

ANIMAL SCIENCE

Title: Effect of GnRH-II on feed efficiency and immune function of growing/finishing pigs –
NPB #14-240

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Date Submitted: February 10, 2016

Scientific Abstract:

Unlike the native form of gonadotropin-releasing hormone (GnRH-I), the recently identified, second isoform (GnRH-II) is produced in nearly every tissue of the body, including non-reproductive tissues. Due to the ubiquitous production of GnRH-II, it has been linked to both feed intake as well as the immune response. Since these relationships have never been explored in pigs, we investigated the role of GnRH-II in feed efficiency and immune function of growing/finishing pigs. Barrows were weaned, moved to nursery facilities at 21 days and maintained on standard Nursery I and II diets for 6 weeks. Next, pigs were provided *ad libitum* access to Phase I of a 3-phase grower/finisher diet, commonly used at the University of Nebraska-Lincoln swine unit, for 4 weeks. During the last week of the Phase I diet, barrows were randomly allocated to receive either an *ad libitum* or restricted (50% of *ad libitum*) intake diet, placed in individual housing with *ad libitum* access to water and allowed a 7-day acclimation period. Daily feed intake was steadily increased in an attempt to determine the average *ad libitum* feed intake. Following the acclimation period, pigs were provided the Phase II grower/finisher diet and feed intake treatments were initiated, with half of the daily feed provided between 8 and 9 am and the other half delivered between 5 and 6 pm. However, after Week 1, barrows fed the restricted intake diet exhibited a significant loss in body weight. In order to avoid any potential health issues related to weight loss, we adjusted the restricted intake diet to 68% of *ad libitum* for the remainder of the study. Pigs received the Phase II and III diets for 4 weeks each. At the start of Week 2 for each feeding phase, animals received diets mixed with 0.4% titanium dioxide, as an exogenous digestibility marker, for 10 days. On Day 8, 9 and 10, 3 fecal grab samples were taken from each barrow (8 am and 5 pm), pooled within pig, homogenized, and examined for nitrogen, phosphorus, titanium dioxide and energies. Barrows were weighed weekly and blood samples taken every 2 weeks to measure serum levels of GnRH-II and a marker of immune response, c-reactive protein (CRP), via enzyme-linked immunoassays (ELISA). As expected, *ad libitum* feeding resulted in greater body weights during every week of the trial ($P < 0.0001$) and overall, *ad libitum* fed growing/finishing pigs had greater average daily gain and average daily feed intake, as well as decreased gain:feed ratios compared to restricted fed pigs ($P < 0.0001$). Despite observing no differences in Phase II, dry matter and energy digestibility were greater in restricted pigs compared to *ad libitum* pigs during Phase III ($P < 0.05$). Serum GnRH-II concentrations were relatively low and significantly different among animals prior to treatment ($P < 0.05$). Although GnRH-II levels were lower for barrows fed a restricted vs. *ad libitum* diet on Day 7 and 14, we did not detect any overall effects

These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer-reviewed.

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of treatment ($P = 0.16$) or treatment x age interaction ($P = 0.22$). However, GnRH-II concentrations did decrease with age regardless of treatment ($P < 0.01$). No differences in serum CRP levels between treatments were observed through Day 42 of the trial ($P > 0.05$). In contrast, CRP concentrations tended ($P = 0.06$) to be decreased on Day 7 in barrows fed a restricted compared to *ad libitum* diet, likely associated with severe weight loss from a 50% feed restriction during the first week of the trial. Thus, we were unable to establish a relationship between serum GnRH-II concentrations and feed efficiency or immune response in growing/finishing barrows. However, GnRH-II levels varied among animals and decreased significantly with age. Although more research is warranted, circulating GnRH-II levels could represent a potential marker for growth, leading to the development of novel screening methods or growth promoting agents to enhance the productivity and profitability of pork producers.