Center of Excellence Update, (40) Speaker & Co-Organizer
- Cooperstown, ND, Drought Feeds and Cow Management, (68) Speaker
- Steele, ND, Drought Management: Nitrates, Early Weaning, and Water Quality Issues, (43) Speaker & Co-Organizer
- Zeeland, ND, Drought Management: Nitrates, Early Weaning, and Water Quality Issues, (43) Speaker & Co-Organizer
- Center, ND, Nutritional Management Options During Drought, (30) Speaker & Co-Organizer
- Dickinson, ND, Nutritional Management Options During Drought, (48) Speaker & Co-Organizer
- Carson, ND, Nutritional Management Options During Drought, (50) Speaker & Co-Organizer
- Hettinger, ND, Nutritional Management Options During Drought, (45) Speaker & Co-Organizer
- Steele, ND, The Effect of Vaccinations on Value of North Dakota Feeder Calves, (106) Speaker
- Antler, ND, The Effect of Vaccinations on Value of North Dakota Feeder Calves, (200) Speaker
- Maddock, ND, The Effect of Vaccinations on Value of North Dakota Feeder Calves, (89) Speaker
- Lisbon, ND, The Effect of Vaccinations on Value of North Dakota Feeder Calves (135) Speaker
- Bowman, ND, The Effect of Vaccinations on Value of North Dakota Feeder Calves (116) Speaker
- Beulah, ND, The Effect of Vaccinations on Value of North Dakota Feeder Calves, (75) Speaker
- Fargo, ND, NDSU Beef Systems Center of Excellence, (6) Speaker
- Bismarck, ND, NDSU Beef Systems Center of Excellence, (12) Speaker
- Fargo, ND, Nutrition for Your Show Cattle, (22) Speaker
- Enderlin, ND, Effect of Increasing Level of Field Peas on Sensory Attributes and Tenderness in Beef, (18) Speaker
- Dickinson, ND, Beef Systems Center of Excellence Update, (27) Speaker & Co-Organizer
- Fergus Falls, MN, Nutritional Supplements for Your Horse, (55) Speaker
- Dickinson, ND, (via Poly Comm), Nutritional Strategies to Reduce Nutrient Excretion, (31) Speaker
- Minot, ND, (via Poly Comm), Nutritional Strategies to Reduce Nutrient Excretion, (27) Speaker
- Valley City, ND, (via Poly Comm), Nutritional Strategies to Reduce Nutrient Excretion, (22) Speaker
- Devils Lake, ND, (via Poly Comm), Nutritional Strategies to Reduce Nutrient Excretion, (25) Speaker
- Langdon, ND, (via Poly Comm), National Animal Identification System, (17) Speaker
- Carrington, ND, Ruminant Nutrition, (30) Speaker
- Carrington, ND, Questions and Answers about Beef Production, (30) Speaker
- Lisbon, ND, Alternative Feeds, (40) Speaker
- Center, ND, Management for Improved Carcass Quality, (15) Speaker
- Carrington, ND, Feeding Programs, (28) Speaker
- Carrington, ND, Optimizing Nutrient Utilization, (28) Speaker
- Carrington, ND, Ration Balancing, (28) Speaker
- Fargo, ND, Survey of North Dakota Beef Consumers, Processors, and Feedlots, (5) Speaker
- Mandan, ND, Survey of North Dakota Beef Consumers, Processors, and Feedlots, (75) Speaker
- Dickinson, ND, Basic Ruminant Nutrition and Applied Cow Nutrition, (25) Speaker
- Miles City, MT, The National Animal Identification Program, (75) Speaker

Luther, J.

**Scholarly (n = 3)**
- Luther, J.S., Schauer, C.S., Berg, P.B. Development of a low-input sheep operation. NCR-190 Meetings. Booneville, AR.
- Luther, J.S. Estrous Synchronization and AI in Sheep. Bismarck State College. Bismarck, ND.

**Other (n = 34)**
- Your New Extension Sheep Specialist. Hettinger Sheep and Beef Day. Hettinger, ND.
- North Dakota’s Sheep Industry. ND Newspaper Convention. Bismarck, ND.
- Feasability of Controlling Leafy Spurge with Sheep and Goats. ND Invasive Plant Species Workshop. Lisbon, ND.
- Factors Influencing Profitability of the Sheep Enterprise. Advanced Sheep School. Bowman, ND.
- Reproductive Management In Sheep. 1st Annual Hettinger Shepherd’s Clinic. Hettinger, ND.
- Using Ultrasound for Reproductive Management in Sheep. Pingree, ND.
- Using Ultrasound for Reproductive Management in Sheep. Bismarck, ND.
- Scotland’s Sheep Industry. NDLWPA State Convention. Mandan, ND.
- Fall Lambing. NDLWPA State Convention. Mandan, ND.
- Scotland’s Sheep Industry. Valley Wool Grower’s Convention. Paige, ND.
- Water Quality. Hettinger Drought Meeting. Hettinger, ND.
- Nitrate Poisoning in Livestock. Hettinger Drought Meeting. Hettinger, ND.
- Water Quality. Dickinson Drought Meeting. Dickinson, ND.
- Water Quality. Center Drought Meeting. Center, ND.
- Nitrate Poisoning in Livestock. Center Drought Meeting. Center, ND.
- Hettinger Ram Sale September 14th (presented) Hettinger, ND, No. Participated (190)
- Performance Ram Test May 22nd to August 15th (presented) Hettinger, ND (22)
- Sheep Repro. Seminar May 18th (coordinator) Fargo, ND (20)
- Ultrasound Workshop December 5th (presented) Pingree, ND (5)
- Advanced Sheep School October 25th (presented) Bowman, ND (18)
- Youth Sheep Selection December 28th (presented) Carrington, ND (25)
- Semen Collection Workshop (presented) Fargo, ND (10)
- Hettinger Drought Meeting Hettinger, ND July 31st (Presented) (50)
- Carson Drought Meeting August 1st (presented) Carson, ND (60)
- Dickinson Drought Meeting August 1st (presented) Dickinson, ND (50)
- Center Drought Meeting August 2nd (presented) Center, ND (40)
- NDLWPA Convention December 2nd Mandan, ND (130)
- Hettinger Sheep Day 2-8-06 (presented) Hettinger, ND
- Invasive Plant Species Workshop 7-7-06 (presented) Lisbon, ND
- Tappen Wool Pool 5-24-06 (greeted producers) Tappen, ND

**Maddock Carlin, K.**

**Scholarly (n = 5)**

- Experiences in Graduate School. ARS Senior Seminar. North Dakota State University.
- Influence of meat microenvironment on activity of the calpain system. ARS Departmental Seminar. North Dakota State University.
- Field pea inclusion in high grain diets for beef heifers improves beef tenderness without altering performance. Poster Presentation. ASAS National Meeting.
- Survey of small meat processors in North Dakota. Poster Presentation. ASAS Midwestern Meeting.
- Survey of cattle backgrounding and finishing feedlots in North Dakota. Poster Presentation. ASAS Midwestern Meeting.

**Other (n = 2)**

- Increasing beef tenderness through inclusion of field peas in finishing diets. ND Pea and Lentil Association Annual Convention.
Maddock, R.  
Scholarly (n = 1)  
- Factors affecting tenderness.

Moore, B.  
Scholarly (n = 3)  
- Invited speaker, National Montadale Show, Springfield, IL  
- Invited presenter, Midwest Stud Ram Show, Sale and Seminars, Sedalia, MO  
- Invited participant as sheep judge, Tennessee State Fair, Nashville, TN

Redmer, D.  
Scholarly (n = 1)  

Reynolds, L.  
Scholarly (n = 2)  
- Keynote Speaker: “Fetal programming of adult disease and its potential impact on animal production;” 2005-06 Keynote Speaker, Graduate Student Association, Department of Animal Science, University of Nebraska-Lincoln; April 2006.  
- Panel Discussion, Biology: The next frontier of materials science and engineering; Materials Research Society, NDSU Student Chapter, North Dakota State University, Fargo; March 2006.

Schroeder, J.  
Other (n = 2)  

Sedivec, K.  
Scholarly (n = 11)  
- Getting the most out of your native pasture.  2006 Manitoba Grazing School, Manitoba Forage Council, Selkirk, Manitoba, Canada. (Invited presenter - 346 people)  
- Inventory and comparison of wildlife species diversity, richness, and evenness by plant community on military training bases in North Dakota. 2006 ITAM Workshop. Manhattan, KS. (Volunteer presenter - 84 people).

Other (n = 28)
- Pasture management and drought strategies. McHenry County Range Tour, ND. July 6, 2006. (Invited speaker - 105 people)

Stoltenow, C.

Scholarly (n = 44)

National
- American Veterinary Medical Association Leadership Conference, Jan 12-16, 2006, Chicago, IL. Leaders of the veterinary profession with in the US were in attendance. I was part of the planning committee (House Advisory Committee) for the conference.
- Western State 78th Annual Veterinary Conference, February 19-23, 2006, Las Vegas, NV. Veterinarians from across the nation attend. Attended continuing education seminars and campaigned for the office of president of the AVMA.
- AVMA Executive Board Legislative Visit, March 30-April 4, 2006, Washington, DC. Visited the offices of Conrad, Dorgan, and Pomeroy on behalf of the AVMA.
- AVMA Executive Board/House Advisory Committee combined meeting, April 19-23, 2006, Chicago, IL. Attended as a member of the AVMA House Advisory Committee and finalized AVMA Bylaws complete revision.
- AVMA Executive Board meeting, June 6-10, 2006, Chicago, IL. Attended as AVMA candidate for President-Elect.
AVMA Annual Convention, July 11-19, 2006, Honolulu, HI. Attended as delegate for ND, member of the House Advisory Committee, continuing education sessions and as candidate for AVMA President-Elect. Unsuccessful in election.

USDA/NRI Workshop, November 8-9, 2006, Kansas City, MO. Attended as a representative from NDSU to learn about the proposal submission mechanism now in place for all USDA/NRI proposals.

Regional
- Horse Owners Education Day, March 18, 2006, Red Horse Ranch, Fergus Fall, MN. University of MN and NDSU combined extension program. Anthrax and your horse presentation.

