

## Minutes

**Project/Activity Number:** NCCC42 Committee on Swine Nutrition  
S-1081 Nutritional Systems for Swine to Increase Reproductive Efficiency

**Project/Activity Title:** Committee on Swine Nutrition

**Period Covered:** January 2020-January 2021

**Date of This Report:** January 27, 2021

**Annual Meeting Date:** January 5-6, 2021

**Meeting Location:** Virtual-Zoom

**Day 1 Session: Tuesday, January 5, 2021**  
**Breakout Session (NCCC42 & S-1081)**

**NCCC42**

**Members in Attendance:** Tayo Adedokun (tayo.adedokum@uky.edu) – University of Kentucky); Layi Adeola (ladeola@purdue.edu) - Purdue University; Scott Carter (scott.carter@okstate.edu) - Oklahoma State University; Ryan Dilger (rdilger2@illinois.edu) - University of Illinois; Brian Kerr (Brian.Kerr@usda.gov)- USDA; Shengfa Liao (s.liao@msstate.edu) - Mississippi State University; Hans Stein (hstein@illinois.edu) – University of Illinois; Phillip Miller (Pmiller1@unl.edu) - University of Nebraska; Jason Woodworth (jwoodworth@ksu.edu) – Kansas State University; Yanhong Liu (yahliu@ucdavis.edu)-UC Davis; Sung Woo Kim (sungwoo\_kim@ncsu.edu)-North Carolina State University; Tom Crenshaw (tdcrensh@wisc.edu)-University of Wisconsin; Laura Greiner (greinerl@iastate.edu)-Iowa State University

**Members listed in NIMSS, but not in attendance:** Mike Azain-University of Georgia, Sam Baidoo-University of Minnesota, Rajesh Jha-University of Hawaii, Anoosh Rakhshandeh-Texas Tech. University

**Administrative Advisors in Attendance:** Dr. Don Beitz (Iowa State University)

**Officers:** Tayo Adedokun – Chair; Anoosh Rakhshandeh -Vice Chair; Jason Woodworth -Secretary

The meeting was declared open at 1:02 PM by Tayo Adedokun (Chair) with the introduction of the officers and administrative advisors. An overview of the agenda was presented and everyone introduced themselves. Tom Crenshaw moved and Layi Adeola seconded a motion to accept the minutes of the 2020 meeting followed by a unanimous vote to accept the minutes as written.

At 1:10 PM, the Administrative Advisor, Don Beitz commented that he appreciated to meet with the group again this year. He thanked Tayo and the rest of the organizers for preparing for this meeting. He looks forward to serving as the Administrative Advisor and in this role he helps facilitate communication, arranges for peer review, ensures the meeting is authorized and the reporting guidelines are carried out and helps with committee reappointment which he reminded us that we are in the second year of the current term which will expire on Sept. 30, 2024. Dr. Beitz believes that the key benefits of this group are the exchange of ideas and he continues to be impressed with how this committee has taken on projects and how we act to stimulate each other to generate better science and continue in a spirit of building community among swine nutritionists. His final wish was for a productive meeting.

At 1:23 PM, discussions of older/current research projects were conducted:

**A. Bakery meal AME and ileal amino acid (AA) digestibility studies (H. Stein)**

Two experiments have been conducted and analyzed with 11 sources of bakery meal. Data have been summarized that represent 6 stations participating in the AME experiment and 4 in the AA experiment. For the AME portion, 1 station was removed which resulted in a clean data set with no station interactions. For the AA portion there were lots of station × AA interactions which have made it hard to summarize. The interactions are the result of low SEM increasing power to detect interaction and are basically present on all AA. Hans asked for suggestions on how to handle the data

summary with these interactions and if we should bypass them and focus on the main effects of station and bakery meal source. Tom suggested to consider allowing the interaction effect to drop into the error term to allow for main effect reporting as the interaction may just be random error. Hans mentioned that he had visited with Merlin Lindeman about a past study with similar levels of interactions, but they can't find the study to show how we had handled this in the past. Phil suggested that the way Gary Cromwell presented this in the past was to create a table with anonymous station listing and report the AA mean for each station so that a person could see the interactive means. Hans mentioned that this is how it is represented now, but there are way too many tables to properly understand and summarize the data in this fashion. Sung Woo asked if we know the reason for the differences in AA digestibility between sources and Hans suggested not. All of the samples have low lysine digestibility suggesting overheating. Shengfa asked if we can group the sources into categories to help explain similarities/differences in digestibility and then analyze the differences between categories, but Hans was unsure of how to properly create the different categories. Hans will create a first draft summary in JAS format and circulate to the full committee for review.

