

Title: S1044: Nutritional Systems for Swine to Increase Reproductive Efficiency

Peer Reviews

----- Review 1 of 4 -----	
From: Peer Reviewer	
submitted by:	
Reviewed on: 07-11-2013	
Recommend: Approve	
Sound scientific approach	excellent
Achievable goals/objectives	excellent
Appropriate scope of activity to accomplish objectives	good
Potential for significant outputs (products) and outcomes and/or impacts	excellent
Overall technical merit	excellent
Comments: The Southeast Universities collaborative efforts over the past thirty years has yielded some of the best publically available research in sows of any research group9s) in the world. Their current proposal is excellent and is designed to answer some of the questions the US swine producer from large to small have in what works and does not. I would urge the approval of the their project.	
Response by Lindemann: Thank you for the kind comments. No changes made.	

----- Review 2 of 4 -----	
From: Peer Reviewer	
submitted by:	

Reviewed on: 06-25-2013

Recommend: Approve

Sound scientific approach	good
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Achievable goals/objectives	good
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Appropriate scope of activity to accomplish objectives	good
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Potential for significant outputs (products) and outcomes and/or impacts	excellent
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Overall technical merit	good
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Comments:

Research projects focused on multi-parity sow performance is particularly suited to multi-state collaborative effort because it is time consuming, labor intensive and requires a large number of animals. The primary goal of this proposed project is to improve the reproductive performance of sows while increasing their retention in the herd and minimizing their nutrient excretion. This will be accomplished through the following three objectives: 1) the impact of Copper in sow diets, 2) Effect of essential oils and reproductive performance of sows, and 3) Determine the effect of organic minerals on sow productivity and longevity. These three objectives are of importance to US pork producers as they have been identified as areas of research need. Improving sow longevity and productivity has been specifically identified by US pork producers as an area of research focus that can have a profound impact on profitability. Additionally, this project has application in reducing the impact of seasonality on sow productivity. This area has been targeted by the National Pork Board as it annually costs an estimated industry wide loss approaching \$1 billion dollars.

As outlined in the proposal, this group uses well established SOPs for all projects and then collaboratively develops unique procedures for individual objectives as needed. This is a sound scientific approach as it facilitates statistical comparison between stations as well as across all stations participating in an objective.

The goals that this group has set forth are achievable during the duration of the project. Historically this group has worked well toward the common goals/objectives and has been successful in achieving those goals/objectives. Because of the diverse skills these investigators possess, the probability of success is improved.

Since the inception of this project, this group has been successful in obtaining their objectives and publishing their results. Given this track record, there is no reason to expect that the current project will be any less successful.

The expected outputs outlined in the proposal are well thought out and represent the potential for

significant impact on the way sows are fed. Moreover, these outputs are directly applicable to the farm and can be easily implemented by swine nutritionists.

Response by Lindemann:

The fact that the research meets US pork producers identified needs (as stated in paragraph 1) is gratifying. It is further appreciated that it is recognizable that the outputs are directly applicable to the farm and can be easily implemented by swine nutritionists. No changes made.

----- Review 3 of 4 -----	
From: Peer Reviewer	
submitted by:	
Reviewed on: 07-03-2013	
Recommend: Approve	
Sound scientific approach	good
Achievable goals/objectives	good
Appropriate scope of activity to accomplish objectives	good
Potential for significant outputs (products) and outcomes and/or impacts	good
Overall technical merit	excellent
Comments:	
<p>Sow research is highly variable and such collaborative research is critical to providing adequate replication as well as providing replication at variable environmental, genetic, and production potential levels. As such, those who participate in the proposed projects need to consider taking measurement which characterize these differences in case interactions between diet and locations are noted.</p>	
<p>Objective 1: can the group provide insight as to what is new relative to past literature?</p>	
<p>Objectives 1 and 3: any consideration or discussion relative to the possible impact of trace mineral interactions on interpretation of the data? Would any digestibility coefficients be of value?</p>	
<p>Objective 2: use of essential oils has tremendous amount of assumptions, and as such, focusing on</p>	

active components instead of generic products should be considered. Is the group considering measures of oxidative status, antimicrobial activity, immune function, etc, to provide more scientific understanding of what is occurring metabolically? Field could be deemed highly speculative similar to nutraceuticals/herbal medicine in human literature.

Objective 3: has the group considered availability between the proposed dietary treatments as well as potential interactions. How would dietary phytate impact potential results? Has the group considered focusing on just 2 or 3 trace minerals or do they believe it is a mixture of all? If all, how have they determined the levels of each?