State
- Killdeer Beef Days, January 17, 2006, Killdeer ND. Health programs that work presentation.
- Medora Beef Days, January 18, 2006, Medora ND. Health programs, antibiotics and anthrax presentation.
- Kansas Veterinary Medical Association (KVMA) 102nd Annual Convention, January 20-22, 2006, Topeka, KS. Attended continuing education seminars and campaigned for the office of president of the AVMA.
- North Dakota Feedlot School, January 24-25, 2006, Carrington, ND. Diseases, Treatments and Health Programs presentation.
- Foster County Cow-Calf Management School, February 7, 2006, Carrington REC, Carrington, ND. Getting the Most out of a Vaccine Program presentation.
- Beef Issues, Mountrail County, February 8, 2006, Stanley, ND. BVD, How it affects your herd presentation.
- New York Veterinary Medical Association, Executive Board meeting, March 7&8, 2006. Visited Hudson Valley Foie Gras farm, recorded video and digital pictures to record activities on the farm, and campaigned for the office of president of the AVMA.
- North Dakota Veterinary Medical Association (NDVMA) Executive Board meeting, April 18, 2006, Bismarck, ND. Attended as NDVMA delegate to the AVMA House of Delegates.
- NDSU Veterinary Diagnostic Laboratory continuing education day, May 18, 2006, Fargo, ND. Anthrax 2005, lessons learned presentation.
- Producer meeting, June 27, 2006, Lisbon, ND. The need for vaccination in 2006 presentation.
- NDVMA 101st Annual meeting, July 26-28, 2006, Minot, ND.
- Producer meeting, August 3, 2006, Park River, ND. The need for vaccination in 2006 presentation.
- Summer 2006 Drought Meeting, August 1, 2006, Dickinson, ND. Drought related animal health problems presentation.
- Summer 2006 Drought Meeting, August 2, 2006, Center, ND. Drought related animal health problems presentation.
- Summer 2006 Drought Meeting, August 8, 2006, Steele, ND. Drought related animal health problems presentation.
- Summer 2006 Drought Meeting, August 9, 2006, Bismarck, ND. Drought related animal health problems presentation.
- NDVMA Issues Meeting, September 27, 2006, Fargo, ND. Attended as member of NDVMA and presented information on ND students attending veterinary school in regards to debt load, payback clauses and future veterinary needs of North Dakota.
- North Dakota Stockmens Association meeting, September 28-30, Fargo, ND. Attended NDSA meeting as a member and as NDSU Animal and Range Sciences faculty.
- NDSU/Pfizer Scientific Exchange Program, October 18, 2006, Fargo, ND. Update on Transmissible Spongiform Encephalopathies (TSE’s) presentation.
- Missouri Valley Producers Meeting, October 24, 2006, Bismarck, ND. Bovine Viral Diarrhea (BVD) disease and Persistently Infected (PI’s) Animals presentation.
- Advanced sheep school, October 25, 2006, Bowman, ND. Advances in scrapie detection and valine-associated scrapie at NDSU presentation.
- NDSU Extension/Extension Research Center Fall Conference, November 6-8, 2006. Participant.
- State fleet defensive driving course, November 14, 2006, Fargo, ND. Participant.

Vonnahme, K.
Scholarly (n = 5)
- Speaker; ND Dairy and Pork Convention, Fargo, ND. Fetal development and litter size in the pig. November 29, 2006.
- Speaker: Youth Hog College, Fargo, ND Swine reproduction. November 28, 2006
Wagner, S.
Other (n = 3)
- Calf Diarrhea: Physiology, Calf Diarrhea: Pharmacology, and Cattle Behavior/Handling

5. Technology transfer

One example of departmental technology transfer is the North Dakota Dairy Diagnostic Program. The North Dakota Dairy Diagnostic Program’s central focus is to sustain and grow the state’s dairy industry. This is being accomplished by enhancing the income and changing the lifestyles of our dairy farm families. Directed by the NDSU Extension Dairy Specialist and coordinated by facilitators, dairy families monitor and measure the impact of decisions formulated by their advisory boards. Since the inception of program, over 15% of North Dakota dairy farms have participated in the program. Gross annual economic impact from eight selected farms (57 farms have been involved in the program) is:
Farm #1: In three years lowered debt to equity ratio from 4.96:1 to 1.4:1; repayment capacity went from 0.94:1 to 2.57:1. Annual Impact = Improved debt service.
Farm #2: Instituted a calf health and vaccination program that help lower death loss from 20% to 2%. Reduced the number of calves treated for sickness from 30% to 1%. = Annual Impact: = $11,250.
Farm #3: Developed a management and nutrition plan which discontinued an injection strategy with minimal loss of milk production. = Annual Impact: $49,550.
Farm #4: Reorganized labor arrangements over a 2-year period to lower costs and improve overall efficiencies. Annual Impact: = $71,958.
Farm #5: Improved management of calf-rearing facilities raised the quality of replacements resulting in an increase in milk yield of first-calf heifers (compared to the previous year) by 5 pounds per cow per day. Annual Impact: = $52,613.
Farm #6: Coordinated expansion plan increased milking herd from 47 to 82 head and cash inflows. Annual Impact = $20,372.
Farm #7: Implemented a dairy diagnostic plan that helped increased the net worth (difference between beginning and ending balance sheets) to over $25,000 for the 2005 production year. Annual Impact: = $25,000.
Farm #8: Implemented plan increased the net income, after inventory change and depreciation, from $25,221 to $436,850 in 3 years (includes total of three years income). Annual Impact: = $953,573.
C. Outreach

1. Professional service


Barker, W. Reviewed a grant proposal for the NDSU grants office.

Barker, W. Serve as a regional reviewer of family manuscripts for the North American Flora Project. This year I reviewed about 50 family manuscripts.


Berg, E.P. Member & Technical Advisor, Board of Directors; MO Assoc. of Meat Processors, 2005 – present.

Berg, E.P. Chair, State FFA Meats Professional Development Event (Meat Judging Contest)


Berg, E.P. Member. Reciprocal Meat Conf. Program Committee, American Meat Science Association

Berg, E.P. Chair. Graduate Poster Competition Committee, American Meat Science Association

Berg, E.P. (National)
- Chair. Graduate Poster Competition Committee, American Meat Science Assoc., 2006.
- Member. Pork Checkoff Animal Science Committee, National Pork Board. 2004 to present.


Berryhill, D. Director of Special Programs, College of Agriculture, Food Systems, & Natural Resources (30%), including Director of the General Agriculture Program.

Berryhill, D. Responsible Official, Select Agent Program (% to be determined).

Berryhill, D. (University)
  Chair, Institutional Biosafety Committee
  Member, Natural Resources Management Coordinating Committee
  Member, Natural Resources Graduate Program Steering Committee
  Member, Electron Microscopy Advisory Committee
  Alternate Member, Institutional Animal Care and Use Committee
  Member, Visual Arts Gallery Program Advisory Committee
  Member, University Athletics Committee
  Member, Laboratory and Chemical Safety Committee
  Member, NCAA Athletics Certification Academic Integrity Subcommittee
  Member, Disaster-Resistant University Advisory Committee

Berryhill, D. (College)
  Member, College of Agriculture, Food Systems, & Natural Resources Student Progress Committee
  Chair, College of Agriculture, Food Systems, & Natural Resources Curriculum Committee
  Chair, Committee for Excellence in Teaching Awards

Berryhill, D. (Department)
  Chair, Awards Nomination Committee
  Member, Curriculum/Student Affairs Committee
  Member, Graduate Committee

Biondini, M. (National/international)
Biondini, M. (Regional)
- USGS Mountain Prairie Information Network.

Biondini, M. (State)

Biondini, M. (University)
- NDSU Computer Policy Group
- NDSU Software Committee.
- NDSU ITS Long Term Planning Committee.
- NDSU Network Committee.
- NDSU GIS Committee.
- NDSU Research Infrastructure Advisory Group.
- NDSU CHPC Advisory Council

Biondini, M. (College)
- Steering Committee of the NRM Program

Biondini, M/ (Department)
- Range Science Committee (Chairman).
- ARSc PTE Committee (Chairman).

Biondini, M. (International)

Biondini, M. Reviewed Proposals for:
- NSF-Ecosystems Study Program: Reviewed 3 proposals.
- NSF-Ecology Program: Reviewed 1 proposal.

Biondini, M. Reviewed scientific papers for:
- Rangeland Ecology and Management: 1 paper.
- Ecological Applications: 1 paper.
- Ecology: 1 paper.
- New Phytologist: 1 paper.
- Ecosystems: 1 paper.
- Weed Science: 1 paper.
- Restoration Ecology: 1 paper.

Caton, J.
- April 2006. NIH NIDDK Washington DC, Invited as Panel Member.

Caton, J.
- Associate Editor, Journal of Animal Science.
- NIH panel member.
- Ruminant Nutrition Award committee ASAS-AFIA.

Caton, J. (Regional) NC1021 Secretary Elect.

Caton, J. (University) Co-Director Center for Nutrition and Pregnancy.


Caton, J. (Department)
- Nutrition Committee
- ANPC Faculty Leader
- Nutrition Laboratory Faculty Leader


Colville, T.  Proposal Reviewer, Delmar Learning, Clifton Park, NY.

Colville, T.  Consulting Veterinarian, American College of Surgeons Advanced Trauma Life Support Course.

Colville, T.  Consulting Veterinarian, American College of Surgeons Pediatric Advanced Life Support Course.

Colville, T.  Liaison to the North Dakota State University Veterinary Technology Program Advisory Committee.

Colville, T.  (University)
- Chair, North Dakota State University Standing Committee on Faculty Rights.

Colville, T.  (College)
- Chair, College of Agriculture, Food Systems and Natural Resources Advising Committee (currently inactive).

Colville, T.  (Department)
- Member, ARS Awards Committee.
- Member, ARS Curriculum/Student Affairs Committee.
- Member, ARS Facilities Planning Committee.
- Member, ARS PTE Committee.
- Member, ARS PTE Mentoring Committee for Dr. Sarah Wagner.
Danielson, R. (National/International)
- National Cattlemen’s Beef Association – Research Committee – 2004- current
- Beef Improvement Federation - Live Animal Evaluation Committee - 1990-current

Danielson, R. (Regional)
- Board of Directors for the ND Cowboy Hall of Fame
- Secretary/Treasurer ND Cowboy Hall of Fame
- ND Cowboy Hall of Fame Executive Fund Raising Committee
- North Star Classic Livestock Show Board of Directors
- ND Winter Show - Livestock Committee
- ND Winter Show - Steer Shows - Chair

Danielson, R. (State)
- ND Stockman’s Association Student Mentoring Program Board of Directors.
- ND Livestock Endowment Foundation
- United Tribes Technical College Land Grant Strategic Planning and Program Review Committee.
- ND Junior Beef Expo Board of Directors.

Danielson, R. (University)
- University Assessment Committee – 2004-current.

Danielson, R. (College)
- Academic Advising Committee - 1993-current.
- College of Agriculture Scholarship Committee - 2000-current.
- College of Agriculture Recruitment Committee - 2001-current.

Danielson, R. (Department)
- Undergraduate Curriculum & Student Affairs Committee - Chair.
- ARS Beef Unit Manager Search Committee - Chair
- ARS Beef Committee
- ARS Equine Committee
- ARS Assessment Committee
- ARS Equine Search Committee

Danielson, R. Secretary/Treasurer North Dakota Livestock Endowment Foundation.

Danielson, R. Served as Beef Cattle Judge at:
- 2006 National Tarentaise Show – National Western Stock Show - Denver, CO.

Danielson, R. September - 2006 - ND Stockman’s Association Convention - Research & Promotion Committee member – MC of Annual Banquet, Fargo, ND.

Danielson, R. Herd consultant - Goldberg Angus Farms, Moorhead, MN
Danielson, R. Keynote speaker – Bull Days Program, Bismarck, Merits of Bull Selection.


Eck, T. (Regional)
- University of Wisconsin – River Falls Rodeo; River Falls, WI, September 2006.
- Iowa State University Rodeo – Ames, IA, September 2006.
- Iowa Central Community College Rodeo – Fort Dodge, IA, September 2006.
- North Dakota State University Rodeo – Fargo, ND, October 2006.