**B. Phytase super-dosing project (M. Shannon)**

No discussion occurred with the absence of Marcia.

**C. Calcium and phosphorus project (H. Stein)**

The goal of this project is to analyze commercial diets sourced in the US for Ca and P and compare the analyzed values to their formulated values. In a similar assessment made in Europe it was discovered that most commercial diets contained much more Ca than was formulated, while P was much closer to the formulated expectation. This is a concern because overfeeding Ca will lead to diminished growth performance. Hans has been able to secure 140 samples out of his original goal of 200, but COVID created delays in securing the others. Hans requests the samples originate from commercial US production with phase of production to be noted on them. Ca and P analysis will be conducted in Han's lab. Jason will reach out to Hans and can help secure additional samples. Hans will also ask Laura for assistance in securing samples.

**D. Intestinal microbiome project (P. Miller)**

Phil had sent out the revised protocol and survey to solicit samples after the last meeting. Samples were received from KSU, UC Davis, Nebraska, Purdue, and Kentucky. However, COVID halted progress of gathering samples and the Nebraska labs were shut down until July 1. The fecal analysis has not yet been completed because of the backlog of other student samples that need analyzed. The target is to finish analysis by the mid/end of February 2021. Tayo will submit his samples previously collected. Shengfa will determine where his previously collected samples are located and will send if found. Phil will resend the protocol to the committee in case anyone else wanted to send samples.

**E. Phytase effect on ileal amino acid digestibility in cannulated pigs (L. Adeola)**

This project was discussed at last year's meeting and is designed to be a  $2 \times 2 \times 2$  factorial arrangement of phytate, phytase, and protease in a Latin square design using cannulated pigs to determine AA digestibility. Layi drafted a protocol which Hans reviewed, but no further actions have been taken. The biggest issue is identifying enough stations to participate in the study with only Layi and Hans committing thus far. Layi suggested that we need more stations to participate in order to make this a multi-state project, but no other capable participants were identified. Therefore, this project idea will be terminated at this time with no further follow up.

**F. Swine immunology project (A. Rakhshandeh)**

No discussion occurred with the absence of Anoosh.

**G. Gut function measurement (T. Crenshaw)**

This project was originally brought to the committee by Tofuko Woyengo, but Tom Crenshaw took the lead when Tofuko ceased his participation in this committee. Little progress had been made by Tofuko and to the best of Tom's understanding the goal is to come up with markers of gut function. Phil thought the idea was to define blood and urine markers that indicated a compromised gut that could be used in nutrition  $\times$  health studies. Discussion suggested that the intended markers were mannitol or other sugars. Hans mentioned that you cannot acidify urine if measuring sugars in urine, which means more frequent collections needed. Thus, a blood sample would be easier to collect. Yanhong suggests measuring endotoxin in serum as an indicator of leaky gut; however, Ryan suggested that the endotoxin is normally very low and undetectable in most samples, which makes it hard to use in pig studies. A fluorescent dye tied to the carbohydrate could be a better option and it has been used in rodent studies in the past. For future progress, Yanhong will review the literature and develop a protocol with Ryan's help with the goal of bringing more direction to the committee the next time we meet. Tom mentioned that he has a new way to collect spot urine samples without total collection required. An ISU student developed this technique and has created a video to show how to do it. Tom will pass along this urine collection information to the group.

At 2:20 PM we opened the floor for discussion of new projects; however, none were presented.

The session went into break at 2:24 PM and resumed at 2:40 PM.

Laura Greiner and Brian Kerr joined the meeting after break and made self-introductions to the rest of the committee.

At 2:43 PM sub-committee discussions occurred:

**A. Production sub-committee (Chair: Layi Adeola):**

The production sub-committee did not meet in 2020, primarily due to COVID restrictions. The phytase  $\times$  AA digestibility project was one originally planned for this sub-committee, but lack of participation will terminate that project idea. Layi requested new ideas for other projects, but none were presented.

**B. Gut Health sub-committee (Chair: Phil Miller)**

The health sub-committee did not meet in 2020, primarily due to COVID restrictions. Phil plans to get the microbiome data analyzed and then call for a sub-committee meeting in the coming months to further discuss that microbiome project and any other relevant topics.

Election of new officers occurred at 2:49 PM with the following officers unanimously elected for 2021:

- Chair: Jason Woodworth (moved from Secretary): Tayo nominated, Phil seconded
- Vice Chair: Brian Kerr: self-nominated, Phil seconded.
- Secretary: Yanhong Liu: self-nominated, Ryan seconded.

