USDA-ARS-MWA
Livestock Behavior Research unit

Fall 2005

LBRU Update

LBRU welcomes Dr. Marcos Rostagno

The Livestock Behavior Research Unit is pleased to announce that Dr. Marcos Rostagno has joined the Unit as a Research Animal Scientist. Marcos is the Unit's fifth Animal Scientist and his arrival brings the Unit up to full strength. He holds a D.V.M. from Brazil and a Ph.D. gained as part of a cooperative research project between the Federal University of Minas Gerais in Brazil and the and the USDA-ARS National Animal Diseases Center based in Ames Iowa. For Marcos, a return to West Lafayette is something of a homecoming, as he was born in the city while his father was studying at Purdue University.

Dr Marcos Rostagno samples the holding pen floor at a slaughter facility to culture for Salmonella bacteria

Dr. Rostagno joins the Unit from USDA-ARS NADC, where he was the Veterinary Medical Officer in charge of the salmonella ecology and epidemiology research team. He brings a strong set of new laboratory skills to the LBRU and is in the process of establishing microbiology capabilities in the Unit's Farm Animal Behavior Laboratory, that was officially opened last year. In terms of research direction, Marcos will focus on investigating the effects of management practices and its associated stress on the microbial ecology of the gastrointestinal tract of swine with emphasis on potential foodborne pathogens and the consequent food safety risk.

With both food safety and animal well-being issues becoming increasingly important within the U.S., the LBRU is uniquely placed to investigate the relationships between stress and zoonotic disease susceptibility in food producing animals.

Major grant to study molting in laying hens

Dr. Heng-wei Cheng, Dr. Don Lay and Dr. Ruth Marchant-Forde, have been awarded a major competitive grant of $314,000 under the USDA-NRI grant scheme to study molting in laying hens over the next three years. Usually, laying hens are molted by withdrawing feed for up to two weeks, which results in the hens ceasing egg production and losing their feathers. When feed is returned, the hens begin to re-grow their feathers and they start a second egg-laying cycle. However, welfare concerns about the practice of feed withdrawal are driving research into alternative methods of forcing molt. The project, is entitled "Reproduction II as a New Strategy for Molting in Laying Hens: Stress Indicators, Alternative Method for Molting, and Practical Implication."

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Special points of interest:

- Research News
- Grants awarded
- New arrivals
- Presentations
- Visitors
- Publications

New ß-agonist promotes growth, safeguards welfare

LBRU scientists have just completed a study on a pure form of salbutamol, commonly known as an asthma treatment, and have shown that it promotes lean tissue growth in swine yet does not have adverse effects on welfare.

Salbutamol, also known as albuterol, is one of a series of compounds known as beta-agonists. They bind to beta-adrenergic receptors which are situated on many organs and tissues in the body, and promote a decrease in fat and an increase in muscle. Another beta-agonist, ractopamine, is already licensed for use in the US swine and beef cattle industries and is in widespread use. However, we have previously shown that ractopamine affects the behavior and physiology of pigs, making the animals harder to handle and more susceptible to stress[1]. In the current study, salbutamol did increase animal productivity, resulting in faster growth, greater feed efficiency and leaner carcasses, but also had no adverse effect on behavior or physiology. The study was partially-sponsored by Stirling Products Ltd., an Australian company with the worldwide rights to the product's use in livestock production and they are now moving forward to gain Food and Drug Administration Approval.

Dr. Jeremy Marchant-Forde and Gary Nowling investigating how pigs fed salbutamol react to handling and weighing

[1] Marchant-Forde, J.N. et al. (2003) The effects of ractopamine on the behavior and physiology of finishing pigs. Journal of Animal Science, 81: 416-422.

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We welcome 3 graduate researchers, 1 moves on

Welcome!

Fall semester at Purdue University saw the registration of three new graduate researchers beginning their studies with the LBRU.

Erin Schenck has joined to pursue her M.S. in sow welfare, with an emphasis on longevity and lameness, with Dr. Don Lay and Dr. Jeremy Marchant-Forde as co-chairs. Erin holds a B.S. degree in Animal Science from West Virginia University.

Rachel Dennis joins us from the University of Maryland, where she completed an M.S. in poultry welfare. She will be working with Dr. Heng-wei Cheng on beak-trimming in laying hens.

Rosangela Poletto completed her B.V.M. in Brazil and her M.S. on the effects of weaning age on piglet well-being at Michigan State University and has embarked on her Ph.D. with Jeremy Marchant-Forde looking at β-agonists' effects on behavior and neurophysiology.

Farewell!

Daniele Cary graduated from the group with an M.S. degree in dairy calf immunology under Dr. Susan Eicher. Daniele has moved on to a Ph.D. program at Penn State University.