Grazul-Bilska, A.T. Served on editorial boards Reproductive Biology and Endocrinology


Grazul-Bilska, A.T. Reviews of grants: five 2006 Graduate School Teaching/Research Awards, NDSU.


Grazul-Bilska, A.T. North Dakota Academy of Sciences meeting, Valley City, ND, April 2006, state meeting.

Grazul-Bilska, A.T. EPSCoR Conference, Grand Forks, Fall 2006, regional meeting.

Grygiel, C. 3rd International Fire Ecology & Management Conference, November 13-17, 2006; San Diego, CA.

Grygiel, C. Federal Environmental Regulations Seminar, October 23-24, 2006; Las Vegas, NV.

Grygiel, C. Joint Annual Meeting of the SD and ND Chapters of the Soil and Water Conservation Society and the Society for Range Management and the Professional Soil Scientists Association of SD, October 4-5, 2006; Aberdeen, SD.

Grygiel, C. Awarded renewal of Certified Professional in Range Management (CPRM).

Grygiel, C. Awarded a certificate from Environmental Management and Training, LLC, Certification of completion of a two-day course on Federal Environmental Regulations.

Grygiel, C. Awarded a Certification of Appreciation - US EPA Region 8, In recognition of valuation contribution to FY06 Environmental Education Grant Program.

Grygiel, C. NDSU Alumni Association – Influential Faculty Member Recognition Awarded.
Grygiel, C. Reviewed Proposals for: North Dakota Agricultural Experiment Station. 
PI: Mark Halvorson, Project Title: Dryland Crop Production Research in North Central North Dakota.

Grygiel, C. Reviewed scientific papers for: Mario Biondini, Plant Diversity, Production, Stability, and Susceptibility to Invasion in Restored Northern Tall Grass Prairies (United States).

Grygiel, C. Reviewed scientific papers for: Mario Biondini, Allometric Scaling Laws for Water Uptake by Plant Roots.

Grygiel, C. (National/international) 
Member - National Association of State Universities and Land-Grant Colleges.

Grygiel, C. (State)  
Member – Natural Resources and Environmental Management Program Planning Team.

Grygiel, C. (University)  
University Representative – Morris K. Udall Scholarship Foundation.

Grygiel, C. (College)  
Member – College of Agriculture, Food Systems, and Natural Resources – Recruitment Committee.

Grygiel, C. (Department)  
Member – Dept. Animal & Range Sciences – Graduate Committee. 
Chair - Natural Resources Management Coordinating Committee. 
Advisor – Natural Resources Management Club.

Hammer, C. New Salem & Hebron High School – provided presentations about the Equine Studies program to approximately 85 high school students interested in science majors, March 13-14, 2006.

Hammer, C. North Dakota Horse Fest, Minot ND – Exhibition display showcasing the Equine Studies program and North Dakota State University, March 4-5, 2006.

Hammer, C. Coach, NDSU Horse Judging Team.

Hammer, C. Advisor, NDSU Equine Club.


Hammer, C. ARS Dept. Equine Committee – Chair, and Recruitment & Curriculum – member.
Hammer, C. Attended the American Society of Animal Science National Meeting, 2006. Minneapolis, MN.

Hammer, C. Attended the Midwest American Society of Animal Science Meeting, 2006. Des Moines, IA.

Hammer, C. Equine Herpes Virus: Prevention and Control. NDSU Diagnostic Laboratory Veterinary Continuing Education. May 18, 2006. Fargo, ND.

Hammer, C. Equine Nutrition. Livestock Agents In-service Training, Fall 2006. Washburn, ND.

Hammer, C.
Horse Owner Survey Focus Group (Fall 2006), Bismarck, ND, 10 participants
Fuzzy Wuzzy Open Horse Show (March 2006), Fargo, ND, Over 100 entries
Showmanship Clinic (Jan 2006) Fargo, ND, 20 participants

Hammer, C. Equine Herpes Virus: Prevention and Control. NDSU Diagnostic Laboratory Veterinary Continuing Education. May 18, 2006. Fargo, ND.

Hammer, C. Equine Nutrition. Livestock Agents In-service Training, Fall 2006. Washburn, ND.

Hammer, C. (Radio Presentations)
Grain and Water Required. Horse Sense Radio Program. 11/17/2006
Winter Feeding Plans. Horse Sense Radio Program. 11/16/2006
Temps Drop and Feed Needs Rise. Horse Sense Radio Program. 11/15/2006
The Body Condition Score. Horse Sense Radio Program. 11/14/2006
The Winter Diet. Horse Sense Radio Program. 11/13/2006
Letting Nature Take its Course. Horse Sense Radio Program. 4/21/2006
Baby’s First Steps. Horse Sense Radio Program. 4/20/2006
Three Stages of Labor. Horse Sense Radio Program. 4/19/2006
Indoors or Outdoors? Horse Sense Radio Program. 4/18/2006
Reminders for Foaling Season. Horse Sense Radio Program. 4/17/2006

Hammer, C.
Official and Organizer, North Dakota State 4-H Horse Judging Contest, July 24, 2006
Official and Organizer, North Dakota State FFA Horse Judging Contest, June 6, 2006
Judge, Little International 4-H Hippology Contest, February 10, 2006

Kirby, D. International: Society for Range Management Meeting, Vancouver, BC.

Kirby, D. Elected 2nd Vice President of the Society for Range Management.

Kirby, D. (National/International)
- Range Science Education Council, Treasurer, Awards Committee Chair
- American Society Mining and Reclamation, Awards Committee member
Kirby, D. (Regional)
- Northern Great Plains Section, Society for Range Management, Historian, Awards.

Kirby, D. (College)
- NRM Steering Committee

Lardy, G.
- Study of Beef Consumers in Fargo-Moorhead, Radio (Clear Channel Communications, Bismarck).
- Interest Grows in Omega-3 Enriched Beef, Print (Angus Journal).
- Hybrid Bulls Offer Crossbreeding Opportunities, Radio (Red River Farm Network).
- Hybrid Bulls Offer Commercial Cattle Producers Options, Radio (Clear Channel Communications, Bismarck).
- Hybrid Bulls Offer Options, Print (South Dakota Cooperative News).
- Value of Vaccination Programs for ND Feeder Calves, Radio (Red River Farm Network).
- Value of Vaccination Programs for ND Feeder Calves, TV (KFYR-TV, Bismarck).
- NDSU Beef Systems Center of Excellence, TV (KFYR-TV, Bismarck).
- Nitrate Poisoning, Radio (Clear Channel).
- Grazing Drought Stressed Alfalfa, Radio (Clear Channel).
- Value of Vaccinations in Calf Marketing Programs, Radio (Clear Channel).

Lardy, G.
- Official, & Committee Chair, ND Winter Show Judging Contest, March 11, 2006.
- Tour Host, ND Junior Angus Association, ANPC Tour, April 1, 2006.

Lardy, G. (National)
- Journal of Animal Science, Associate Editor. Production and Management Division. 2006-present.
- USDA-SBIR Grant Review Panel Member. 2006.

Lardy, G. (Regional) NCR-SARE Technical Committee Grant Review Panel Member, 2006-present

Lardy, G. (State) Ex-Officio Member, North Dakota Stockmen’s Association Standing Committee on Beef Cattle Research.

Lardy, G. (University)
- Phi Kappa Phi Scholarship Chair, 2006-present, Member.
- Phi Kappa Phi Scholarship Selection Committee, 2003-present, Member
Lardy, G.  (Department)
- Search Committee: Department Head, Animal Science, 2006-2007, Member.
- Search Committee: Equine Center Manager, 2006, Member.
- Search Committee: Assistant Experiment Station Specialist (Beef Herdsman), 2006, Member.
- Search Committee: Meat Scientist-Cellular and Molecular Biology, 2006, Member, Chair.
- Search Committee: Meat Scientist-Retail Product, 2006, Member, Chair.
- Mentoring Committee, Dr. Justin Luther, 2006-present, Member, Chair.
- Mentoring Committee, Dr. Carrie Hammer, 2005-present, Member.
- Search Committee: Meat Scientist-Fresh Meats, 2005-2006, Member, Chair.
- Mentoring Committee, Dr. Kim Vonnahme, 2004-present, Member.

Lardy, G.  Associate Editor, Journal of Animal Science, Production and Management Division.

Lardy, G. Outside Reviewer for Promotion and Tenure Evaluation for Dr. Serhan Haadad, Jordan University of Science and Technology.

Lardy, G. Outside Reviewer for Promotion and Tenure Evaluation for Dr. Steve Paisley, University of Wyoming.

Lardy, G. National, American Society of Animal Science.

Lardy, G. National, National Cattleman’s Beef Association.

Lardy, G. Regional, Midwestern Section American Society of Animal Science.

Lardy, G. Regional, Minnesota Nutrition Conference.

Lardy, G. State, North Dakota Stockmen’s Association.

Luther, J.S. Howard Wymann Sheep Leadership Program in Greeley, CO. National Meeting. Participant and Speaker.

Luther, J.S. NCR 190 – Increased efficiency of sheep production in Booneville, AR. National Meeting. Speaker and Participant.

Luther, J.S. Hettinger Sheep and Beef Day in Hettinger, ND. State Meeting. Speaker and Participant.

Luther, J.S. North Dakota Lamb and Wool Producers Convention in Mandan, ND. State Meeting. Coordinator and Speaker.

Luther, J.S. Spring NDSU Extension Conference in Bismarck, ND. State Meeting. Participant.

Luther, J.S. Fall NDSU Extension Conference in Bismarck, ND. State Meeting. Participant.

Luther, J.S. 2006 Gunkleman Award Nominee
Luther, J.S. 2006 Outstanding NDSU Junior Extension Award Nominee

Luther, J.S. Coordinator. Hettinger Ram Test. May 22nd to August 15th.
- Recruited producers.
- Sent out press releases.
- Managed rams on test.
- Updated producers with results.
- Compiled all results and presented them to the producers.

- Recruited producers.
- Sent out press releases.
- Collected semen and artificially inseminated ewes.
- Updated producers with results.

Luther, J.S. Manager. Hettinger Ram Sale. June 15th to September 13th.
- Advertising and all general management activities.

Luther, J.S. Co-Coordinator. ND State Fair Carcass Contest. July 31st.
- Recruited funds and set-up transportation for lambs.

Luther, J.S. Reviewed three articles for the journal entitled Placenta and reviewed one article for the USDA Sheep Experiment Station.

Luther, J.S. (National)
- NCERA 190 Committee: Increased Efficiency of Sheep Production.
- American Sheep Industry Association: Research and Education Committee

Luther, J.S. (University)
- Center for Child Development: Parent Committee

Luther, J.S. (Department)
- ARS: Sheep Committee

Luther, J.S. Nitrate Poisoning, Carson, ND (TV)
- New Sheep Specialist, Fargo, ND (Radio)
- Terminal Ram Test, Fargo, ND (Radio)
- North Dakota’s Sheep Industry, Fargo, ND (Radio)

Maddock Carlin, K.
- Reviewed 1 manuscript for Journal of Animal Science.
- Reviewed 1 grant proposal for Wyoming Ag Experiment Station.

Maddock Carlin, K. Collegiate Meats Judging, American Meat Science Association, committee member.
Maddock Carlin, K. American Society of Animal Science Midwestern Section Meetings, Des Moines, IA. Two poster presentations.