Ryan and Tayo have offered to support Jason if needed.

Other discussion:

- It was noted that Michigan State, Ohio State, South Dakota State, Texas Tech, Texas A&M, Georgia, and Hawaii are missing in membership on this committee. Donald Beitz will reach out to the Agriculture Experiment Station and/or Department Head at each of the respective Universities to recruit new members.
- It was also mentioned that all members need to ensure they are officially part of the project and entered in the NIMSS system. Currently Sung Woo Kim, Yanhong Liu, and Scott Carter are participating in the current meeting without being listed in NIMSS. Marcia Shannon participated in the past, but is also not currently listed in NIMSS.

The meeting was adjourned at 3:15 PM via motion by Shengfa that was seconded by Ryan.

## **S-1081**

**Members in Attendance:** Joel Brendemuhl (University of Florida), Lee Chiba (Auburn University), Merlin Lindemann (University of Kentucky), Crystal Levesque (South Dakota State University), Charles Maxwell (University of Arkansas), Eric van Heugten (North Carolina State University), Mark Estienne (Virginia Tech), Lee Chiba (Auburn University), Tsung Cheng Tsai (University of Arkansas)

**Members listed in NIMSS, but not in attendance:** Robert Dove (University of Georgia)

**Officers:** Mark Estienne- Chair; Robert Dove- Vice Chair; Crystal Levesque- Secretary

Mark Estienne called the zoom session to order at 12:00 p.m. EST. The agenda and minutes from previous year's meeting were noted with no revisions.

Robert Godfrey noted the increasing emphasis on impact statements in particular with multi-state projects and project renewals. He had attended an impact statement writers seminar specific to multi-state groups that was very informative. Something to keep in mind as we approach the 2023 end date of the current project. Robert reminded the group about the Excellence in Multistate Research Award to consider submitting an application at the end of the current project (i.e. Feb 2024 submission).

### Past projects

- Copper supplementation: all performance data is compiled. Merlin intending to work on paper for submission. Also have milk composition (proximate and fatty acid) data that could be compiled into another paper.
- Essential oils: Merlin to work on getting data into manuscript. Mike Azain working on fatty acid analysis. Crystal to send Merlin data from SDSU. This is the end of work on this objective.
- Organic minerals: a paper was published in 2020 completing this objective.

### New projects

- Boron: UK has 110 sows on test with animal work to be finished in fall 2021. Limitation currently in assay is to determine tissue boron levels. VT may have 40 sows to contribute to the data set.
- Phytogetic feed additives: essential oil work can fall under here. Work at AR evaluating a 'sensory additive' could fall under this project.
- Phase feeding: animal work at SDSU done. Working on preparation of manuscript.

### Other collaborative projects

- Iron injection: MWASAS abstract accepted. Paper nearing submission preparation. Intent to submit to Livestock Science. Still need diet formulation and diet trace mineral content from 3 of stations involved.
- Milk composition: Merlin working with Ajinomoto to determine whether milk AA composition can be analyzed in liquid or freeze dried milk. Considerable discussion on influence of fat source on milk composition, describing the consistency of milk composition across day of lactation and parity, duration of dietary fat level pre-farrow on colostrum/milk

composition. Eric will look into what data he already has relative to colostrum/milk fatty acid composition and fat source. Joel suggested to connect with lactation physiologists to discuss some of the questions/ideas. Merlin will distribute some ideas for possible studies to the group for continued discussion and study objective(s) refinement.

- Discussion on statistical analysis and challenges that come with changes in analytical procedures with time and differences in opinions of what analysis is most suitable for a given study.

2022 officers: Chair: Robert Dove; Vice chair: Crystal Levesque; secretary: Eric Van Heugten

Meeting adjourned: 2:25 pm.

**Day 2 Session: Wednesday, January 6, 2021**  
**Joint Session (NCCC42 & S-1081)**

**NCCC42 Members in Attendance:** Tayo Adedokun (tayo.adedokum@uky.edu) – University of Kentucky; Ryan Dilger (rdilger2@illinois.edu) - University of Illinois; Brian Kerr (Brian.Kerr@usda.gov)- USDA; Shengfa Liao (s.liao@msstate.edu) - Mississippi State University; Hans Stein (hstein@illinois.edu) – University of Illinois; Phillip Miller (Pmiller1@unl.edu) - University of Nebraska; Jason Woodworth (jwoodworth@ksu.edu) – Kansas State University; Tom Crenshaw (tdcrensh@wisc.edu)-University of Wisconsin; Laura Greiner (greiner1@iastate.edu)-Iowa State University

