

## 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 2022-May 2023  
**Date of This Report:** May 22, 2023  
**Annual Meeting Date:** May 16-17, 2023  
**Meeting Location:** Hybrid (In person and Zoom)

### Day 1 Morning Session: Tuesday, May 16, 2023 Joint Session (NCCC42 & S-1081)

**NCCC42 Members in Attendance:** (6 participants)

*Attended in person:* Ryan Dilger (rdilger2@illinois.edu) - University of Illinois; Brian Kerr (Brian.Kerr@usda.gov)- USDA; Hans Stein (hstein@illinois.edu) – University of Illinois; Jason Woodworth (jwoodworth@ksu.edu) – Kansas State University;

*Attended on Zoom:* Laura Greiner (greinerl@iastate.edu) - Iowa State University;.

**NCCC42 Members listed in NIMSS, but not in attendance:** Layi Adeola (ladeola@purdue.edu) - Purdue University; Tayo Adedokun (tayo.adedokun@uky.edu) – University of Kentucky; Tom E Burkey (tburkey2@unl.edu) – University of Nebraska; Sam Baidoo - University of Minnesota; Shengfa Liao (s.liao@msstate.edu) - Mississippi State University; Phillip Miller (Pmiller1@unl.edu) - University of Nebraska; Yanhong Liu ([yahliu@ucdavis.edu](mailto:yahliu@ucdavis.edu)) - UC Davis; Tom Crenshaw (tdcrensh@wisc.edu) - University of Wisconsin; Sung Woo Kim (sungwoo\_kim@ncsu.edu) - North Carolina State University;

**S-1081 Members in Attendance:** (6 participants)

Robert Dove (crdove@uga.edu) - University of Georgia; Crystal Levesque (crystal.levesque@sdstate.edu) – South Dakota State University; Eric Weaver (eric.weaver@sdstate.edu) - South Dakota State University; Tsung Tsai (ttsai@uark.edu) – University of Arkansas as proxy for Charlie Maxwell

*Attended on Zoom:* Merlin Lindemann (Merlin.Lindemann@uky.edu) – University of Kentucky; Lee Chiba (chibale@auburn.edu) – Auburn University; Eric van Heugten (Eric\_vanHeugten@ncsu.edu) – North Carolina State University; Guoyao Wu (guoyao.wu@ag.tamu.edu) – Texas A&M University

**S-1081 Members listed in NIMSS, but not in attendance:**

Mark Estienne (mestienn@vt.edu) - Virginia Polytechnic Institute and State University; Jeff Clapper (jeffrey.clapper@sdstate.edu) - South Dakota State University; Sherrie Clark (sherrie@vt.edu) - Virginia Polytechnic Institute and State University; Charlie Maxwell (cmaxwell@uark.edu) – University of Arkansas; Joel Brendemuhl (brendj@ufl.edu) – University of Florida.

**Committee Officers:**

NCCC42: Brian Kerr, Chair; Yanhong Liu, Vice Chair; Laura Greiner, Secretary

S-1081: Crystal Levesque, Chair; Eric van Heugten, Vice Chair; Mark Estienne, Secretary

**Guests:** Dr. Chris Hostetler (National Pork Board, zoom); Steve Smith (USDA-NIFA, zoom); Gordon Denny (Gordon Denny LLC, zoom), Jason Schwenneker (Athens Management Group, in person); Sarah Pearce – USDA-ARS-NLAE; Young Dal (University of Wisconsin-River Falls, [youngdal.jang@uwrf.edu](mailto:youngdal.jang@uwrf.edu)); Emma Helm (Virginia Tech University, [ethelm@vt.edu](mailto:ethelm@vt.edu)).

**Administrative Advisors in Attendance:**

Dr. Don Beitz for NCCC42 (Iowa State University; sent notes via email); Dr. James Matthews (Administrative Advisor, S-1081; sent notes via email)

The meeting was declared open at 8:05 AM (CST) by Crystal Levesque (Chair) with the introduction of the officers and guests.