Pig transport study data collection complete

"Is it better to transport piglets a long distance in one go or to break the journey up?"

Is it better to transport piglets a long distance in one go or to break the journey up? That is the topic of a major multi-disciplinary study into the well-being of nursery age pigs during transport which has just entered the final analysis phase under the leadership of Dr. Susan Eicher, Research Immunologist and M.S. researcher Jessica Williams. The study is being funded by the National Pork Board and is comparing a straight 16 hour journey with an 8-hour leg, 8-hour off-load and rest, and a second 8-hour leg. Dr. John Patterson (Purdue University) and Dr. Jeremy Marchant-Forde are inputting microbiology and behavior expertise respectively, as the project aims to determine whether the different transport treatments affect the piglets' susceptibility to pathogens. Researchers are studying gut microbial populations, innate immunity and behavior before, during and after transport.

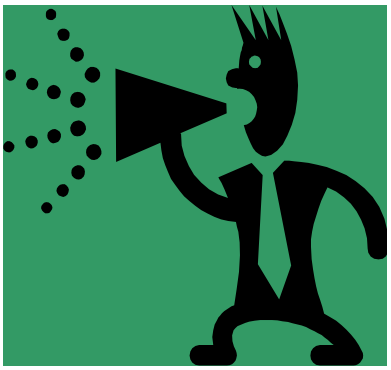
The truck getting ready for the first 8 hour leg

Out and About — Reporting Research Results

Research results delivered to global audiences

Unit scientists have had a busy few months reporting research results at important national and international conferences. July saw a major presence at the joint American Society for Animal Science and the American Dairy Science Association meeting in Cincinnati, Ohio. LBRU scientists delivered a total of five oral and poster presentations and Drs. Eicher, Lay and J. Marchant Forde all chaired scientific sessions.

In August, Heng-wei Cheng, Jeremy Marchant Forde, Ruth Marchant Forde and Alan Fahey attended the 39th International Congress of the International Society for Applied Ethology in Japan. The ISAE is the major academic society for those working in animal welfare science and the LBRU's scientists delivered four oral and two poster presentations. Jeremy Marchant Forde chaired a plenary session and an oral scientific session.



Also in August, Heng-wei Cheng and Alan Fahey attended the Annual Meeting of the U.S. Branch of the Poultry Science Association in Auburn, AL. and gave two oral presentations. Dr. Cheng was also invited to an International Workshop on Beak-Trimming in Melbourne, Australia and gave a total of 6 presentations at the workshop and at other Institutions.

September saw Don Lay travel to Vienna, Austria to participate in the 3rd International Workshop on the Assessment of Animal Welfare at Farm and Group level. Susan Eicher traveled to Oxford, UK to participate in the 38th Annual Meeting of the Society for Leukocyte Biology and Marcos Rostagno traveled to California to present at the 6th International Symposium on the Epidemiology and Control of Foodborne Pathogens in Pork.

Visitors to the LBRU

LBRU scientists and graduate researchers had the opportunity to brief Dr. Temple Grandin on their current research when she visited the Unit as part of her 3-day visit to Purdue University. Dr. Grandin is an international expert on the design of slaughterhouse facilities and animal handling and she engaged in useful discussion on on-going research within the Unit. Earlier, she had presented a seminar to a large audience of Purdue students and Faculty, on welfare auditing which is becoming increasingly important within the livestock industry.

Publications this quarter

Refereed Journal Articles

Cheng HW and Muir WM. (2005) Genetic selection in poultry: Physiological factors associated with production and survivability. *World's Poultry Science Journal* 61:383-398.

Hughes-Davis EJ, Cogen JP, Jakowee MW, **Cheng HW**, Grenningloh G, Meshul K and McNeill TH (2005) Differential regulation of the growth-associated proteins GAP-43 and superior cervical ganglion 10 in response to lesions of the cortex and substantia nigra in the adult rat. *Neuroscience*. 135:1231-1239.

Marchant-Forde JN and **Marchant-Forde, RM** (2005) Methods to reduce aggression at mixing in swine. *Pig News & Information*, 26: 63N-73N.

Rostagno MH, Hurd HS and McKean JD (2005) Resting pigs on transport trailers as an intervention strategy to reduce Salmonella enterica prevalence at slaughter. *Journal of Food Protection* 68:1720-1723.

Toscano MJ and **Lay DC** (2005) Parsing the characteristics of a simulated udder to determine relative attractiveness to piglets in the 72 h following parturition. *Applied Animal Behaviour Science*, 92: 283-291.

Koch JM, Moritz JS, Smith DL, **Lay DC**, Wilson ME (2005) Melengestrol acetate as an effective alternative to induce a decline in egg production and reversible regression of the reproductive tract in laying hens. II. Effects on postmolt egg quality. *Poultry Science*, 84: 1757-1762.

