

DUANE L. DAVIS, Professor

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**EDUCATION:**

**Institution and location**

Kansas State University, Manhattan, KS

Kansas State University, Manhattan, KS

University of Missouri, Columbia, MO

**Degree**

B.S.

M.S.

Ph.D.

**Year**

1970

1974

1977

**Field**

Animal Science

Reproductive Physiology

Reproductive Physiology

**RESEARCH AND PROFESSIONAL EXPERIENCE**

1977 - 82      Assistant Professor of Animal Sciences & Industry  
Kansas State University

1982 - 91      Associate Professor of Animal Sciences & Industry  
Kansas State University

1991 -present      Professor of Animal Sciences & Industry  
Kansas State University

**Additional assignments:**

Coordinator of Swine Teaching & Research Center, Kansas State University

Coordinator of Tissue Culture Laboratory, Dept. of AS&I

**Current Research Interests:**

- Pregnancy establishment in pigs
- In vitro fertilization and development of embryos
- Prepubertal development of gilts resulting in fertility
- Stem cells

**Major Contributions:**

- Identification of catechol estrogens as major products of pig conceptuses and description of their role in prostaglandin production by the conceptus and endometrium.
- Demonstration that oocytes collected from prepubertal gilts have reduced developmental potential in vitro.
- Established that pregnancy failure in prepubertal gilts results from inadequacies in both the embryo and the maternal environment.
- Discovery of umbilical cord matrix cells.

## Refereed Journal Publications

- 1977 Davis, D.L., R.R. Schalles, G.H. Kiracofe and D.L. Good. Influence of winter nutrition on beef cow reproduction. *J. Anim. Sci.* 46:430.
- 1978 Davis, D.L. and B.N. Day. Cleavage and blastocyst formation by pigs eggs in vitro. *J. Anim. Sci.* 46:1043.
- 1979 Davis, D.L., D.J. Kesler, A.L. Jenkins, H.A. Garverick, J.W. Massey, C.J. Bierschwal and B.N. Day. Induction of parturition in cattle with long and short acting corticoids and estradiol benzoate. *J. Anim. Sci.* 49:560.
- 1979 Davis, D.L., J.W. Knight, D.B. Killian and B.N. Day. Control of estrus in gilts with a progestogen. *J. Anim. Sci.* 49:1506.
- 1980 James, J.E., P.D. Reeser, D.L. Davis, E.C. Straiton, A.C. Talbot and C. Polge. Culture and long-distance shipment of swine embryos. *Theriogenology* 14:463.
- 1981 Robl, J.M. and D.L. Davis. Effects of serum on swine morulae and blastocysts in vitro. *J. Anim. Sci.* 52:1450.
- 1982 Nelssen, J.L., D.L. Davis, J.V. Craig and R.H. Hines. Reproductive development in young boars exposed to sexually mature nonpregnant sows and gilts. *Theriogenology* 17:545.
- 1982 Stevenson, J.S. and D.L. Davis. Estrous synchronization and fertility in gilts after 14- or 18-day feeding of altrenogest beginning at estrus or diestrus. *J. Anim. Sci.* 55:119.
- 1983 Davis, D.L., P.L. Pakrasi and S.K. Dey. Prostaglandins in swine blastocysts. *Biol. Reprod.* 28:1114-1118.
- 1983 James, J.E., D.M. James, P.A. Martin, D.E. Reed and D.L. Davis. Embryo transfer for conserving valuable genetic material from swine herds with pseudorabies. *JAVMA* 183:525.
- 1983 Stevenson, J.S., D.S. Pollmann, D.L. Davis and J.P. Murphy. Influence of supplemental light on sow performance during and after lactation. *J. Anim. Sci.* 56:1282.