Email notes from the Administrative Advisors were read. Of note, Don Bietz reminded NCCC042 group to get started preparing project renewal for September 15, 2023 submission of request to Write, October 15, 2023 submission of project Objectives and December 1, 2023 submission of final proposal to NIMSS. The final proposal deadline is firm, no extensions allowed. James noted for the S-1081 group the new proposal is submitted and waiting one reviewer response. S1081 committee has until June 15 to respond in writing to reviewer comments and submit a revised proposal. The MRC committee reviews the revised proposal and makes any further revision recommendations. S1081 responds and edits the proposal as appropriate (completed in August 2023). SAAESD reviews all revisions and makes final project decision. New project starts October 1, 2023.

**NIFA update**

Steve Smith (on zoom) gave an update on NIFA and shared a pdf containing a detailed update. Copy of the pdf was emailed to all members May 17, 2023. Highlights are listed below. In the question period it was noted the recent listening session for the new Turkey and Laying Hen specific RFA seemed to have limited questions/feedback from industry which may be a limitation to overall application of funded work. Steve noted that a RFA in this area was directed by Congress prior to coming to USDA for implementation so NIFA is somewhat limited in its ability to alter.

***News and personnel updates from NIFA*** (<https://nifa.usda.gov/newsroom>)

1. NIFA is now fully staffed with approximately 80% within the first year of employment.
2. On May 8, 2023, Dr. Manjit Misra was appointed as the NIFA Director and Dr. Dionne Toombs transitioned as the Associate Director for Programs to replace Dr. Parag Chitnis (May 2022). Dr. Frank Siewerdt (previous National Program Leader) left April 2023.

***NIFA Budget***

Total NIFA discretionary appropriations increased \$48 million for FY2023. Budget information can be found at <https://nifa.usda.gov/budget>. Mandatory funding was \$231 million.

Three AFRI request for Applications (RFAs) have been released for FY 2023. See <https://nifa.usda.gov/afri-request-applications>. 1. Sustainable Agricultural Systems. \$75 million allocated for funding, LOI deadline was April 13, 2023. Full applications due July 13, 2023). 2. Education and Workforce Development published May 2, 2023. 3. Foundational and Applied Sciences published February 7, 2023.

Two interagency funding opportunities of note: Ecology and Evolution of Infectious Disease (NIFA, NSF, NIH, and U.K. Biotechnology and Biological Sciences Research Council. NIFA planned contribution is \$5 million in FY2023. Dual Purpose with Dual Benefit brought back, at least once more. Submission deadline was December 16, 2022. Submission response was good. Previous program was deemed valuable (hence one-year trial renewal); high likelihood of renewal for another year. Steve specifically encouraged NCCC042 and S1081 members to consider the IDEAS program. Felt there was good overlap between general objectives of these members and the program objectives.

Program contacts for Animal Nutrition, Growth, and Lactation are Mark Mirando and Steve Smith. Contact details for Program Leaders and Program Specialists in the USDA pdf. Please feel free to contact for questions on RFA or anything else.

#### **Station reports following this order**

1. Laura Greiner (on Zoom)
2. Eric Van Heugten (on Zoom)
3. Merlin Lindemann (on Zoom)
4. Jason Woodworth (in person)
5. Tsung Tsai (in person)
6. Guoyao Wu (on Zoom)
7. Young Dal Jang (in person)
8. Robert Dove (in person)
9. Ryan Dilger and Hans Stein (in person)
10. Crystal Levesque and Eric Weaver (in person)

#### **Break (9:40-10:00 AM)**

#### **Break-out Sessions**

##### **NCCC42**

##### **Review agenda (10:05 AM):**

The minutes of the 2022 meeting were read by Hans Stein. Brian Kerr asked for any changes or revisions to the minutes. No changes were made. Jason Woodworth moved and Ryan Dilger seconded a motion to accept the minutes of the 2022 meeting followed by a unanimous vote to accept the minutes as written.

##### **Committee member discussion (10:10 AM)**

The committee discussed the role of the advisor to the group. It was determined that Brian Kerr would visit with Don Beitz to determine if he would like to continue to serve in this role. If Don Beitz determines that he no longer wishes to serve, the committee determined that John Patience or Phil Miller may be acceptable nominees.

In addition, the committee reviewed the list of universities that could contribute and participate in the NCCC-042 activities. Universities such as Michigan State University, Louisiana State University, University of Minnesota, South Dakota State University, and Colorado State University. It was determined that the NCCC-042 advisor would be the individual to contact the experimental station designees at each university and request participation. Brian Kerr agreed to visit with Don Beitz and then the group will move forward with updating and adding new members to the committee.

