

Current Research Projects

Measuring Hunger

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Current diet manipulations in swine production systems, such as restricted feeding of sows during gestation may result in animals that are chronically hungry and suffering as a result. Our lab is currently engaged in an attempt to objectively quantify an animal's state of hunger in response to particular diets. Our efforts include developing motivational, neurological, behavioral, and physiological profiles to various feed deprivation periods and then linking these profiles to specific diet regimens, e.g., the inclusion of roughage.

Development of a Novel Paradigm for the Real-Time Monitoring of Bacterial Pathogenicity in Swine

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There are 2 million non-typhoid salmonellosis cases in the U.S. per year costing on average \$1.4 billion. *Salmonella* infection is a ubiquitous problem in the livestock industry, and the bulk of *Salmonella* infections in humans originate from food of animal origin. Recent evidence has shown that on-farm *Salmonella* prevalence in swine may be as low as 5.3%, yet after transport and holding at the abattoir, prevalence in the same herds rose to 39.9%. To understand how *Salmonella* migrates and infects swine, research in our laboratory will use a novel technique, biophotonics, to monitor *Salmonella* exposure in living swine. There are large gaps in understanding how *Salmonella* migrates through the body of swine and what causes it to start to be shed by specific individuals. These gaps in knowledge are largely due to an inability to follow the progression of infection in the living animal. Our team has engineered *Salmonella* strains to express luciferase (i.e., they give off light), in order to visually track the organisms path of infection in the living, weanling pig and through tissues of market weight pigs post-mortem. Research during the coming year is aimed at refining our technique to monitor *Salmonella* in living piglets, and to adapt this procedure to market hogs in order to develop management procedures to decrease food safety concerns and improve animal well-being.

Sow Motivation for Gestation Housing

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The swine industry practice of housing sows in small individual stalls limits the expression of natural behaviors and is considered a serious animal welfare issue. Although group housing systems are being developed in Europe, few studies have compared group housing with gestation stalls in the US. In addition, very few studies have included measures of motivational strength, which estimate how badly animals want things. Those that have were unable to quantify motivational strength, owing to a limited methodology. The objective of this experiment is to measure how strongly motivated stall-housed sows are to be in a group pen. Furthermore, the study will discriminate between sows of different social status. Subordinate and intermediate individuals may fare less well than dominant sows in group housing systems and are a source of concern in the industry. The study will ascertain whether they express a strong preference for group housing, despite their low social rank.

The Effect of Co-Mingling Litters on Social Behavior, Performance and Temperament

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Individual variation in behavior can have serious economic impacts in swine production. The present experiment has several objectives. First, we will describe individual characteristics of piglets based on their suckling behavior, social interactions, time budget, growth and performance, neuron development in terms of dendritic branching, and responses to temperament tests, such as the backtest, isolation test and social challenge. Second, we will examine the extent to which temperament correlates with individual characteristics by comparing test outcomes to behavioral observations cited above. Third, we will examine the degree to which piglets' individual characteristics explain the variation in growth and behavior known to occur in two systems for housing lactating sows and litters: communal housing and standard farrowing crates. Finally, we will examine the effect of different levels of social experience on piglet behavior. By understanding individual variation, one may be able to predict responses to challenges imposed by production systems and eventually to develop an environment that suits diverse individuals' needs, thus reducing the incidence of some welfare problems.

