

William R. Dayton

Professor

Appointment 85% Research, 10% Teaching, 5% Service

Research Area Muscle Biology

Appointment History

1985-present	Professor
1980-1984	Associate Professor
1975-1980	Assistant Professor

Graduate Program Affiliations

Animal Sciences – Senior Member

Professional and Honorary Societies

American Society of Animal Science

Phi Kappa Phi

Gamma Sigma Delta

Five Most Significant Publications

Kamanga-Sollo, E., M.S. Pampusch, G. Xi, M.E. White, M.R. Hathaway, and W.R. Dayton. 2004. IGF-I mRNA levels in bovine satellite cell cultures: Effects of fusion and anabolic steroid treatment. *J. Cell. Physiol.* (In press).

This publication establishes that both estradiol-17 β and trenbolone (a testosterone analog) act directly on muscle satellite cells to increase IGF-I mRNA levels in cultured bovine satellite cells. Additionally, treatment of cultured bovine satellite cells with either estradiol-17 β or trenbolone increases proliferation rate. These data are the first to show a direct effect of anabolic steroids on IGF-I mRNA level in satellite cells and they support our hypothesis that an anabolic steroid-induced increase in muscle IGF-I level plays a major role in anabolic steroid-induced muscle growth.

Kamanga-Sollo, E., M.S. Pampusch, M.E. White, and W.R. Dayton. 2003. Role of insulin-like growth factor binding protein (IGFBP)-3 in TGF-beta- and GDF-8 (myostatin)-induced suppression of proliferation in porcine embryonic myogenic cell cultures. *J. Cell. Physiol.* 197:225-231.

This publication establishes that IGFBP-3 mediates the action of both TGF-beta and GDF-8 (myostatin) on porcine embryonic myogenic cells. This is particularly significant because both TGF-beta and myostatin play important roles in regulating muscle differentiation and proliferation. Thus, these data support our hypothesis that IGFBP-3 plays a role in regulating differentiation and proliferation of myogenic cells.

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.* 81:2733-2740.

This publication shows that muscle IGF-I mRNA levels are elevated within 7 days after anabolic steroid implantation and by day 30 after implantation IGF-I mRNA levels were three times higher than levels in the same steers prior to implantation. This is a time frame that is consistent with our hypothesis that IGF-I is a major player in the increased satellite cell proliferation that is involved in steroid-induced muscle growth.

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.* 176:227-235.

This publication reports production and purification of recombinant porcine IGFBP-3 and characterization of an antibody raised against recombinant porcine IGFBP-3. Additionally, this publication examines the IGF-dependent and IGF-independent effects of IGFBP-3 on myogenic cell proliferation. These data support our hypothesis that IGFBP-3 plays a role in regulating differentiation and proliferation of myogenic cells.

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.

This publication was the first to establish the potential role of IGFBP-3 in regulating differentiation and growth of muscle cells and it provided the basis for a USDA competitive grant examining the role of IGFBP-3 in muscle differentiation and growth.

Johnson, B.J., N. Halstead, M.E. White, M.R. Hathaway, and W.R. Dayton. 1998. Activation state of muscle satellite cells isolated from steers implanted with a combined trenbolone acetate and estradiol implant. *J. Anim. Sci.* 76:2779-2786.

Muscle satellite cells support postnatal muscle growth by fusing with muscle fibers and providing nuclei needed to support fiber growth. This publication shows that muscles of anabolic steroid-implanted steers contain more actively proliferating satellite cells than muscles of non-implanted control steers. We hypothesize that this anabolic steroid-induced increase in satellite cell numbers provides more nuclei to support postnatal muscle growth. Furthermore, we hypothesize that anabolic steroid-induced increases in production of IGF-I in muscle stimulates increased satellite cell proliferation. These findings provided the basis for a USDA competitive grant examining the mechanism of action by which anabolic steroids enhance muscle growth.