### **Research discussion (10:20 AM)**

#### *Review of past projects:*

**1. Bakery meal digestibility in growing pigs (Hans).** Hans Stein reported that the work has been accepted for publication with revisions.

**2. Phytase super-dosing (Marcia).** Marcia did not attend annual meetings for the last three years. There was no update provided on this project. The committee that was present discussed that this project does not appear to be making progress. They are requesting that the manuscript be submitted by September 1, 2023 or the project will need to be terminated.

**3. Calcium and phosphorus (Hans).** Hans Stein reported that the work has been published.

**4. Intestinal microbiome (Phil).** The microbiome study is currently in the analytical phase. All samples have been collected and are being analyzed at this time.

**5. Digestible Ca requirement (Layi).** Layi was not present to present the progress on this project. No update was provided.

**6. Cecal microbiome and energy contribution (Tom Burkey).** Tom was not present to update on the progress of the cecal microbiome study and no update was submitted to the committee ahead of time.

**7. Intestinal integrity model (Ryan and Yanhong).** Ryan reported on the progress of the trial. He has received samples from multiple stations and has completed the lactulose/mannitol sample analysis. He is getting ready to collect additional information to start working on the report. Ryan noted that two different Masters of Science degree candidates will be using this work as part of their thesis.

**8. DE/ME evaluation (Hans).** Hans reported that the DE/ME work has been completed. The manuscript has been written and sent to the committee for review.

#### *Discussion of new projects:*

**1. Evaluation of reduced energy diets on the growth performance of grow-finish pigs (Brian Kerr and Jason Woodworth).**

Pigs (approximately 25 kg) will be allocated to one of five treatments. The five treatments will be as follows: 1. Corn-SBM (no added fat/oil); ME = 3275 kcal/kg, NE = 2440; 2. Corn-DDGS, less 50 kcal ME than diet 1; 3. Corn-DDGS, less 100 kcal ME than diet 1; 4. Corn-Soyhulls, less 50 kcal ME than diet 1; and 5. Corn-Soyhulls, less 100 kcal ME than diet 1. Diets will be formulated to be equal in SID Lys & AA ratio and not Lys levels relative to energy. Diets will contain no additional supplemental fat inclusion. The DDGS will be that of 4% fat level and both the DDGS and soy hulls will need to be shipped across all stations for testing. Total Ca and available phosphorus levels will be equal and all other mineral and vitamin supplemental inclusions will be held constant. mins, minerals, vits, tm. Pen average daily gain, feed intake and feed efficiency will be measured throughout the study. The study will be divided into three phases: 25-75 kg BW, 75-125 kg, 25-125 kg. At the end of the study, carcass yield measurements may be taken at universities where possible. In addition, digestibility work (Ti and GE) may also be conducted dependent upon the researcher's abilities.

### **Business meeting discussion (11:30 AM)**

1. Young Jang was nominated for the position of secretary. This was moved and seconded. A unanimous vote followed.
2. Brian Kerr will visit with Don Beitz to determine if he will continue as the advisor to the committee.
3. The group decided to remove sow research as one of the assignments of the committee since many universities do not have access to sows for research.

### **Extra discussion (11:38 AM)**

- Group briefly discussed next year's meeting location and potential dates.
- The group also discussed how there is a need for people within the committee to take leadership and be active in the work. There was concern of the lack of attendance for the meeting with the recognition that some individuals were still completing teaching responsibilities at their respective universities.
- In addition to potential research studies, there was discussion on funding. While some researchers have funding available to complete studies created by the committee, others may not. Looking for new funding opportunities or studies that have low input costs will be critical as the committee continues.

### **S-1081 Committee**

Review of the agenda and minutes started at 10:05 am. Both were accepted and approved as written. A discussion on past and current projects followed.

### **Research Discussion**

#### *Past projects*

1. **Essential oils (phytochemicals).** KY working on manuscript.
2. **Boron.** AK will put additional sows on this objective in 2023. KY has data from approximately 150 litters with limited detectable effect. Some evidence of effect on birth weight. Unsure of the overall value of additional data.
3. **Phase feeding.** One manuscript in final review process from SD. Expect publication soon. Other data waiting submission by past student to finalize another manuscript. No additional sows expected on this objective.