Maddock Carlin, K. Sheep School, Presentation on lamb carcass evaluation for quality and yield grade. 10/25, Bowman, ND.

Maddock Carlin, K. North Dakota Stockman’s Association Cattlemen’s College. Presentation on differences in tenderness between muscle types in a beef carcass. 09/28, Fargo, ND.

Maddock Carlin, K. North Dakota Extension Service Fall Meeting. Presentation on factors influencing beef quality. 11/07, Fargo, ND.


Moore, B.L. (National/International)
National Western Stock Show, Denver, CO - January 2006
Sioux Empire Farm Show, Sioux Falls, SD - January 2006
Midwest Meat/Livestock Evaluation Clinic, Oklahoma City, OK - March 2006
Midwest Stud Ram Show, Sale and Seminars, Sedalia, MO - June 2006
Iowa State Fair, Des Moines, IA - August 2006
Minnesota State Fair, St. Paul, MN - August 2006
National Barrow Show, Austin, MN - September 2006
World Beef Expo, Milwaukee, WI - September 2006
Tennessee State Fair, Nashville, TN - September 2006
American Royal Livestock Show, Kansas City, MO - November 2006
North American International Livestock Exposition, Louisville, KY - November 2006
International Intercollegiate Livestock Coaches Association Annual Meeting, Louisville, KY -
November 2006
- International Katahdin Sheep Expo, Planning Committee
- American Society of Animal Science, Production/Management Committee- Past Chairman
- International Intercollegiate Livestock Coaches Association, Eligibility Committee Chairman
- Montadale Sheep Breeders Association, Scrapie Advisory Committee, Breed Standards Committee
- American Hampshire Sheep Association, Breed Standards Committee
- All American Junior Sheep Show Coordinating Committee, Judging Contest Superintendent
- Sheep Evaluation for Youth Committee, National Montadale, Shropshire, Oxford & Polypay Shows

Moore, B.L. (State)
North Dakota Winter Show, Valley City, ND - March 2006
North Star Classic, Valley City, ND - December 2006
- NDSU Regional Livestock Judging Contests, Coordinator
- North Dakota State 4-H & FFA Livestock Judging Contests, Livestock Coordinator, Swine Committee Chairman
- NW Regional Minnesota FFA Livestock Judging Contest, Coordinator
- North Central Minnesota Regional Livestock Judging Contest, Coordinator

Moore, B.L. (Department)
ARSC Department - Sheep Committee
ARSC Department - Beef Committee
ARSC Department - Curriculum Committee
ARSC Department - Awards Committee

Moore, B.L.
NDSU Regional Judging Contest, Fargo, ND, 30 participants, January 2006
NDSU Little I, Judging Contest Class Manager, Fargo, ND, 235 partic. February 2006
ND State 4H & FFA Livestock Judging Contest, Valley City, ND, 360 partic. March 2006
NW MN Region FFA Judging Contest, Fargo, ND, 120 partic. March 2006
North Central MN Region FFA Judging Contest, Fargo, ND, 95 partic. March 2006
NDSU Regional Judging Contest, Fargo, ND, 55 partic. October 2006

Park, C.S. Reviewed 3 USDA-NRI proposals.
Reviewed 3 Journal of Dairy Science manuscripts.
Reviewed 1 Journal of Animal Science manuscript.

Park, C.S. (National/International)
- Advisory Member of Korean National Academy of Sciences for Agricultural Affairs.

Park, C.S. (University) Institutional Biosafety Committee.

Park, C.S. (Department) Dairy Committee, and Graduate Committee.
Redmer, D.A. American Society of Animal Science Joint Meeting with ADSA, Midwestern Section, March 2006, Des Moines, regional meeting – several presentations by students.

Redmer, D.A. Great Plains Natural Science Symposium, Northwestern College, Orange City, IA, April 2006, regional meeting – Keynote speaker.

Redmer, D.A. American Society of Animal Science Joint Meeting with ADSA, July 2006, Minneapolis, national meeting – several presentations by DAR and students.

Redmer, D.A. Society for the Study of Reproduction, August 2006, Omaha, NE, national meeting – several presentations by students.


Reynolds, L.P. Director, Cell Biology Center – Biotechnology Institute, North Dakota State University; and Cell Biology Center, Biology Core, North Dakota University System, Infrastructure Network for Biomedical Research Excellence (INBRE), NIH, 1990-present.

Reynolds, L.P. Supervisor, Research Development Coordinator/Grants Management Specialist (responsible to 9 faculty) – Department of Animal & Range Sciences, North Dakota State University, 2001-present.

Reynolds, L.P. (National/international)
- Member, Pregnancy and Neonatology (formerly Human Embryology and Development-1) Study Section, Panel Member, National Institute of Child Health and Human Development, NIH; Washington DC; 4 years (2002-2006).
- National Heart, Lung, and Blood Institute, Program Project Special Emphasis Panel Member, NIH; Washington, DC; January 2006.
- National Institute of Child Health and Human Development, Program Project Special Emphasis Panel Member, NIH; Washington, DC; July 2006.
- National Heart, Lung, and Blood Institute, Program Project Special Emphasis Panel Member, NIH; Conference Call Review; October 2006.
- Ad hoc reviewer, US and international agencies:
  Biomedical Research Support Grant Program, NIH, 1988-present.
  Biotechnology and Biological Sciences Research Council, UK, 1997-present.
  Competitive Research Grants Program, USDA, 1988-present.
IDeA (EPSCoR) Seed Grant Program, NIH, 1993-present.
National Science Foundation, USA; EPSCoR program, 1996-present.
National Science Foundation, Switzerland, 1994-present.
National Science Foundation, USA; Applied Mathematics and Computational Mathematics Program; Integrative Animal Biology, Physiology and Behavior Program; Integrative Animal Biology, Signal Transduction and Regulation Program; 1995-present.
U.S.-Israel Binational Agricultural Research and Development Fund (BARD), 1995-present.
Research Grants Council of Hong Kong, University Grants Committee, 2002-present.
Horserace Betting Levy Board, Equine Veterinary Research Funding, London, UK 2003-Present.

Reynolds, L.P. (University)
- Faculty, undergraduate Biotechnology Program
- Faculty, graduate Cellular and Molecular Biology Ph.D. Program
- Alternate Member, Institutional Animal Care and Use Committee (IACUC)

Reynolds, L.P. (Department)
- Supervisor, Reproductive Physiology Laboratory Technician Pool (3 permanent and 2-3 temporary [3-5 yr] technical positions) – Department of Animal & Range Sciences, North Dakota State University, 2004-present.
- Faculty Grantsmanship Mentor, New Faculty – Department of Animal & Range Sciences, North Dakota State University, 2004-present.
- Member, PTE Mentoring Committee for Dr. Kimberly Vonnahme, Asst. Prof., 2004-06.
- Member, PTE Mentoring Committee for Dr. Sarah Wagner, Asst. Prof., 2004-present.


Reynolds, L.P. Host - No-Name Society, Annual Meeting, Logging Camp Ranch, near Amidon, ND; Sept 2006.

Reynolds, L.P. Co-Director, Center for Nutrition and Pregnancy – North Dakota State University, 2002-present.


Reynolds, L.P. Reviewed proposals for 2 US federal granting agencies: US National Institutes of Health (NIH); US Department of Agriculture-NRICGP (these were study sections/peer review panels).
Reynolds, L.P. Reviewed 20+ scientific papers, total, for the following professional journals:
American Journal of Pathology, 2000-present
American Journal of Physiology, 1994-present
Animal Reproduction Science, 2003-present
Biology of Reproduction, 1990-present
Domestic Animal Endocrinology, 1993-present
Endocrine, 1994-present
Endocrinology, 1989-present
Endothelium, 2004-present
Experimental Biology and Medicine, 2002-present
FASEB Journal, 2004-present
Fertility and Sterility, 2000-present
Journal of Animal Science, 1984-present
Journal of Biotechnology
Journal of Clinical Endocrinology and Metabolism, 2000-present
Journal of Dairy Science, 1997-present
Journal of Endocrinology, 1994-present
Journal of Molecular Endocrinology, 2005-present
Journal of Pharmaceutical Sciences, 1999-present
Journal of Physiology, 2004-present
Molecular and Cellular Endocrinology, 2001-present
Obstetrics & Gynecology, 1997-present
Pediatric Research, 1996-present
Placenta, 1993-present
Prostaglandins, 1992-present
Theriogenology, 1994-present
Schroeder, J.W.
- Dairy Cow College Dates Set. 1/20/06. Statewide. KFGO – Al Gustin, Release/enews, Jamestown Sun.
- Comfort Important to Dairy Cows. 2/22/06. Regional. Release/enews.
- Get the Most from Forages. 7/13/06. Regional. Release/enews. Jamestown Sun.
- Minimizing Feed Costs May Not Maximize Profits. 8/11/06. Regional. Release/enews.
- Store Wet Byproducts in Bags or Bunkers. 8/16/06. Regional. Release/enews. Progressive Dairyman.
- Don’t Risk Fire in Forage. 8/21/06. Regional. Release/enews.
- Minimize Risks of Fall Alfalfa Harvest. 8/24/06. Regional. Release/enews. Jamestown Sun, Ag Week.

Schroeder, J.W. (National)
Professional Dairy Heifer Growers Association (PDHGA), member.

Schroeder, J.W. (Regional) Midwest Branch - American Dairy Science Association:
- ADSA Midwest Branch 2006 Officer Nomination, Candidate for Director-at-Large
- Chair of the Starch Utilization by Ruminants Committee.
- American Dairy Association, Midwest Dairy Council; ex-officio advisor, represent NDSU.
- Heart of America DHIA University Extension representative; ex-officio advisor.

Schroeder, J.W. (State)
North Dakota Dairy Coalition.
- Board of directors
- In-state dairy retention and expansion committee

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- Open dairy show organizer and manager
Milk Producers Association of North Dakota; advisor
- Education committee, Convention coordinator
North Dakota Dairy Products Promotion Commission/ADA; ex-officio advisor.

Schroeder, J.W. (University) University Senate
- North Dakota State University representative for the College of Agriculture, Food Systems, and Natural Resources. 2006 to present.
- University Assessment Committee (UAC) Extension Service representative, 2000 to present. Educational planning sub-committee.

Schroeder, J.W. (College)
- Animal Nutrition and Physiology Center (ANPC) Research Facility Use Committee

Schroeder, J.W. (Department)
- Dairy Committee, ARS standing research committee, chair
- Laboratory of Growth and Lactation lab group
- Technology Transfer Committee, member
- Nutrition Laboratory Committee, member
- ARS Facilities Committee, member

Schroeder, J.W. State 4-H Dairy Contest, Aug. 8 (Co-organize with Dean Aakre, 4-H/Youth). North Dakota State University, Animal and Range Sciences, Dairy Research and Teaching Center: Four teams, 19 individuals.