Refereed Journal Publications and Book Chapters (Last Five Years)

Authored or co-authored 14 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-I mRNA levels in bovine satellite cell cultures: Effects of fusion and anabolic steroid treatment. *J. Cell. Physiol.* (In press).
- 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.* 200:387-394.
- 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.* 81:1456-1463.
- 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.* 24:81-93.
- Kamanga-Sollo, E., M.S. Pampusch, M.E. White, and **W.R. Dayton**. 2003. Role of insulin-like growth factor binding protein (IGFBP)-3 in TGF-beta- and GDF-8 (myostatin)-induced suppression of proliferation in porcine embryonic myogenic cell cultures. *J. Cell. Physiol.* 197:225-231.
- 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.* 81:2733-2740.

- 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.* 176:227-235.
- 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 nonimplanted steers. *J. Anim. Sci.* 81:965-972.
- 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. Effect of feed intake on antimicrobially induced increases in porcine insulin-like growth factor I. *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. 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. of Vet. Res.* 60:1088-1091.
- 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.

Invited Lectures

2000: Invited research presentation at Intervet, Inc.

2001: Invited presentation, FASEB Conf., Muscle Satellite Cells and Stem Cells in Tucson, AZ.

2002: Invited seminar in Graduate School Seminar Program, University of Arizona, Tucson.

Funding (Last Five Years) \$593,000

USDA-NRI: Animal Growth, Development and Nutrient Utilization. Role of porcine IGFBP-3 and -5 in proliferation and differentiation of porcine myogenic cells. 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. 1999-04. \$182,000.

National Pork Board. Alternative strategies for utilizing antimicrobials as growth promotants. \$50,000. M. Hathaway (PI). 2001-03.

Intervet. Gift. 2001. \$6000.

Biotechnology Research and Development Corporation. IGFs and cytokines in swine growth and health. M. White (PI). 1999-01. \$90,000.

USDA-NRI Competitive Grants Program: Animal Growth, Development and Nutrient Utilization. Insulin-like growth factor binding protein production by porcine myogenic cells. 1997-00. \$180,000.

MPPA. Effect of antimicrobial supplementation on satellite cell responsiveness to growth factors. M. Hathaway (PI). 1997-99. \$15,000.

Hoerst Roussel. Gift. 1999. \$15,000.

Biotechnology Research and Development Corporation. IGFs and Cytokines in swine growth and health. M. White (PI). 1998-99. \$55,000.

Graduate Student and Post-doctoral Supervision - Current Advisees

Melvin Pagan (co-supervise)	Post-doctorate	Animal Sciences
Ernest I. Kamanga-Sollo (co-supervise)	Post-doctorate	Animal Sciences
Mary Pampush (co-supervise)	Post-doctorate	Animal Sciences
Xi Gang (co-supervise)	Ph.D.	Animal Sciences

Courses Taught (Last Five Years)

Designator	Name	Cr	% Effort	Term	Years
AnSc 3511	Animal Growth & Dev	3	33%	Spring	2000-2004
AnSc 8211	Animal Growth & Dev	3	50%	Spring	2002

Service

2002: Member of Grant Review Panel for the NRI Competitive Grants Program: Animal Growth, Development and Nutrient Utilization (reviewed 30 grant proposals)

Reviewer: 40-50 manuscripts, *Journal of Animal Science*, *Endocrinology*, *Journal of Endocrinology*, *Molecular and Cellular Biology*, *Meat Science*, *Journal of Cell Physiology*, *Domestic Animal Endocrinology*.

Ad Hoc reviewer for 15 USDA Competitive Grants

Presidents Distinguished Faculty Mentor Program

Faculty Mentor for Minority Scholars Development Program

Service to National and Regional Research Committees

Member, Tech. Comm. NC-131 Regional Project, Molecular Mechanisms Regulating Skeletal Muscle Growth and Differentiation.

Coordinator, re-write committee, NC-131 Regional Project.