### *Current projects*

1. **Iron.** One student completed thesis work on this project from KY. Two students working on this objective at SD. At SD, first parity data indicates a dip in sow Hb status around 90 d of gestation and at least 60% of piglets below target Hb status at birth with 40% still below target at weaning and no clear relationship with birth or weaning weight. Additional sows going on test at SD in 2023.
2. **Histidine (HIS).** Extensive discussion on study proposal. Added His during lactation, greater milk output based on dairy cattle. Proposed limit to 2 sow groups to strengthen statistical power at individual stations and for ease of treatment application. Proposed Control diet and Control + 0.2% added His. Based on quick gestation diet formulation, 0.2% represents about 40% added His. Recommend to limit SID Lys to 0.93%. Proposed variables of interest: farrowing and litter performance, milk at d10 – 14; N balance at d10 – 14; total tract digestibility at d15. Eric at SD to look into measuring milk casein content. Robert at GA to contact CJ Bio about providing His. Crystal at SD has Val to share for diet formulations. Recommended all stations interested (UK, GA, AK, SD) to put sows on test starting spring 2024 to try to limit differences in lactation intake due to heat. At present, expect about 150 total sows on test. Recommend separate His diet rather than top dress to better account for specific sow intake (hence His intake). Crystal at SD to prepare draft study protocol to share. Robert at GA to finalize diet formulations.
3. **Sow metabolic status.** Discussion around what samples are either already being collected or easily added to existing projects that could be used for metabolic screening of sows in late gestation to be correlated with ‘good’ and ‘bad’ lactation performance. Proposed each station to collect serum sample at loading to farrowing room from as many sows as possible Once lactation is complete, identify ‘good’ vs ‘bad’ performing sows and send those specific samples to Eric at SD along with specific farrowing/lactation performance. Eric to analyze samples for cytokines and/or acute phase proteins.
4. **Sensory additives.** AK has some initial data. KY plans to start sows on test, specific to an umami product.

### **Business meeting discussion**

Tsung Tsai recommended for position of secretary. Unanimous agreement.

### **Next year’s meeting discussion**

Discussed limited attendance and potential relation with timing for this year.

### **Lunch break (12:00-1:00 PM)**

### **Afternoon Session Joint Session (NCCC42 & S-1081)**

Crystal Levesque declared the meeting open at 1:05 PM. It was noted that because all station reports were completed prior to lunch break and the number of participants (in person and on Zoom) that all remaining agenda items could be accomplished in the afternoon.

**Guest Presentation:** National Pork Board, Chris Hostetler

Chris Hostetler provided an update of the NPB. At present there are 5 staff positions related to Sustainability objective with a variety of backgrounds. The multi-year NPB funded Sustainability project is wrapping up. New multi-year, multi-state project on Nutrient Utilization has started and is lead by Dr. Laura Greiner (ISU) with an emphasis on standardizing Life Cycle Analysis estimations. A Real Pork ad campaign is underway with Dr. Nick Gabler (ISU) focused on ‘debunking myths’ about pork production. The Real Pork Scholars program (previously Pork Scholars) will start to specifically include communication and media training. In the question period it was noted that the previous RFP model of funding smaller individual projects is less likely to occur unless a specific need is identified. The consortium-type research programs is expected to continue. iFeeder is working to develop US ‘numbers’ for future formulation of diets to the smallest carbon footprint. Part of the Nutrient Utilization consortium.

**Guest presentation:** US Soybean Industry: Gordon Denny, Gordon Denny, LLC (1:30 PM)

Gordon gave a presentation update of the US Soybean industry and market predictions. A copy of the slide presentation was shared with members May 16, 2023. Highlights of the discussion include: realized expansion of solvent crushing capacity expected at 1.5 mill bu/d by 2026 (approximately 20% increase) which is slightly less than earlier predictions/planned expansions. High processor crush margins are gone, the margin dropped 3-fold in the last 4 months, in part explaining the lower predicted crusher expansion. Broiler industry is the major growth opportunity for domestic demand of SBM. Soy oil demand will subsidize SBM growth; while exports of chicken and pork drive meal use.

The soy industry has recognized the disconnect between field yield goals and meal protein content; where higher field yield is increasing raffinose and stachyose content which is driving down protein content. As processor margins lower there is greater interest in ‘fixing’ protein quality concerns. Expecting ethanol demand to lower, lowering value of DDGS but continued demand for sustainable aviation fuel (SAF) by individual states (ie. CA) can help to maintain DDGS value.