Schroeder, J.W. State FFA Convention: NDSU ARS, Fargo
- Dairy cattle judging Contest, June 7, No. Participants (113)
- Pedigree evaluation, June 7, (146)
- Herd record evaluation, June 7, (146)
- Dairy products judging Contest, June 8, (162)
- Written individual exam, June 8, (162)
- Team problem-solving - dairy foods, June 8, (162)

Schroeder, J.W. (National) – Joint ADSA/ASAS, Minneapolis, MN

Schroeder, J.W. (Regional) – Midwest Section Joint ADSA/ASAS, Des Moines, IA
International - none

Sedivec, K. (National/international)
- Society for Range Management. 1988-present, member, services include Student Activities Committee board member from 1995-1998.
- Society for Range Management 59th Annual Meeting in Vancouver, BC, Canada. (Volunteer speaker)
- Manitoba Grazing School in Brandon, Mani., Canada. (Invited speaker)
- West Rangeland Partnership 5th Annual Meeting in Tuscon, AZ.
Sedivec, K. (Regional)

Sedivec, K. (State)
- North Dakota Stockman Association. 1990-present, member, services include presenter and contribution in providing needed information.

Sedivec, K. (University)
- Program Planning Team - Extension Service. 2004-present, natural resource management program Chair.

Sedivec, K. (Department)
- Range Committee, 2000-present, Member
- Equine Committee, 2005-present, Member
- Nutritional Laboratory Committee, 1996-2003, Member
- Search Committee - Equine Lecturers

Sedivec, K. Manuscripts review for Range Ecology and Management (2).

Sedivec, K.
- Rancher Range Management Workshop - Dickinson College, 11 participants
- Cow/calf Management School, Carrington, 33 partic., 4.6 Course rating, 4.9 Instr. rating
- N.D. Range Youth Camp – Amidon, 29 partic., 4.2 Course rating, 4.6 Instr. rating
- N.D. State Youth and Adult Range Judging Contest – Killdeer, 105 partic.
- Southwestern N.D. State Youth Range Judging Workshop - New England, 154 partic.
- Drought Strategy Workshops, 379 partic.

Sedivec, K. (In-service training)
- GIS Tools for range surveys and mapping, In-service training, 27 participants
- Sustainable Management of Western Rangelands, Antelope, SD, 33 partic.
- Natural Resources Management and Educational Training on Tribal Lands in North and South Dakota, Fort Yates, ND, 24 partic.

Sedivec, K.
- Selenium in soils, pastures, and bison, Bismarck for KFYR TV.
- Selenium in soils, pastures, and bison, National News, Farm Report, TV.
- Selenium in soils, pastures, and bison, National News, AgWeek, TV.
- Nutritional value of weeds for livestock, Detroit Lakes Radio Show.
- Selenium in soils, pastures, and bison, National News, PBS News, TV.
Stoltenow, C.  (National/International)
- Civilian Research and Defense Foundation, Russian-US Scientific Exchange program, site visit to
Colorado Serum, February 26-27, 2006, Denver, CO.
Coordinated and facilitated a site visit of two Russian anthrax experts with personnel from
Colorado Serum, the only US vaccine company producing anthrax vaccine for animals.
- St. George’s Veterinary School Site Visit, March 12-17, 2006, Grenada.
Visited St. George’s Veterinary School on the island of Grenada to evaluate the program for
sending students from ND for veterinary education.
- Mongolia V.E.T. Net National Veterinary Practice Act Consultant, November 25- December 12,
2006, Ulaanbaatar, Mongolia.
Served as a consultant to the Chief Veterinary Officer of Mongolia in developing a national
veterinary practice act for the country.
Member, National Association of Extension Veterinarians
Member, American Association of Equine Practitioners
Member, American Association of Bovine Practitioners
Diplomat, American College of Veterinary Preventive Medicine
Member and Chair, Extension Agrosecurity Team
- American Veterinary Medical Association (AVMA)
  - House of Delegates
  - House Advisory Committee
  - Constitution and Bylaws Task Force
  - Candidate for AVMA President-Elect

Stoltenow, C.  (State)
Consulting veterinarian for the ND Board of Animal Health
Member, North Dakota Stockmens Association
- North Dakota Veterinary Medical Association (NDVMA)
  - Delegate to the AVMA House of Delegates
  - Member of the NDVMA Executive Board

Stoltenow, C.  (University)
Institutional Animal Care and Use Committee
  - Alternate for Animal and Range Sciences
NDSU Rodeo Team Attending Veterinarian

Stoltenow, C.  (College)

Stoltenow, C.  (Department)
Committee member – Equine Instructor Search Committee, June 2006, successful.
Chair, ad hoc sheep committee.  July 2006.
Sheep Committee member
Awards Committee member
Stoltenow, C.
Anthrax Update, KFYR Agri-International, Radio.
Calving Season and Calf Health – Newspaper, March 23, 2006
Avian Influenza, Bird Flu – Newspaper Interview, May 5, 2006 Grand Forks Herald
Avian Influenza, Bird Flu – Radio Follow-ups
    May 8, 2006 Montana News Network
    May 9, 2006 KFYR – Al Gustin
    May 9, 2006 KFYT – Ken Jameson
Anthrax Preparations – Press Release, May 12, 2006
Cyanobacteria poisoning – Press Release, June 22, 2006

Vonnahme, K. Attended ASAS Meeting (National)

Vonnahme, K. Attended W112 Meeting (regional; established collaborations)

Vonnahme, K. (National/International)
- On SSR membership committee

Vonnahme, K. (Regional)
- On Midwestern Section of ASAS—Quadrathlon committee and Graduate Student Competition Committee

Vonnahme, K. (College)
- Momentum committee
- Distance Education committee

Vonnahme, K. (Department)
- Library committee—pick books that would be of interest to our department
- Recruitment and Retention committee
- Quadrathlon committee

Wagner, S. (National/International)
- Committee on Pharmaceutical and Biological Issues, American Association of Bovine Practitioners, January 2003 – present. Committee review issues pertaining to drug use in food animals.
- Exam Committee, American College of Veterinary Clinical Pharmacology, 2005-present.
- Assist in writing and grading the certification examination for the College.

Wagner, S. (University)
Institutional Animal Care and Use Committee
- Voting Committee Member, 2004- present
- Alternate Attending Veterinarian, 2006
- Search Committee for Attending Veterinarian/University Veterinarian
Wagner, S.  (Department)  
- Dairy Committee  
- Award Nominations Committee  


Wagner, S. VETTNET (Association of European veterinary Technician Educators). Attended annual meeting, Helsinki, Finland, October 2006.  

2. **Alumni events and other community-related activities**  

During the past year, department faculty participated in the NDSU College of Agriculture, Food Systems, and National Resources Fall Festival, Harvest Bowl Banquet, Student Scholarship Luncheon, College Awards Ceremonies and various other related events.  

3. **Fund-raising accomplishments**  

Dr. Kim Vonnahme and Ms. Marsha Kapphahn coordinated the departmental Momentum Campaign in 2006. Professor Russ Danielson was successful in soliciting additional funds for the Livestock Endowment student scholarship fund.  

4. **Other outreach activities**  

Department faculty participate in numerous outside activities each year. For example:  

a. Dr. Larry Reynolds is Editor of the Journal of Animal Science.  
b. Dr. Mario Biondini acted as Program Manager to the USDA NRICGP Managed Ecosystems Program for the 2006 funding cycle.  
c. Professor Russ Danielson serves on the Research and Promotion Committee of the N.D. Stockman’s Association.  
d. Professor Russ Danielson acts as the secretary/treasurer of the N.D. Livestock Endowment Foundation.  
e. Dr. Don Kirby serves as the Treasurer and Awards Committee Chair for the Range Science Education Council.  
f. Dr. Don Kirby was elected 2nd Vice President of the Society for Range Management.  

D. **Special Initiatives**  

1. **Diversity**  

The department faculty originated from four countries, the USA, Poland, Korea, and Argentina. In addition, seven female faculty are included of which five have three or less years tenure at NDSU.
Graduate students enrolled in the department, including NRM, are from Angola, Brazil, Cameroon, China, Kenya, Khazakstan, Korea, India, Pakistan, Poland, Thailand, and Uzbekistan. A total of 10 departmental graduate students including those enrolled in NRM attend NDSU from foreign countries.

2. Cooperative programming/interinstitutional activities

As outlined in section A. 6. the department provides academic coursework to other N.D. campuses through distance education. In addition, the Range Science curricula, syllabus, texts, lectures and lecture outlines, have been shared with all requesting tribal colleges, Bismarck State College, Dickinson State University, and the N.D. State School of Science in Wahpeton.

3. International activities

Departmental faculty were very active in international activities during 2006-2007. Dr. Lawrence Reynolds spent five weeks in 2006 conducting collaborative research in Italy. The collaboration was with Drs. Lino Loi and Grazyna Ptak, who are on the faculty of Veterinary Medicine at the University of Teramo, Italy. The collaborative research project is focused on evaluating why pregnancies fail at a relatively high rate in embryos created in vitro (in other words, in ‘test tube babies’) when using so-called ‘assisted reproductive technologies,’ such as in vitro fertilization and somatic cell nuclear transfer. The collaboration also involves Dr. Anna Grazul-Bilska who is a widely recognized expert in sheep embryology. Additional collaborators include Dr. Robert Feil at the Institute of Molecular Genetics, CNRS, University of Montpellier, France, who is one of the world’s leading experts on epigenetic regulation of genes during embryonic development, and Dr. Michael Clinton in the Department of Gene Expression and Development at the Roslin Institute in Scotland, who is one of the world’s leading experts on regulation of protein expression by micro-RNAs. This international team has several grant proposals pending, including proposals to the U.S. National Institutes of Health, the U.S. Department of Agriculture, as well as the European Union’s Human Frontiers Science Program, and the Italian Ministry of Science. The visit that Reynolds just returned from is part of an ongoing effort to obtain preliminary data for these grant proposals, and was funded in part by the Animal & Range Sciences Department, the Agricultural Experiment Station, and the Research Administration at NDSU, and also by the University of Teramo in Italy. Reynolds, Grazul-Bilska, and a post-doctoral fellow in their group, Dr. Pawel Borowicz, have together spent approximately six months in Italy working on this project in the last two and a half years and already have several publications with their Italian collaborators, including a recent article in the international journal, Placenta.

Dr. Caton traveled to the Rowett Research Institute in Aberdeen, Scotland with Dr. Dale A. Redmer last October (2006) to conduct research, discuss publications, visit their proteomics lab, and explore opportunities for additional research. These activities are related to a long-term collaboration with the Rowett (Dr. Caton did a 6-month sabbatical there in 1998-1999) and also are part of Dr. Caton’s efforts concerning the pending NIH COBRE proposal entitled “Center for Developmental Programming,” for which he serves as Principal Investigator of the Animal Core and member of the Administrative Team. Dr. Caton has also been involved in the Aspen Perinatal Biology Symposium, entitled “Interaction of Maternal, Placental and Fetal Systems in Perinatal Development,” as an invited speaker, co-workshop organizer, and a member of the Scientific
Committee. This symposium is scheduled for the 25 to 28 of August, and is sponsored by the National Institutes of Health, the US Department of Agriculture’s National Research Initiative, the Canadian Institutes of Health Research, the March of Dimes, Ross Products Division of Abbott Laboratories, North Dakota State University, the University of Cincinnati, and the University of Colorado.

