



# Center for Nutrition and Pregnancy

## *“Healthy Offspring through Optimal Nutrition”*

### Rationale:

- Nutritional status during pregnancy and the postnatal growth period has major impacts on maternal, prenatal, and postnatal health in both humans and livestock
- These impacts extend not only into infancy and adolescence but also into adulthood – thus, infants from nutritionally-compromised mothers are “programmed” such that they have an increased risk of developing a variety of serious diseases throughout their lifespan, including diabetes, obesity, and cardiovascular disease
- Approximately 20% of pregnancies are considered at significant risk nutritionally in both livestock and humans – for example, among pregnant women in the U.S., 1 in 5 pregnancies are classified as “nutritionally at risk” by the federal WIC program – these contribute disproportionately to pre-term and postnatal sickness and death
- In humans and livestock, the first pregnancy often occurs during adolescence, which is a particularly vulnerable time in terms of poor pregnancy outcome – adolescents and adults with poor nutrition often deliver low birth weight offspring, which have an increased risk of postnatal complications, including increased mortality, birth defects, and poor health
- Poor nutrition during pregnancy and the postnatal period also contribute to health problems in the mothers, including increased incidence of obesity
- Reducing the incidence of low birth weights, and developing informed strategies to manage low birth weight offspring are important to improve health and well-being of women, infants, children, and families, and also are major components of successful livestock production systems
- How prenatal and postnatal nutrient supply affects the health of mothers and babies are poorly understood
- Development of animal models will be critical to addressing these major health and productivity issues in both livestock production and human health care

### Mission and Goals:

- Established in 2002, the CNP performs **cutting-edge research**, through an integrated, multidisciplinary, and collaborative program that transcends institutional and geographic boundaries, with the **Goals** to:
  - Develop nutritional strategies that promote fetal and neonatal growth and development resulting in offspring that are healthy throughout infancy, adolescence, and adulthood
  - Develop nutritional strategies that promote maternal health and well-being
  - Provide **coordinated research and training programs** focused on the impact of nutrition during pregnancy on the health and productivity of the mother, fetus, and offspring
  - Deliver **advanced leadership training** that will prepare clinicians, and graduate and undergraduate students, to become leaders in research and graduate training in the future



## Impacts:

- **Health** – Improved life-long health and well-being in mothers and their offspring
- **Leadership Development** – Research and outreach to develop highly trained and knowledgeable clinicians, and graduate and undergraduate students, that will become scientific and community leaders
- **Long-Term Research Capacity** – Strengthened research capacity and competitiveness to ensure the long-term capabilities to solve future health issues related to nutrition and pregnancy
- **Rural Development** – Promoting sustainability of rural communities that depend on agriculture through enhanced production efficiency, life-long health, and product quality in livestock

## Animal Models

- The Center for Nutrition and Pregnancy and our collaborators have ***more well established models of compromised pregnancy than any other research center in the world***; these include:
  - Maternal nutritional intake – effects of over- and under-nutrition, and specific nutrients
  - Maternal age – Adolescent, early adult, adult, and aged adult pregnancies
  - Stages of pregnancy – nutritional effects around the time mating, during early pregnancy, or during late pregnancy
  - Pregnancies with multiple fetuses – singles, twins, and triplets
  - Effects of Maternal and fetal genotype/ethnicity

## Participants and Collaborators

- North Dakota State University: Drs. Larry Reynolds and Joel Caton (**Co-Directors**), and Drs. Marc Bauer, Julie Garden-Robinson, Anna Grazul-Bilska, Carrie Hammer, Greg Lardy, Justin Luther, Kasey Maddock-Carlin, Ken Odde, Dale Redmer, and Kimberly Vonnahme
- USDA-ARS – US Sheep Experiment Station, Dubois, ID: Drs. Josh Taylor and Greg Lewis
- University of Teramo, Faculty of Veterinary Medicine, Teramo, Italy: Drs. Lino Loi, Grazyna Ptak, and Leo Della Salda
- Rowett Research Institute for Nutrition, Aberdeen, Scotland: Dr. Jacqueline Wallace
- University of Wyoming – Center for the Study of Fetal Programming: Drs. Steve Ford and Bret Hess
- University of Nebraska – West Central Research and Extension Center, North Platte: Dr. Rick Funston
- USDA-ARS – Human Nutrition Research Center, Grand Forks: Dr. Gerald Combs