Objective 1, 2, 3: are any metabolic measures being obtained to help assist in explaining the results?

Response by Lindemann:

1. Objective 1. New insight relative to the past literature. The new aspect of this study is that there is no study in the literature that splits out the gestation and lactation needs for multiple parities. Further, given the fact that Cu is a mineral that is on the radar screen for environmental regulation, it is important that we understand the true needs rather than feed an indiscriminate amount. In that vein, fecal digestibility of Cu is added to the protocol (item 2 for the Cu objective on page 10 of the proposal) for stations that can accomplish it.
2. Objective 1 and 3. Impact of potential trace mineral interactions. Certainly the committee discussed interactions among divalent cations. But there is no work in the literature that has directly addressed that issue. At this point, investigators simply need to document responses accurately, get the results published so that we begin to get a database from which to actually develop hypotheses relative to trace mineral interactions in future studies. Objective 3 is nearing completion (as stated on page 8; Accomplishments of Previous Project) and we will not be able to get multi-university digestibility numbers for that. But digestibility has been added to Objective 1.
3. Objective 2. Essential oils effect on aspects of metabolic responses. No, there is no plan at the present to measure more than whole-animal responses (i.e., fecundity, body weight changes, sow feed intake). Examination of essential oils is a relatively new area. Rather than spend money on responses that may not happen, we are first going to establish if there is a whole-animal response and then subsequent experiments will delineate the metabolic means whereby the whole-animal response is elicited. No change made in the current project plans.
4. Objective 3. Concept of single vs multiple mineral assessment. There are 2 points to be presented here. First, several universities have already completed their contributions and to change the treatments in any way at the present time would preclude data pooling for analysis. Secondly, as stated to a previous reviewer comment, there is not enough information in the literature to allow a group of 8-10 academic nutritionists to agree on what the levels ought to be for 4 minerals. At the time of establishing the treatments, this S-1044 committee felt the treatments described are the most appropriate. No changes made.

5. Objective 1, 2, and 3. Metabolic measures. There have been no measures put in the objectives that all universities must obtain. This is because there is no actual discretionary money provided to the investigators to pay for those measures. However, while there is not a mandated metabolic measure, any university that wants to obtain more data of a deeper measure to use in a student thesis/dissertation is able to do so and, in fact, is encouraged to do so. With regard to Objective 1, there is one university (University of Kentucky) that will be expanding the measurements to include some metabolic enzymes as well as intestinal transporters related to mineral uptake. No changes made in the protocol that apply to all universities but encouragement given to all to consider adding beyond-mandated measures.

----- Review 4 of 4 -----

From: Peer Reviewer

submitted by:

Reviewed on: 06-28-2013

Recommend: Approve

Sound scientific approach	good
Achievable goals/objectives	excellent
Appropriate scope of activity to accomplish objectives	good
Potential for significant outputs (products) and outcomes and/or impacts	excellent
Overall technical merit	good

Comments:

Initially (with the draft proposal), I had concerns about confounding. This version (along with personal communications with project participants) has allayed some of those concerns. I still feel care will need to be taken to avoid confounding given the diets to be fed (not the supplements) - but base diets - appear to be coming from different sources (e.g., corn not from one supplier and lot). At the least analysis of subsamples of base diets at each should be collected and analyzed for content of minerals, vitamins and essential oils in addition to normal feed analyses (this may be already occurring - so if I missed it in the project plan I apologize). Overall, it is my feeling that this project is scientifically and technically sound that appears to offer great potential for positive impacts on the committees stakeholders' enterprises as well as the general welfare of agricultural industries.

Response by Lindemann:

1. The reviewer correctly observes that there will be differences across the stations that participate in the objectives. The differences will be in the indigenous nutrient level of the grain used at each station, genetics of the animals at each station, environment (e.g., temperature and humidity depending on the geographic location of the stations), as well as such things as feeder design in the farrowing barn and other management or equipment differences. This is actually a strength of this multi-university research. If there is no treatment*station interaction then we can know that the results can be broadly applied. If there is an interaction, then we will have to dig deeper to explain the contributing factors to that interaction. Actual basal diet analyses, as suggested by the reviewer, will certainly be a part of that further examination. The need for diet samples to be collected has been strengthened (item 10 on page 10 in the Methods section). I would also point out that there is no statistical confounding in the protocol (which certainly would be a fatal flaw); we are using statistical procedures that we have used for decades on the design and analysis of group projects. Verbiage has been strengthened relative to diet sampling, submission, and analysis.