

Marcia R. Hathaway

Professor

Appointment 70% Research, 30% Teaching

Research Area Muscle Biology

Appointment History 2000-present Professor
1992-1999 Associate Professor
1986-1992 Assistant Professor

Graduate Program Affiliations

Animal Sciences – Senior Member

Professional and Honorary Societies

Member, American Society of Animal Science

Five Most Significant Publications

Hathaway, M.R., M.E. White, and W.R. Dayton. 2003. Effects of antimicrobials and weaning on porcine serum insulin-like growth factor binding protein concentration. *J. Anim. Sci.* 2003 Jun;81(6):1456-63.

The increase in serum insulin-like growth factor-1 (IGF-1) which occurred in pigs fed subtherapeutic levels of an antimicrobial was accompanied by an increase in IGF binding protein-3 and a concurrent decrease in IGF binding protein-2. The binding proteins have been shown to modify the effect of IGF-1. This publication supported our earlier conclusions that antimicrobial supplementation induces significant physiological changes in the pig which are compatible with enhanced growth.

Hathaway, M.R., W.R. Dayton, M.E. White, T.L. Henderson, D. Young, and T. Doan. 1999. Antimicrobial-induced increases in serum Insulin-like growth factor-1 (IGF-1) concentrations are not the result of increased voluntary feed intake. *J. Anim. Sci.* 77:3208-3214.

In this publication we showed that the increase in serum insulin-like growth factor-I was not solely the result of increased voluntary feed intake that is typically associated with subtherapeutic antimicrobial supplementation. Rather, the increase in serum insulin-like growth factor-1 was a physiological response by the pig to the presence of antimicrobials in the gastrointestinal tract.

Hathaway, M.R., W.R. Dayton, M.E. White, T.L. Henderson, and T.B. Henningson. 1996. Serum insulin-like growth factor-I (IGF-I) concentrations are increased in pigs fed antimicrobials. *J. Anim. Sci.* 74:1541-1547.

This publication showed that when pigs were fed a subtherapeutic level of antimicrobials there was a significant increase in the concentration of a positive growth factor: serum insulin-like growth factor-1. This was the first time that antimicrobial supplementation had been directly linked to a blood borne anabolic growth factor.

Hathaway, M.R., D.H. Kretchmar, C.E. Allen, S.G. Cornelius, and W.R. Dayton. 1990. In vitro muscle cell proliferation and protein turnover as affected by serum from pigs fed antimicrobials. *J. Anim. Sci.* 68(10):3190-3197.

This was the first determination that feeding subtherapeutic antimicrobials to pigs resulted in changes in blood borne growth factors that could affect the growth of muscle cells. Such a finding changed the perspective on the proposed hypothesis of how antimicrobials enhance animal growth.

Hathaway, M.R., M.S. Pampusch, S.G. Cornelius, C.E. Allen, and W.R. Dayton. 1990. Antimicrobial supplementation of growing pigs; The effect of porcine sera fractions on in vitro muscle cell proliferation. *J. Anim. Sci.* 68(11):3642-3648.

This publication showed that there were changes in both positive and negative growth factor concentrations in the sera of pigs receiving subtherapeutic levels of antimicrobials in their feed. This work showed that there were significant physiological changes occurring that reflected enhanced growth.

Refereed Journal Publications and Book Chapters (Last Five Years)

Authored or co-authored the following 13 papers in peer-reviewed journals.