Dr. Dale A. Redmer (Professor of Physiology) and Dr. Dave Carlson (Post-doctoral Fellow) have conducted experiments this spring, each spending 5 to 7 weeks abroad at the Rowett Research Institute (RRI) in Aberdeen, Scotland. The Rowett Research Institute was home for several Nobel Laureates and presently aims to conduct research at the forefront of nutrition to define how nutrition can prevent disease, improve health and enhance the quality of food production in agriculture. Work conducted by Drs. Redmer and Carlson is part of a larger series of studies of Drs. Larry Reynolds' (Professor of Physiology) and Redmer's, funded by their $1.5M NIH grant in collaboration with Dr. Jacqueline Wallace at the RRI. Dr. Redmer has also invited Mr. Juan Castañeda, a senior undergraduate student majoring in Agricultural Science at the Universidad Autonoma de Aguascalientes, in Aguascalientes, Mexico to engage in a short-term internship in the Animal and Range Sciences Department in sheep production management. Castañeda arrived in March, 2007 and is under the tutelage of the NDSU shepherd Mr. Wes Limesand. He is also engaged in ongoing studies at NDSU and the Hettinger Research and Extension Center supervised by NDSU sheep extension faculty Dr. Justin Luther. Castañeda returns to Mexico in June, 2007.

Dr. Grazul-Bilska was invited to present a seminar entitled “Assisted reproduction in animal model: Role of hormones, growth factors, nutrition and fetal programming (when does it start?)” at the local joined meeting of the Polish Society of Physiology, and the Society for Biology of Reproduction in June 2006 for the scientists from the Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences, and the University of Warmia and Mazuria in Olsztyn, Poland. Dr. Grazul-Bilska has also been collaborating on research with Kiyoshi Okuda of Okayama University in Japan and Dariusz J. Skarzynski of the Polish Academy of Sciences on research related to the effect of storage and passage of luteal endothelial cells on endothelin-1 and prostaglandin F2α production and recently co-authored an article on the same with them in the Journal of Reproduction and Development.

Dr. Mary Lynn Johnson, Research Assistant/Post Doc, attended the joint international conference of the European Network of Excellence (NoE) NeuroPrion that was held in Turin, Italy October 3-6, 2006 with Dr. Dale A. Redmer and Jessie Evoniuk (graduate student) 2006.

Dr. Charlie Stoltenow conducted a site visit to St George’s Veterinary School on Grenada to evaluate the program for sending North Dakota students for veterinary education. He also served as a consultant to the chief veterinary officer of Mongolia, Ulaanbaatar, Mongolia for developing a national veterinary practice act for the country.

4. Interdisciplinary activities

Departmental faculty participate in numerous interdisciplinary programs on and off campus. The National Resources Management (NRM) interdisciplinary academic program is housed in ARS and directed by Dr. Carolyn Grygiel, a faculty member in ARS. Drs. Barker, Biondini and Kirby also serve on the steering committee for NRM. A total of 96 undergraduate and 30 graduate
students were enrolled in NRM in 2006 of which 89 were in the Biotic Resources option and advised primarily by the Range Science faculty. Additionally, numerous faculty serve on graduate committees for the Cellular and Molecular Biology interdisciplinary program. Dr. Kasey Carlin serves on the Great Plains Institute of Food Safety Committee.

International interdisciplinary activities were centered around the Center for Nutrition and Pregnancy (CNP) as detailed in Section D. 3. The goals of the CNP are to perform cutting edge nutritional research that promotes fetal and neonatal growth, provided a mechanism for coordinated research and training programs in nutrition and pregnancy, and deliver leadership training for students and clinicians in research and education. The CNP has participation from ARS faculty; Food and Nutrition faculty; University of Wyoming and Nebraska faculty; the USDA in Dubois, Idaho and Grand Forks, ND; faculty from the University of Teramo, Italy; and researchers from the Rowett Research Institute for Nutrition, Aberdeen, Scotland.

5. Economic development efforts

The department’s major economic development activity continues to be the Beef Systems Center of Excellence (BSCOE). The BSCOE has the objectives of:
a. Economic development of the livestock industry in the state.
b. Build the research capacity of beef cattle in the state.
c. Increase educational opportunities for livestock producers and students in the state.

The BSCOE will center around the natural beef segment of the industry which is growing at a 25% rate per year in the U.S. The last annual income estimate from cattle sales in N.D. was $739 million from 950,000 beef cows. If cattle finishing and slaughter were integrated into the industry of the state, potentially livestock could provide an additional $400 million in revenue to the state. Additional revenue could also be derived from increased corn and soybean sales that would be required from this expanded industry.

6. On-line courses and programming

This is explained in Section A.6.

E. Planning

1. Future plans

Current students advised in the department total 400. Our goal is to increase student members to 500. In doing so we expect to develop additional courses in Equine Studies, Meat Science, Natural Resource Management, and Veterinary Technology in the new large animal emphasis. We currently generate 5,767 student credit hours annually for an FTE production of 9.99. With the additional students and courses, we hope to increase student credit hours generated by 10%; thereby increasing our FTE production more in line with the department’s budgeted FTE (10.58).
Considering the department futuristically and globally, and to strengthen the academic research, and service components of the department, we would need to add a livestock business and development emphasis to our programming. Whether we add business or economic development faculty experienced in the livestock industry, or utilize existing faculty to actively work in this area with departmental faculty, this is a much needed program to grow the agricultural economy of the state and region.

2. **Program strengths**

The department has numerous strengths. In teaching, Equine Studies, Natural Resources Management, and Veterinary Technology options place a strong emphasis on undergraduate education. Student exit surveys repeatedly comment on the superior advising they received from departmental faculty. In research, the department has had long-term “Centers of Excellence” in Range Science, Reproductive Physiology, and Ruminant Nutrition. Our intention is to add Meat Biology as an additional research “Center of Excellence” with the recent hiring of three meat scientists.

Our extension programming has been cited numerous times for its “Excellence in Programming”. In the past year, Dr. Justin Luther was added to the extension/research staff and we expect our programming to expand and improve with his addition.

3. **Future challenges**

The departmental challenges are common to most academic units on the NDSU campus. We are extremely short of space: offices for faculty, staff and graduate students; laboratories for research and teaching; classrooms for academic programming; and land to provide for the livestock at the departmental farm units. We are also in great need of repair and update of facilities. Funds that should go to support academic activities are being siphoned off to maintain an aging infrastructure. The department farm units are all in great need of repair also.

Budgets need to be increased. Departmental funds for teaching and research have declined or maintained level/ despite increases in student numbers and an additional six faculty hired in the past two years. For example, equipment necessary for lab courses has not been purchased, or out-of-date equipment used instead. This leads to a competitive disadvantage for our students seeking technically-trained positions in high tech industries.
### F. Enrollment and FTE data

#### Animal and Range Sciences Course Enrollment

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**VETS**

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<td>Anatomy/Physiol/Domestic Animals</td>
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### G. Other relevant data and materials

#### Impact statement

**Barker, W.**
- Herbicide application to control Leafy spurge costs from $17-$37/acre to apply. Our work has shown that Leafy spurge can be controlled to an acceptable level using multispecies grazing with the profit from the sheep being a new enterprise.
- Our natural resource work has provided up-to-date information on poorly known areas of the state and helps the National Guard to better manage their lands for a healthy ecosystem.

**Berg, E.**
- The major impact that I have had to North Dakota and to North Dakota State University was, at this point, being hired November 1, 2006.

**Biondini, M.**
- Develop new restoration techniques and management strategies to optimize biomass production for ethanol while maintaining the USDA CRP program objectives.
- Construct a user-oriented model for the planning and ecological assessments of CRP-ethanol projects across a variety of climatic and soils conditions.
- Determine which combinations of plant species will produce optimal fermentable sugar yields.
- Determine the optimal feedstock transportation, handling, and storage methods to deliver a steady supply of biomass from subdivided CRP regions to a centrally located cellulosic ethanol processing plant.

Caton, J.
- Efforts in Maternal Nutrition and Selenium on maternal and fetal outcomes have contributed to the development of multiple symposia and workshops. Efforts in this regard have been contagious and numerous projects have developed from the platform of data at NDSU.
- Research efforts have resulted in several invited papers and three more scheduled in 2007.

Colville, T.
- Among the 130 accredited veterinary technology educational programs in the United States, the NDSU Veterinary Technology Program is one of only 16 that offer the Bachelor of Science degree. This attracts students from around the country in addition to students from North Dakota and the surrounding region.
- The Veterinary Technology Program offers students interested in careers in animal health care an educational alternative to pursuit of a veterinary degree. The complexity of modern-day animal health care has resulted in the veterinary profession moving increasingly toward the development of the animal health care team concept. The animal health care team consists of veterinarians working with skilled veterinary technicians, and other aides and assistants. The education students receive in the NDSU Veterinary Technology Program fosters the development of professional knowledge, manual skills and critical thinking in the context of a complete university Bachelor of Science education. According to the 2006 Veterinary Technology Program Graduate Survey, graduates of the program are spread over 22 states, but more than 75% of the survey respondents are located in North Dakota, South Dakota and Minnesota.
- Through the Robinson Hall Veterinary Wellness clinic, Veterinary Technology Program students and staff provided wellness services to animals from the F-M Humane Society and the Red River Zoo.
- Through its graduates, the Veterinary Technology Program contributes to improving the quality of animal health care in North Dakota, the upper mid-west region and across the country. This impacts the public through improved prevention, diagnosis and treatment of livestock and companion animal diseases and injuries.
- Veterinary Technology Program staff members contribute to the advancement of veterinary technician education and the veterinary technology profession in general. Two program staff members are past presidents of national professional associations – the Association of Veterinary Technician Educators (Thomas Colville and Teresa Sonsthagen) and the National Association of Veterinary Technicians in America (Teresa Sonsthagen). All program staff members have authored all or part of veterinary technology textbooks and other educational resources.

Grazul-Bilska, A.
- The results of my research program will help to enhance reproductive efficiency, which may have a direct impact on reducing high input costs to the animal industry. Development and establishment of an animal embryology program and animal embryology laboratory at NDSU will bring these new technologies to North Dakota, and make them available for practical on-farm use. The immediate practical impact of this research is that it will enable the development of practical methods of assisted reproductive technologies (ART) that will serve the animal agriculture industry in North Dakota. The practical and economical merits of ART in the domestic animal industry
include not only improvements in reproductive efficiency, but also in the breeding improvement programs through use of embryos with specific genetics (e.g., sex selection on dairy farms), importation and exportation of animals in the form of frozen embryos, production of transgenic animals with highly desirable genes, etc. Having this technology available in North Dakota will open up these specialized markets to North Dakota producers. In addition, the proposed activity will help to generate preliminary data to apply for grants from outside sources, and recruit undergraduate and graduate student researchers. Therefore, the impact of a strong research program in this area will strengthen our teaching program by bringing these new biotechnologies to North Dakota students.

- In summary, these proposed studies will enhance our research, teaching, and outreach activities, which in turn should have a major impact on the livestock industry and economy of North Dakota.

Grygiel, C.

RESEARCH - The main objective of my recently completed research project (see Grants Funded Section of this report) was to test an innovative technique for use in prairie restoration that will facilitate the establishment of a self-sustaining prairie landscape rich in biodiversity. This research project bridges the gap between basic research that I initially conducted on small-scale disturbances and the creative application of these research findings in addressing a conservation issue of great importance i.e., restoring a degraded prairie landscape into a functioning tallgrass prairie ecosystem.