**Guest presentation:** Overview of US Biofuels industry: Jason Schwenneker, Athens Management Group (2:00 PM)

Jason gave an update of the Biofuels industry, copy of his slide presentation was shared with all members May 16, 2023. Highlights include: generating carbon credits is becoming more profitable than the fuel. Right now renewable diesel (RD) is more profitable than SAF, individual states with tax credits to promote RD will maintain demand. Use of waste oils (e.g., animal fat, used cooking oil) is increasing and follow a similar pattern of increasing demand as soy oil (e.g., 2009, 10% of soy oil into biofuels; 2020’s, 50% into biofuel) which is going to similarly impact these fat sources for animal feed. Expecting a SBM price storm in 2024. Soy oil demand for food/feed has been relatively stable the last 10+ years which means it is not the driver of price, biofuels is. However, growth of animal fats, recycled oils, etc to meet higher demand for biofuels is not likely (specific markets are fairly static)

**Short break (3:25 to 3:30 PM)**

**Discussion of intestinal integrity models (Emma Helm, Virginia Tech University)**

Emma started the discussion with a brief description of the different potential models to assess intestinal integrity based on live animal measures (FITC-dextran, lactulose:mannitol ratio), tissue measures (Ussing Chambers, gene expression) and blood. Most of the discussion centered around the differential sugar absorption test, primarily due to past objectives from the NCCC042 group. A general protocol related to dosing was 500 mg/kg BW - lactulose and 50 mg/kg – mannitol in 1 mL/kg oral gavage. Ryan noted blood collected at 60 or 90 minutes after dosing. Brian indicated they collect blood at 4h after. Ryan indicated a major challenge with analytical determination of sugars is removing glucose because it elutes

close to mannitol and that the total run time is about 90 minutes/sample. It was generally noted that few models besides heat stress can actually pick up differences in gut permeability. Emma noted part of the challenge is the capacity of the gut to compensate (i.e. increase mucus layer with intestinal viral challenge). Eric Weaver suggested to consider byproducts of bacteria (i.e. flagellan) as possible alternative; it is used in humans for this purpose.

Ryan noted another challenge is variability between labs and that there is really no data on the inherent variability between animals and/or sample concentrations. To generate some baseline data on variability, UIUC (Dilger) and USDA-ARS (Kerr) will evaluate urine and blood samples at both locations.

### **Summary of projects from NCCC042 and S1081 for the joint discussion**

NCCC042 study for potential interest across groups centered around no added fat in finisher stage. Brian is taking lead on developing the standard protocol. General ideas were corn/SBM standard diet + reduced energy diet (50 – 100 kcal using wheat midds, DDGS, soyhulls) with up to 5 treatments. Require at least 2 replicate pens/station. Specific period of growth undecided. Noted challenges are ensuring the same source of fiber for all stations, especially if including finishing phase. Possibly to include carcass characteristics (at least what can be garnered from standard packer data).

S1081 studies of potential interest across groups was the His study and the sow metabolic status study (described above). Jason noted KSU is planning a similar study with 2 supplementation levels at a commercial farm late summer 2023 and are willing to share results. The data may be useful to help direct specifics related to the S1081 objective.

### **Discussion of next year's meeting place and date and reenergization of this meeting.**

It was noted that representation from some relevant Universities has lapsed (i.e., Michigan, Missouri) and that encouraging the various Ag Experiment Station Directors to promote participation would be helpful. Brian to reach out to these Directors. Crystal will confirm with James and Don what the specific requirements are for the annual meetings to ensure whatever is decided meets the requirements. Ideas discussed: moving back to January in a warm location, challenges with going to a location where there is no point person, moving to 3<sup>rd</sup> week in May to stay at NPB but problem getting too close to World Pork Expo. Possible solutions: have the Vice Chair of each group organize the venue and accommodations; Brian to submit a poll regarding possible 'warm' locations and interest in going back to January meeting. Acknowledged that given the time, responses to the poll are needed ASAP. Discussed the potential to move to a single day meeting by reducing or eliminating guest speakers. Alternative idea was to have committee members or post-docs of committee members share on a specific topic.

Meeting was adjourned at 5:00 PM. It was decided that all topics had been suitably discussed so no meeting would be held Wednesday, May 17 morning. The 2023 NCCC042 and S1081 annual meeting was complete.