- Kamanga-Sollo E., M.S. Pampusch, G. Xi, M.E. White, **M.R. Hathaway**, and W.R. Dayton. 2004. IGF-ImRNA Levels in Bovine Satellite Cell Cultures: Effects of Fusion and Anabolic Steroid Treatment. *J. Cell Physiol.*
- Xi, G., E. Kamanga-Sollo, M.S. Pampusch, M.E. White, **M.R. Hathaway**, and W.R. Dayton. 2004. Effect of recombinant porcine iGFBP-3 on IGF-I and Long-R3-IGF-I-stimulated proliferation and differentiation of L6 myogenic cells. *J. Cell Physiol* 200(3):387-94.
- Hathaway, M.R.**, W.R. Dayton, M.E. White, and M.S. Pampusch. 2003. Effects of antimicrobials and weaning on porcine serum insulin-like growth factor binding protein levels. *J. Anim. Sci.* 81(6):1456-63.
- Johnson, B.J., M.E. White, **M.R. Hathaway**, and W.R. Dayton. 2003. Effect of differentiation on levels of insulin-like growth factor binding protein mRNAs in cultured porcine embryonic myogenic cells. *Domest. Anim. Endocrinol.* 24(1):81-93.
- Pampusch, M.S., B.J. Johnson, M.E. White, **M.R. Hathaway**, J.D. Dunn, A.T. Waylan, and W.R. Dayton. 2003. Time course of changes in growth factor mRNA levels in muscle of steroid-implanted and nonimplanted steers. *J. Anim. Sci.* 81(11):2733-40.
- Pampusch, M.S., E. Kamanga-Sollo, M.E. White, **M.R. Hathaway**, and W.R. Dayton. 2003. Effect of recombinant porcine IGF-binding protein-3 on proliferation of embryonic porcine myogenic cell cultures in the presence and absence of IGF-I. *J. Endocrinol.* 176(2):227-35.
- White, M.E., B.J. Johnson, **M.R. Hathaway**, and W.R. Dayton. 2003. Growth factor messenger RNA levels in muscle and liver of steroid-implanted and non-implanted steers. *J. Anim. Sci.* 81(4):965-72.
- Schoonmaker, J.P., S.C. Loerch, W.R. Dayton, and **M.R. Hathaway**. 2002. Effect of an accelerated finishing program on performance, carcass characteristics, and circulating IGF-1 concentration of early-weaned bulls and steers. *J. Anim. Sci.* 80: 900-910.
- Yi, Z., **M.R. Hathaway**, W.R. Dayton, and M.E. White. 2001. Effects of growth factors on insulin-like growth factor binding protein (IGFBP) secretion by primary porcine satellite cell cultures. *J. Anim. Sci.* 79:2820-2826.
- Hathaway, M.R.**, W.R. Dayton, M.E. White, T.L. Henderson, D. Young and T. Doan. 1999. Antimicrobial-induced increases in serum insulin-like growth factor-1 (IGF-1) concentrations are not the result of increased voluntary feed intake. *J. Anim. Sci.* 77:3208-3214.
- Johnson, B.J., M.E. White, **M.R. Hathaway**, and W.R. Dayton. 1999. Decreased steady-state insulin-like growth factor binding protein-3 (IGFBP-3) mRNA level is associated with differentiation of cultured porcine myogenic cells. *J. Cell. Physiol.* 179:237-243.

- White, M.E., **M.R. Hathaway**, W.R. Dayton, T.L. Henderson and A. Lepine. 1999. Comparison of insulin-like growth factor-I concentration in mammary secretions and serum of small-and giant-breed dogs. *Am. J. Vet Res* 60(9): 1088-1091.
- Yang, F., B.J. Johnson, M.E. White, **M.R. Hathaway**, and W.R. Dayton. 1999. Effect of insulin-like growth factor (IGF)-I and Des (1,3) IGF-I on the level of IGF binding protein-3 and IGF binding protein-3 mRNA in cultured porcine embryonic muscle cells. *J. Cell. Physiol.* 178:227-234.

Funding (Last Five Years) – \$65,000

- USDA-NRI: Animal Growth, Development and Nutrient Utilization.** Role of porcine IGFBP-3 and -5 in proliferation and differentiation of porcine myogenic cells. W. Dayton (PI). 2000-04. \$210,000.
- USDA-NRI: Animal Growth, Development and Nutrient Utilization.** Role of satellite cell activation and growth factors in anabolic steroid-induced muscle growth of steers. W. Dayton (PI). 1999-04. \$182,000.
- National Pork Board.** Alternative strategies for utilizing antimicrobials as growth promotants. 2001-03. \$50,000.
- Biotechnology Research and Development Corporation.** IGFs and Cytokines in swine growth and health. M. White (PI). 1999-01. \$90,000.
- USDA-NRI: Animal Growth, Development and Nutrient Utilization.** Insulin-like growth factor binding protein production by porcine myogenic cells. W. Dayton (PI). 1997-00. \$180,000.
- MPPA.** Effect of antimicrobial supplementation on satellite cell responsiveness to growth factors. 1997-99. \$15,000.
- Biotechnology Research and Development Corporation.** IGFs and Cytokines in swine growth and health. M. White (PI). 1998-99. \$55,000.

Dissertations and Theses (Last Five Years)

Zhilan Yi. Effect of growth factors on IGFs in media conditioned by primary porcine satellite cells.

Graduate Student and Post-doctoral Supervision - Current Advisees

Ernest I. Kamanga-Sollo (co-supervise)	Post-doc	Animal Sciences
Mary S. Pampusch	Post-doc	Animal Sciences
Gang Xi	Ph.D.	Animal Sciences

Courses Taught (Last Five Years)

Designator	Name	Cr	% Effort	Term	Years
AnSc 3511	Animal Growth & Development	3	33%	Spring	2000-2004
AnSc 8211	Animal Growth & Development	3	50%	Spring	2002
AnSc 1007	Horse in Your Backyard	2	50%	Fall	2002-2003

Service

Reviewer, USDA/SBRI proposals, USDA Growth and Development
 Reviewer, J. of Animal Science
 Panel member, USDA National Initiative Grant Review Committee
 Coordinator, Science in Agriculture Program
 Member, Forage and Equine Team

Service to National and Regional Research Committees

Member, NC-131 Committee
 Member, National Pork Board's Non-Antimicrobial Promotants Enhancers Advisory Council