- Maintaining a high level of species diversity on a restored prairie site is a predominant and still unresolved problem. Maintaining species diversity on small fragments of native prairie landscape presents another difficult management priority. Conventional agronomic methods for prairie restoration have met with various long-term success and failure rates. Despite the importance of the subject, very few relevant studies have been conducted to explore alternative restoration methods for maintaining and increasing species diversity on prairie landscapes. The primary objective of this research was to develop an understanding of how natural drivers of change can be simulated to establish and maintain plant diversity in restored prairies and to incorporate the understanding into a methodology for the restoration of prairie landscapes.

- Results derived from his research can serve as a model for prairie restoration efforts of landowners for restoring as well as maintaining a viable prairie landscape. The results of this research will be applicable to large sites, but may also prove especially useful on small areas of 5 Acres or less in developed areas, where management practices such as prescribed burning cannot be easily employed. The results of this research may also be used in areas where large-scale roto-tilling is not aesthetically acceptable.

- This research represents a unique and innovative approach to restoration of sites where past restoration efforts have been less than successful in maintaining species diversity. This research holds the potential for developing an innovative restoration methodology for use especially in vista-sensitive areas where long-term evidence of drilled seed rows and plowing induced landscape homogenization is aesthetically unacceptable.

EDUCATION – Natural Resources Management at NDSU is a dynamic interdisciplinary academic program with steadily increasing student enrollment at both the undergraduate and graduate levels. This program is directed toward educating students in areas of natural resources expertise, enabling them to attain important employment positions where their knowledge can be applied toward solving problems associated with the management of scarce natural resources. - While this program formally engaged a majority of students with farming and ranching backgrounds, an increasing number of students enrolling in the program have a non-rural orientation. The projected total
student enrollment for Fall Semester 2007 is 170 students and a continuing increase in student enrollment is anticipated for future semesters. Graduates of this program have successfully obtained employment in areas relating to natural resources management. Graduates are employed with federal and state agencies, metropolitan governments, non-profit organizations, private corporations, consulting firms, academic institutions, and other organizations.

- The structure of this program is comprised of six emphasis areas: Biotic Resources, Physical/Earth Resources, Natural Resource Economics, Social Sciences, Pollution Control Science, and Environmental Communications. Natural Resources Management offers Bachelor of Science (BS), Master of Science (MS), and Doctor of Philosophy (PhD) degrees in all of these emphasis areas. These interdisciplinary emphasis areas were developed to accommodate the career aspirations of our diverse student population. Development of new emphasis areas will continue in reflection of students’ career goals, as they address the increasingly complex effects associated with society’s impacts on the environment.

- Educating and preparing students for significant roles in areas of natural resources management is increasingly important as the growing human population continues to impart impacts on the environment. Natural Resources Management at North Dakota State University is at the forefront of interdisciplinary education and student preparation for leadership positions in careers oriented toward managing natural resources for their highest and best uses for society while maintaining the integrity of natural systems.

Hammer, C.

- Extension efforts will help ND horse owners improve their quality of horse care and increase owner knowledge resulting in higher performance and enhanced economic potential
- Promotion of the ND horse industry will increase awareness of opportunities and business potential within the industry
- Research efforts will enhance understanding of immunoglobulin transport and absorption resulting in improved neonatal health

Lardy, G.

- Extension. The largest impact extension program I conducted this year was to organize and deliver drought management programming at nine sites across North Dakota. This included organizing conference calls with extension specialists and agents throughout the spring and summer in an effort to monitor drought conditions and respond to immediate needs of agents for extension material. It is difficult to estimate the direct economic impacts of this programming but we did reach over 360 producers at these meetings. Producers in drought affected regions who adopted our supplementation recommendations likely saved their operations over $20 per cow. This would result in a cost savings of approximately $630,000 if 10% of the ranchers in the drought affected regions implemented these practices.
- In addition, another fun extension activity was speaking at all six of the North Dakota Stockmen’s Association’s Spring Roundup meetings. This program reached over 700 producers across the state of North Dakota. Our data indicates ranchers could increase revenue by $10 per head with additional management of feeder calves. If these recommendations were adopted by 10% of ranchers in the state adopted these strategies the direct economic impact would be $950,000.
- Another important effort I undertook this year was a focused effort at increasing the readership of my monthly newsletter, The Ranch Hand. By the end of the year I had about 850 subscribers for the electronic version of the newsletter. This subscribers are primarily cattle producers but also include media personnel, veterinarians, allied industry personnel, and other livestock producers. I was also able to secure over $176,000 in grant funds to conduct extension and research activities.
aimed at improving profitability of beef cattle operations in the 4-State region (ND, SD, MT, WY). This collaborative activity involves extension specialists from each of the four states.

- Research. Research highlights this year included publication of 13 peer reviewed publications and securing over $300,000 in grant dollars for research activities related to a broad range of beef cattle nutrition and management practices. The publications dealt primarily with co-product evaluation, specifically with the use of ethanol and sugar beet processing byproducts. These byproducts are very important to the region. The sugar beet industry alone generates over $500 million in direct economic impact in the Red River Valley. The ethanol industry in North Dakota is growing rapidly. At the end of 2006, North Dakota had about 85 million gallons of ethanol production capacity. By the end of 2008, that number is projected to grow to approximately 435 million gallons. This will result in a dramatic increase in byproduct availability as well. Our research indicates wet sugar beet pulp can be ensiled with a variety of other feedstuffs. This should prove to be a useful means for livestock producers to store these wet byproducts. Our research with ethanol byproducts indicates that corn condensed distillers solubles is a useful supplement for cattle consuming low quality roughages. This byproduct is typically competitively priced and should save North Dakota cattle producers thousands of dollars per year in supplementation costs compared to typical protein supplements.

- Service. This year marked the successful culmination of over four years of work related to the development of the Beef Systems Center of Excellence. In 2006, we completed a successful equity drive for our private business partner, North Dakota Natural Beef, LLC. This business will ultimately process 25,000 head of cattle annually in their Fargo facility. This business represents approximately $3.7 million in private investment in the beef processing industry in North Dakota and has the potential to stimulate significantly more investment in the industry as the project moves forward. In addition, we were also able to hire three outstanding meat scientists. This should be the start of a nationally and internationally recognized meats program at NDSU.

- I also began my duties as an Associate Editor for the Journal of Animal Science. My duties began in September and for 2006, I handled three manuscripts with final decisions. I also served on a SBIR grant review panel in February in Washington, DC.

Luther, J.
- My extension and research efforts deliver enthusiasm and modern knowledge to North Dakota sheep producers. Since my primary research focus is on reproductive physiology in sheep, my research, and subsequent extension efforts will enhance income of ND sheep producers through increased reproductive efficiency. Furthermore, my active involvement at the national level will aid in making NDSU’s Sheep Extension and Research Program one of the top sheep programs in the nation.

Maddock Carlin, K.
- My research in meat science and muscle biology has important implications:
  - Because utilization of field peas in feedlot diets may impact tenderness of beef. Tenderness is the most important palatability trait of beef and may provide a means of providing a guaranteed tender beef product to consumers. Additionally, North Dakota produces more field peas annually than any other state, and demand for field peas may be impacted if found to improve meat quality.
  - Maternal nutrition has huge impacts on offspring growth. The impacts on muscle growth, and subsequent carcass composition and meat quality may be economically measurable as well as have implications of maternal nutrition in human growth and development as it pertains to growth of offspring.
Maddock, R.
- Adding value to livestock production by improving end product quality will result in greater economic returns to livestock producers and meat processors. By conducting relevant research and providing timely information to stakeholders, a noticeable improvement in the quality and value of meat products will result.

Moore, B.
- The NDSU sheep flock has been a source of improved genetic material and is recognized nationally. Many questions on production and management of sheep are directed to NDSU from all across the nation. The problem with scrapie has focused some negative attention but has provided unique opportunities to study and disseminate information on the disease. The university beef herd is recognized as having a positive and progressive purebred program. Most importantly, NDSU Animal and Range Sciences graduates are held in high regard, are highly employable, and are important contributors to the livestock industry.

Park, C.
- Area 1. Nutritional Strategy for Animal Development and Epigenetic Control of Lactation:
The economic future of livestock (beef and dairy) operations depends largely on a sound rearing program for replacement heifers. Successful heifer rearing, in turn, is determined by efficiency of heifer growth and, more importantly, their subsequent lactation potential. An effective replacement heifer program is vital to farm profitability.
- For nearly 17 years, our laboratory has been investigating the use of a stair-step compensatory growth feeding regimen to improve lifelong heifer production. The basic concept of this regimen is to reduce energy levels [restriction phase] at times when heifers are not as likely to put it to good use (e.g., early to mid-gestation) and to push energy [realimentation phase] when the animal can make the best use of it (e.g., late gestation). Heifers raised on our stair-step nutrition regimens exhibit enhancements in 1) growth efficiency, 2) mammary gland development with improved lactation performance over two or more lactations, 3) prepartum metabolic and immune status, and 4) reproductive performance in first calf dairy and beef heifers.
- Animal agriculture. Dairy heifers reared on compensatory nutrition regimens have at least a 10% enhancement in lactation performance which carries through to subsequent lactations. If heritable genes regulating milk synthesis are identified, the possibility exists to manipulate genes to further improve lactation as well as the longevity of lactation. An increase in lactation efficiency may increase profits without increasing cow number which has economical as well as environmental impact (e.g., land use).
- Human health. Findings from these studies may facilitate future studies on a broad range of biological pathways regulating proliferation, functional differentiation, and apoptosis of the mammary cell. By establishing a correlation between nutrition and development of the mammary gland, we may be closer to controlling lactation potential. Also, the ability of compensatory growth-directed and gestation-specific mammogenesis to influence epigenetic changes in the expression of genes regulating milk synthesis may aid in developing practical means of enhancing quality and quantity of milk (e.g., infant health, the secretion of certain immunoglobulins or growth factors) as well as longevity of lactation.
- In addition, the degree of development of specific lobular types is highly associated with a susceptibility to carcinogenesis; fuller differentiation of lobules is considered to have anticancer activity. If compensatory mammary growth during the first pregnancy alters DNA methylation and stimulates full mammary cell differentiation, then this information could potentially be used to develop improved maternal diets that may help to prevent and reduce the breast cancer risk.
- Future studies. We have established that the stair-step compensatory nutrition regimen has lasting effects on mammary development, differentiation, and lactation. Thus, the principal challenge will be to document the extent to which nutritionally directed compensatory mammary hyperplasia induced once during the first gestation affects methylation status thereby producing stable epigenetic changes in genes with the result being a metabolic imprinting process.

- Area 2. Nucleotides and Calf Health and Immune Status:
- Calf mortality and disease treatment represents an income loss of more than $250 and $750 million each year for dairy and beef producers, respectively. Our recent efforts focus on dietary supplementation of nucleotides to enhance immune status and health of the neonatal animal. If nucleotide supplementation to the neonate and/or the mother enhances health in general and decreases mortality of the neonate, livestock producers will benefit economically. Moreover, the animal feed industry may have the opportunity to develop an improved formula for nursing products.