- 1984 Davis, D.L. and J.E. James. Embryo transfer in swine. *Mod. Vet. Prac.* 65:191.
- 1984 Dey, S.K., D.L. Davis, R.M. Hersey, J. Weisz, D.C. Johnson and P.L. Pakrasi. Physiological aspects of blastocyst uterine interaction. *J. Bio. Sci.* 6 (Suppl. 2):23.
- 1984 Stevenson, J.S. and D.L. Davis. Influence of reduced litter size and daily litter separation on fertility of sows at 2 to 5 weeks postpartum. *J. Anim. Sci.* 59:284.
- 1985 Davis, D.L. Culture and storage of pig embryos. *J. Reprod. Fert. Suppl.* 33:115.
- 1985 Davis, D.L., J.S. Stevenson and W.E. Schmidt. Scheduled breeding of gilts after estrous synchronization with altrenogest. *J. Anim. Sci.* 60:599.
- 1985 Kluber, E.F., III, D.S. Pollmann, D.L. Davis and J.S. Stevenson. Body growth and testicular characteristics of boars fed a synthetic progestogen, altrenogest. *J. Anim. Sci.* 61:1411.
- 1985 Mondschein, J.S., R.M. Hersey, S.K. Dey, D.L. Davis and J. Weisz. Catechol estrogen formation by pig blastocyst: biochemical characterization of estrogen-2/4-hydroxylase and correlation with aromatase activity during the preimplantation period. *Endocrinology* 117:2339.
- 1985 Schmidt, W.E., J.S. Stevenson and D.L. Davis. Reproductive traits of sows penned individually or in groups until 35 days after breeding. *J. Anim. Sci.* 60:755.
- 1985 Stevenson, J.S., D.L. Davis and D.S. Pollmann. Altrenogest and fat for summer breeding of primiparous sows. *J. Anim. Sci.* 61:480.
- 1985 Tonn, S.R., D.L. Davis and J.V. Craig. Mating behavior, boar-to-boar behavior during rearing and soundness of boars penned individually or in groups from 6 to 27 weeks of age. *J. Anim. Sci.* 61:287.
- 1987 Davis, D.L., J.S. Stevenson, D.S. Pollmann, and G.L. Allee. Estrous and litter traits in gilts altered by altrenogest, flushing and pubertal status. *J. Anim. Sci.* 64:1117.
- 1987 Newton, E.A., J.S. Stevenson and D.L. Davis. Endocrine changes before and after weaning in response to boar exposure and altered suckling in sows. *J. Reprod. Fert.* 81:599.
- 1987 Newton, E.A., J.S. Stevenson and D.L. Davis. Influence of duration of litter separation and boar exposure on estrous expression of sows during and after lactation. *J. Anim. Sci.* 65:1500.
- 1988 Chakraborty, C., D.L. Davis and S.K. Dey. Characteristics of estrogen-2/4-hydroxylase in pig blastocysts: inhibition by steroidal and nonsteroidal agents. *J. Steroid Biochem.* 31:231.
- 1988 Kluber, E.F., III, J.E. Minton, J.S. Stevenson, M.C. Hunt, D.L. Davis, T.A. Hoagland and J.L. Nelssen. Growth, carcass traits, boar odor and testicular and endocrine functions of male pigs fed a progestogen, altrenogest. *J. Anim. Sci.* 66:470.
- 1989 Chakraborty, C., S.K. Dey and D.L. Davis. Pattern and tissue distribution of catechol estrogen forming activity by pig conceptuses during the peri-implantation period. *J. Anim. Sci.* 67:991.
- 1989 Meyen, B.A., C.F. Rosenkrans, Jr. and D.L. Davis. Development of blastocysts in vitro is altered by serum, bovine serum albumin and amino acids and vitamins. *Theriogenology* 31:463.
- 1989 Minton, J.E., D.L. Davis, and J.S. Stevenson. 1989. Contribution of photoperiod to circadian variations in serum cortisol and melatonin in boars. *Dom. Anim. Endocrinol.* 6:177.