**S-1081 Members in Attendance:** Joel Brendemuhl (University of Florida), Lee Chiba (Auburn University), Merlin Lindeman (University of Kentucky), Crystal Levesque (South Dakota State University), Charles Maxwell (University of Arkansas), Eric van Heugten (North Carolina State University); Mark Estienne (Virginia Tech University)

**Guests in Attendance:** Steve Smith-USDA NIFA

**Administrative Advisors in Attendance:** Dr. Don Beitz (Iowa State University; NCCC42) and Dr. Bob Godfrey (University of Virgin Islands; S-1081)

**Committee Officers:**

NCCC42: Tayo Adedokun – Chair; Anoosh Rakhshandeh -Vice Chair; Jason Woodworth -Secretary  
S-1081: Mark Estienne- Chair; Robert Dove- Vice Chair; Crystal Levesque- Secretary

**Call to Order:**

The meeting was declared open at 1:01 PM by Mark Estienne (S-1081 Chair) and Tayo Adedokun (NCCC42 Chair) with the introduction of the officers and administrative advisors.

**Administrative Advisor comments (1:05 PM):**

NCCC42: Don Beitz: Dr. Beitz is pleased to be part of the meeting, especially since he could not join last year. He reported that the NCCC42 committee is going well and he is happy with the progress being made on the projects. He noted that some of the benefits of these meetings are to stimulate each other, share ideas, and develop as a family of swine nutritionists. Don challenged the committees to think about ways we could create even more value over that which we are currently doing and suggested we think about topics like leading meeting symposia as ways to expand our reach and influence. Don also suggested we continue to recruit new members from universities that have swine nutrition positions, but are not currently represented on the committees.

S1081: Robert Godfrey: Dr. Godfrey, while having a ruminant-focused repro physiology emphasis, enjoys being part of this swine committee. He is impressed with the quality and quantity of research going on and is encouraged with the current activities. He considers himself lucky to be part of a mature group of project participants. Dr. Godfrey reminded the committees of the importance of impact statements and how they continue to be critical for showing the reach and influence of not only our multistate committees but also other responsibilities we take on. Opportunities exist for workshops on how to write good impact statements and he encourages us to consider one and suggested we could do it as part of joint group effort. He stated that the level of collaboration is impressive and the manuscripts



that are generated and lead to subsequent grant funding under this multistate project set up demonstrate the success of the group. He closed with encouraging us to continue to meet jointly because it gives a broader view of what is going on and leads to additional collaboration.

Steve Smith-USDA NIFA: Steve mentioned that he is the newly assigned USDA-NIFA representative to these committees and is happy to be back in this capacity. USDA-NIFA is in a rebuilding phase, which is going slowly, but still progressing. Important to Steve is that they have been efficient in getting money distributed for projects and this continues to exceed his expectations.

### **Station reports (1:13 PM)**

Station representatives presented brief reports for calendar year 2020. See the submitted station reports for more detail.

The session went into break at 3:01 PM and resumed at 3:15 PM.

### **Research project discussion between the two committees (3:15 PM)**

No new projects were discussed within the NCCC42 committee that would warrant further collaborative work with members of the S-1081 committee. Merlin Lindeman mentioned that the S-1081 committee will develop a protocol to better define sow milk composition focusing on fatty acid and AA composition. Once the protocol is developed, there will be opportunities for more stations to participate. Those that are interested should contact Merlin with their offer to collaborate.

Ryan Dilger noted that any updates on recent publication within either committee should be reported to him as he is acting as the historian for the group. Merlin mentioned that he has cleaned out some of Gary Cromwell's files and may be able to fill in any gaps in information that might exist.

### **Discussion on next year's meeting place and date (3:22 PM)**

Joel Brendemuhl mentioned that the date and time have already been confirmed for next year and Joel has signed the 2022 contract with meetings occurring on January 4 & 5, 2022. Hotels are blocked for arrival on the 3<sup>rd</sup> and departing on the 5<sup>th</sup> with a few rooms reserved for departure on the 6<sup>th</sup>. The room block was reduced a bit from the past. Room rate will be \$139/night. Two meeting rooms for both days are reserved at no charge with internet connection provided in at least 1 room.

Tom Crenshaw extended appreciation to Joel for the work he does to organize these meetings and negotiate with the hotel and reminded members to send the check to Joel for reimbursement. Joel mentioned that the penalty for cancelling the hotel in 2021 was \$1000 which resulted in a \$50 registration fee for this 2021 meeting.

### **Final discussion/adjournment (3:33 PM)**

Ryan Dilger moved that the meeting should be adjourned and the motion was seconded by Tom Crenshaw.