Koch JM, Moritz JS, **Lay DC**, Wilson ME-Melengestrol acetate in experimental diets as an effective alternative to induce a decline in egg production and reversible regression of the reoroductive tract in laying hens I. Determining an effective concentration of melengestrol acetate. *Poultry Science,* 84: 1750-1756.

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The mission of the LBRU is to develop scientific measures of animal well-being, through the study of animal behavior, stress physiology, immunology, neuro-physiology, and cognition, that will allow an objective evaluation of animal agricultural practices. This method of study will allow the improvement of existing practices and invention of new practices that can enhance animal well-being and increase animal productivity. In addition, this unit will use and develop its knowledge of stress physiology and animal behavior to address concerns of pathogen contamination of livestock carcasses due to the stress of handling and transportation. The optimization of animal well-being will assist in improving animal health, increasing productivity and decreasing human exposure to dangerous pathogens.

We're on the web:
www.ars.usda.gov

USDA Livestock Behavior Agricultural Research Service Research Unit

Finding solutions to agricultural challenges

Publications this quarter (continued)

Refereed Meeting Abstracts

Cary DC, **Eicher SD** and Patterson JA Modulating immune function of neonatal dairy calves fed beta-glucan with and without ascorbic acid. *Journal of Leukocyte Biology*, Suppl: 67: 161

Cheng HW, Gustafson L, Pajor EA and Mench JA (2005) Comparative histology of duck bills following different bill trimming practices. *Poultry Science* 84 (Suppl 1): 82

Cheng HW and **Pohle K** (2005) Behavioural changes and production performance of laying hens in furnished cages vs. conventional cages. In. (Eds. R. Kusunose & S. Sato) *39th International Congress of the International Society for Applied Ethology.* , P136.

Eicher SD and **Cary DC**. (2005) Modulation of TLR 2 and 4, IL-1, and IL-1Ra RNA expression by beta-glucan and ascorbic acid. *Journal of Leukocyte Biology*, Suppl 67: 162.

Fahey AG, Marchant-Forde RM, Muir WM and **Cheng HW** (2005) Effects of Chronic Social Stress on Immune Function, Production and Feather Condition of Three Genetic Strains of Leghorn Hens at 45 weeks of age. *Poultry Science* 84 (Suppl 1): 80

Fahey AG, Marchant-Forde RM and **Cheng HW** (2005) Effects of chronic stress on response to social isolation in three genetic stains of Leghorn hens. In. (Eds. R. Kusunose & S. Sato) *39th International Congress of the International Society for Applied Ethology.* p.70.

Gustafson L, **Cheng HW,** Garner JP, Pajor EA and Mench JA (2005) Effects of bill-trimming on the welfare of ducks. In. (Eds. R. Kusunose & S. Sato) *39th International Congress of the International Society for Applied Ethology.* p.56.

Lay Jr. DC, Marchant-Forde JN, Richert BT, **Marchant-Forde RM** and **McMunn KA** (2005) Effects of albuterol on the physiology of finishing pigs. *Journal of Animal Science,* 83 (Suppl 1): 245

Marchant-Forde JN, Lay Jr. DC, McMunn KA, Richert BT and **Marchant-Forde RM** (2005) Effects of albuterol on behavior and physiology of finishing pigs. In. (Eds. R. Kusunose & S. Sato) *39th International Congress of the International Society for Applied Ethology.* P65.

Marchant-Forde JN, McMunn KA, Richert BT, **Lay Jr. DC and Marchant-Forde RM** (2005) Effects of albuterol on behavioral and heart rate responses of finishing pigs to handling. *Journal of Animal Science,* 83 (Suppl 1): 324.

Marchant-Forde JN and Pajor EA (2005) Sow stereotypic behavior in relation to dietary sodium bicarbonate. In. (Eds. R. Kusunose & S. Sato) *39th International Congress of the International Society for Applied Ethology.* P134.

Marchant-Forde RM, Jefferson L, **Cheng HW** and Muir WM (2005) Genetic related differences in response to chronic stress in laying hens. In. (Eds. R. Kusunose & S. Sato) *39th International Congress of the International Society for Applied Ethology.* p.68.

Richert BT, Hinson RB, **Marchant-Forde RM, Lay Jr. DC, McMunn KA** and **Marchant-Forde JN** (2005) Effects of albuterol on the growth and carcass characteristics of finishing pigs. *Journal of Animal Science,* 83 (Suppl 1): 345.

Ritter M, Ellis M, Benjamin M, Berg E, DuBois P, **Marchant-Forde JN,** Green A, Matzat P, Mormede P, Moyer T, Pfalzgraf K, Siemens M, Sterle J, Whiting T and Wolter B (2005) The fatigued pig syndrome. *Journal of Animal Science,* 83 (Suppl 1): 258.