- 1989 Rosenkrans, C.F., Jr., D.L. Davis, and G.A. Milliken. Pig blastocyst development in vitro is affected by amino acids. *J. Anim. Sci.* 67:1503.
- 1989 Thulin, A.J., G.L. Allee, D.L. Harmon and D.L. Davis. Utero-placental transfer of octanoic, palmitic and linoleic acids during late gestation in gilts. *J. Anim. Sci.* 67:738.
- 1990 Chakraborty, C. D.L. Davis, and S.K. Dey. The O-methylation of catechol oestrogens by pig conceptuses and endometrium during the peri-implantation period. *J. Endocrinol* 127:77.
- 1990 Chakraborty, C., D.L. Davis, and S.K. Dey. Estradiol-15 $\beta$ -hydroxylation: A new avenue of estrogen metabolism in peri-implantation pig blastocysts. *J. Steroid Biochem.* 35:209.
- 1990 Rosenkrans, C.F., Jr., B.C. Paria, D.L. Davis and G.A. Milliken. In vitro synthesis of prostaglandin E and F<sub>2</sub> $\alpha$  by Pig Endometrium in the presence of estradiol, catechol estrogen and ascorbic acid. *J. Anim. Sci.* 68:435.
- 1991 Rhodes, M.T., D.L. Davis and J.S. Stevenson. 1991. Flushing and altrenogest affect litter traits in gilts. *J. Anim. Sci.* 69:34.
- 1991 Zhang, Z., B.C. Paria and D.L. Davis. 1991. Endometrial cells in primary culture: morphology, secretion of prostaglandins and proteins, and effects of pregnancy. *J. Anim. Sci.* 69:3005.
- 1991 Zhang, Z. and D.L. Davis. 1991. Prostaglandin E and F<sub>2</sub> $\alpha$  secretion by glandular and stromal cells of the pig endometrium in vitro: effects of estradiol-17 $\beta$ , progesterone and day of pregnancy. *Prostaglandins* 42:151.
- 1992 Rosenkrans, C.F., Jr., B.C. Paria, D.L. Davis and G. Milliken. Synthesis of prostaglandins by pig blastocysts cultured in medium containing estradiol or catechol estrogen. *Prostaglandins* 43:309.
- 1992 Zhang, Y., B.C. Paria, S.K. Dey and D.L. Davis. Characterization of the epidermal growth factor receptor in preimplantation pig conceptuses. *Dev. Biol.* 151:617.
- 1992 Zhang, Z. and D.L. Davis. Cell-type specific responses in prostaglandin secretion by glandular and stromal cells from pig endometrium treated with catecholestrogens, methoxyestrogens and progesterone. *Prostaglandins* 44:53.
- 1992 Zhang, Z., M. Krause and D.L. Davis. Epidermal growth factor receptors in porcine endometrium: binding characteristics and the regulation of prostaglandin E and F<sub>2</sub> $\alpha$  production. *Biol. Reprod.* 46:932.
- 1993 Rettmer, I., R.D. Goodband, J.S. Stevenson, D. L. Davis, M.D. Tokach, D.W. Rozeboon, J.E. Pettigrew, L.J. Johnston, J. W. Rust, and H. Chester-Jones. Failure of dietary amino acid supplementation at weaning to influence reproductive traits of sows. *J. Anim. Sci.* 71:2511.
- 1993 Davis, D.L. and R.M. Blair. Studies of uterine secretions and products of primary cultures of endometrial cells in pigs. *J. Reprod. Fertil.Suppl.*48:143.
- 1994 Blair, R.M., D.A. Nichols, and D.L. Davis. Electronic animal identification for controlling feed delivery and detecting estrus in gilts and sows in outside pens. *J. Anim. Sci.* 72:891.
- 1994 Blair, R.M., C.M. Coughlin, J.E. Minsto and D.L. Davis. Peri-oestrus hormone profiles, embryonic survival, and variation in embryonic development in gilts and primiparous sows. *J. Reprod. Fertil.* 101:167.
- 1996 Reed, K.L., L. Badinga, D.L. Davis, T.E. Chung, and R.C.M. Simmen. Porcine endometrial glandular epithelial cells in vitro: transcriptional activities of the pregnancy-associated genes encoding antileukoproteinase and uteroferrin. *Biol. Reprod.* 55:469.
- 1997 Groothuis, P.G., R.M. Blair, R.C.M. Simmen, J.L. Vallet, D.M. Grieger, and D.L. Davis. Uterine response to progesterone in prepubertal gilts. *J. Reprod. Fertil.* 110:237.
- 1998 Guo, J., D. M. Grieger and D.L. Davis. Uterine and ovarian responses to puberty induction and pregnancy in prepubertal gilts. *J. Anim. Sci.* 76:1463 .
- 2000 Zhang, Y.L. and D.L. Davis. Culture of pig luminal and glandular endometrial epithelium on plastic or extracellular matrix substrates. *J. Anim. Sci.* 78:131-138.
- 2001 Peters, J.K., G. Milliken and D.L. Davis. Development of porcine embryos in vitro: effects of culture medium and donor age. *J. Anim. Sci.* 79:1578-1583.
- 2001 Martin PL, Davis D, Weiss M, Grieger D, Abou-Easa K, and Troyer D. Xenotransplantation of bovine bone marrow stromal cells into fetal pigs: incorporation into skeletal muscle. *Animal Biotechnology* 12(2):183-191.
- 2002 Groothuis PG, McGuire WJ, Vallett JL, Grieger DM, Davis DL. Retinol and estradiol regulation of retinol binding protein and prostaglandin production by porcine uterine epithelial cells in vitro. *J. Anim Sci.* 80:2688-94.
- 2002 Sherrer ES, Rathbun TJ, Davis DL. Fertilization and blastocyst development in oocytes obtained from prepubertal and adult pigs. *J Anim Sci.* 2004 Jan;82(1):102-8.

- 2003 Henning HJ, Davis DL. Evaluation of the uterine environment and embryos of prepubertal gilts. *J Anim Sci.* 81:2575-82.
- 2003 Troyer DL, Weiss ML, Mitchell KE, Martin PL, and Davis DL. Incorporation of bovine bone marrow stromal cells into porcine fetal tissues after xenotransplantation. *Anatomia Histologia Embryologia:* 32:98-101.
- 2004 Musser RE, Davis DL, Dritz SS, Tokach MD, Nelssen JL, Minton JE, Goodband, RD. Conceptus and maternal responses to increased feed intake during early gestation in pigs. *J Anim Sci.*82:3154-61.



Litter of Duroc pigs conceived in Illinois and shipped to England as 5-day old embryos (James, J.E., P.D. Reeser, D.L. Davis, E.C. Straiton, A.C. Talbot and C.Polge. 1980. Culture and long-distance shipment of swine embryos. *Theriogenology* 14:463.)