- Area 3. Basic Mammary and Cancer Biologies:
- We have been studying the role of dietary methyl donor nutrients (choline, methionine, folic acid, and vitamin B12) in mammary development as well as in tumorigenesis. A dietary strategy that increases the supply of methyl donors may have practical applications in cancer treatment. If dietary supplementation of lipotropes induces apoptotic death of mammary cancer cells, then there is a possibility of developing a dietary regimen that may reduce and treat breast cancer.

- Area 4. Nutraceutical Production in Milk:
- The incentive to produce nutraceuticals (foods which have additional medical and health benefits) in the dairy and food industries is increasing. Dietary supplementation with certain vegetable oils (canola or sunflower) can increase conjugated linoleic acid, an anticancer agent, in milk. However, working with oil is difficult; therefore, we are researching the use of whole seeds in dairy rations to alter the fatty acid composition in milk. At present, there is a strong incentive in the market for the food industry to produce niche products that carry nutritionally and medically beneficial components, such as conjugated linoleic acid in dairy products.

Redmer, D.
- The impact of my research program is to make progress towards increased reproductive efficiency of farm animals, making animal agriculture more profitable for the livestock producer and less expensive to the consumer.
- A secondary impact of my research program is increased overall understanding of the mechanisms that regulate reproductive processes and tissue growth in general, leading to improved animal agriculture, human fertility, and health care.

Reynolds, L.
- Production of animal for meat is a multi-billion dollar industry in the U.S. alone. Income from the sale of animals, feed consumed by animals, and meat consumed in the U.S. is, conservatively, a quarter of a trillion dollars per year. Because the costs of maintaining reproductively sound females is a primary expense for livestock producers, reproductive failure remains one of the most limiting and costly problems facing the livestock industry. Thus, methods to improve reproductive efficiency would have a major impact on the profitability of animal agriculture.
- Beyond that, the world’s population is expected to continue its explosive growth and is conservatively expected to double from its present 6 billion to nearly 12 billion by 2050. Along with world population growth will come a large increase in the demand for meat and milk products. Thus, the efficient production of animal protein, especially from low-quality forages, should remain a driving force for agricultural research. Understanding the mechanisms
controlling reproductive efficiency of farm animal therefore has important economic as well as social implication for North Dakota, the nation, and the world.

- The placenta is the organ through which all of the nutrients, respiratory gases, and wastes are transferred between the maternal and fetal systems. Thus, normal growth and development of the fetus depends on an adequate blood supply to the placenta. Normal fetal growth and development, in turn, are critical determinants of postnatal survival as well as long-term health and productivity of the offspring. Dr. Reynolds' research emphasizes the mechanisms regulating placental growth and vascular development (angiogenesis), using in vivo and in vitro (including histological) approaches.

- Dr. Reynolds' current research emphasizes the effects of over-nutrition, under-nutrition, specific nutrients such as selenium, numbers of fetuses, and the maternal and fetal genomes, on growth and vascular development of the uterus and placenta. The goal of this research is to provide an optimal uterine environment to ensure maternal, fetal, and postnatal health in humans and livestock. Dr. Reynolds also serves as Co-Director of the Center for Nutrition & Pregnancy (http://cnp.ndsu.nodak.edu/).

- Dr. Reynolds' research involves collaboration with numerous scientists in the U.S. and abroad. For example, his recently funded NIH grant, in collaboration with Dr. Jacqueline Wallace at the Rowett Research Institute in Aberdeen Scotland, is evaluating changes in placental vascular development in adolescent ewe lambs that are overnourished or undernourished throughout pregnancy. One of his most recent collaborations, with Dr. Mario Biondini, involves the mathematical modeling of the 3-dimensional architecture of the placental blood supply and how it develops throughout pregnancy. Dr. Reynolds also is involved in a recent collaboration with Drs. Lino Loi and Grazyna Ptak on the Veterinary Faculty of the University of Teramo in Italy, investigating placental vascular defects responsible for the high rate of failure of pregnancy in cloned embryos, including parthenogenotes, androgenotes, and somatic cell nuclear transfer clones.

Schroeder, J.W.

- Key Theme – Agricultural Profitability: North Dakota Dairy Diagnostic Program Justification
Dairy business challenges include more than high feed costs or low milk prices. Important whole farm business decisions affect the typical North Dakota dairy enterprise. Current efforts have focused on in-depth financial analysis with select advisory teams to balance the dairy enterprise with the farming operation.

- Community and Industry Impact
According to economic research from various universities, for every one dollar spent in dairying, the associated rural community can expect it to be reinvested from 2.67 to 7 times in the form of locally purchased supplies, hired labor, equipment, taxes, etc. Intangible benefits of participating in the diagnostic approach include the development of strategic alliances, on-the-job training in evaluating growth, improving communication, and setting personal as well as business goals for growth.

- Economic Impact
Dairy families monitor and measure the impact of decisions formulated by their self-selected advisory board with the help of an ND3P facilitator. Granted the decline in farm numbers magnifies our measure of coverage, but based on December 2006 data, over 19% of the dairy farms permitted to sell milk have been involved in ND3P since its inception.

- Gross Annual Economic Impact –
Accomplishments from selected farms (57 farms have been involved in the program):
- Farm #1: Removed all rBST from the herd resulting in an annual cost savings of $106,680. Coincidentally, management changes resulted in increased average milk production by an additional 9# per cow per day. Gross impact - $428,610.
- Farm #2: Fans were added at the advice of the diagnostic team to increase cow comfort and the goal of reducing milk losses resulting during hot weather, typically dropping about five pounds per cow on a daily average. For the first year with fans, the drop in milk nearly eliminated. Milk receipts indicate an improved persistency of milk marketed during the heat. Estimated gross impact - $50,400.
- Farm #3: Adopted a milk-marketing plan using forward contracts. The results indicate an improved annual gross impact of - $80,000.
- Farm #4: Developed a new management plan for their replacement heifer rearing facility. Results show a significantly reduced death-loss, decreased health-related costs, and increased number of available herd replacements eliminating much of the cost associated with past purchases. Gross impact - $ Priceless, when considering the purchase of developed replacement heifers is from $1800 to 2600 apiece.

Key Theme - Agricultural Competitiveness: Dairy Retention/Sustainability

Demands for expertise in livestock development are escalating with the explosion of interest in investment for alternative fuels production. The 2004 grass-roots driven formation of the North Dakota Dairy Coalition (NDDC) is now attaining a foothold in the rural North Dakota landscape by incorporating dairy development with these emerging revitalization opportunities. The NDSU Extension Service, the Animal, and Range Sciences Department, the North Dakota Department of Agriculture – Dairy Division and the North Dakota Association of Rural Electric Cooperatives collaborated to launch the NDDC for providing central leadership for dairy expansion.

Impact: Emergence renewable fuel development like ethanol and bio-diesel has propelled the state and region into a highly competitive and frankly, volatile economic situation. Yet when comparing North Dakota others in our region, the relative cost to resources to support livestock growth suggests we can have a decisive advantage, especially with availability of feed grains and associated co-products, all of which are well suited for dairy and feedlot producers. If North Dakota wants to capture this opportunity for livestock growth, the window of opportunity should exist for the next five to 10 years.

- Our vision for NDDC was to be a key element to gain momentum for rural growth with livestock. Many of our agricultural communities are now beginning to understand the significance of economics associated with dairy. Moreover, many now see that livestock is an essential ingredient to the success of the sustainability for renewable fuels. As the effectiveness of the coalition grows, so does Extension’s educational role, creating new challenges for assisting the development of sound business plans.

Some of the accomplishments derived from the above-described efforts this past year include: Thirteen land sites have been pre-permitted for dairy use and are near established rural communities who welcome new dairy farm families (map available at http://www.nddairy.com/sites.htm); a few private investment groups are currently preparing business plans.
- Existing North Dakota producers have completed expansion projects with the help of ND3P and Extension resources.
- Recruitment of in-state and out-of-state operators who have purchased vacant dairies: 1] The largest of which includes 1600 cows, 2] Another added 100 cow its farm and brought in a young family of five kids, and 3] Another dairy began the process of filling a 490 cow facility with a new family.
- Efforts currently in progress with a high likelihood of success include:
  Helping a family to complete a dealing on an county dairy with about 75 cows, 2] Bringing in both Eastern and Midwestern U.S. dairy families to view offerings in North Dakota, and 3] Two parties are interested in a larger ND investor dairy that was recently closed.
It is indeed encouraging that several larger dairies do see the advantages and want to build new facilities near North Dakota ethanol plants. We are optimistic these and other results will encourage lawmakers to include NDDC in the FY2008 fiscal budget as a show-of-support to the state’s producers and support agencies that piloted this effort.

**Sedivec, K.**
- Increase grazing efficiency and economic return through improved grazing management.
- Convert leafy spurge from an economic loss to the cattle industry through adding sheep grazing and bio-control to convert a weed into a feed.
- Increase the awareness and use of monitoring rangelands.
- Improve the knowledge and management of natural resources, including CRP, range, pastureland, and wildlands in North and South Dakota.

**Stoltenow, C.**
- Through my efforts with NDSU Ag Communications and the Office of the State Veterinarian, only 5 cases of anthrax on 4 premises were reported after an intensive media anthrax vaccination campaign was conducted in the spring of 2006. This compares with over 1,000 cases of anthrax in 2005.
- Through my efforts and collaborations with the Office of the State Veterinarian, a North Dakota beef herd was selected as a Johnes demonstration herd funded by USDA:APHIS to study modes of transmission and attack rates by age cohort and type of environment. Data from this demonstration herd is being evaluated for implementing management programs on other ND beef operations.

**Swanson, T.**
- Equine Industry Tours provide students with an opportunity to travel to states where equine dominates the economy. By doing this, students see the potential within the industry for jobs. In addition, a class like this gets students exposure to diversity within the U.S. and may motivate the students to intern or find jobs within the industry, thereby utilizing the education they have received here at NDSU.
- Public awareness is something we as educators can not give enough of. Clinics and related publications are a source of educating the public. Education leads to awareness and awareness leads to impact. By sponsoring clinics and a newsletter it is a way for our department to provide the public with useful knowledge they can implement into their businesses or programs.

**Vonnahme, K.**
My research in fetal programming has important implications:
- Because early gestation is a crucial period for placental and fetal growth and differentiation, maternal nutrition during this critical period has a real potential to impact subsequent growth rate and carcass composition of their calves/ lambs. The long term goal is to determine how calves/ lambs born from dams receiving different diets during gestation, perform in the feedlot.
- Alterations in placental vascular development and function may impact nutrient delivery to the growing fetus, potentially affecting the subsequent health, growth efficiency and carcass quality of their offspring, which will have direct relevance to the US beef industry.
- Decreased growth rate and sub-optimal carcasses cost feedlot producers millions of dollars annually. These data will undoubtedly lead to a better understanding of factors limiting *in utero* fetal growth and development, which could lead to reduced offspring health, production efficiency and longevity.

**Wagner, S.**

- Research effects are pending as manuscripts are currently in preparation or undergoing revision for submission to peer-reviewed journals. I presented educational seminars for children and adults locally and nationally in 2006. Visibility of NDSU is enhanced and young people and adults have been provided with guidelines for safe interaction with farm animals, while colleagues in the veterinary community have been provided with current information regarding pathogenesis and treatment of calfhood diseases.
## ANIMAL & RANGE SCIENCES DEPARTMENT

### GRADUATE STUDENT

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