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JOURNAL OF SWINE HEALTH AND PRODUCTION

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JSHAP SPOTLIGHT

Dr Bob Thaler

South Dakota State University

Dr Bob Thaler earned a BS ('82) and MS ('84) from South Dakota State University and a PhD ('88) from Kansas State University. Dr Thaler currently has an extension, teaching, and research appointment at South Dakota State University. While nutrition is his main area of interest, his research also focuses on above ground burial, odor-control technologies, and the impact of swine manure on soil health. Dr Thaler chooses to serve as a JSHAP reviewer because he enjoys seeing basic and applied sciences working together to make an immediate difference to answer questions pork producers are dealing with daily.

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Be there

The AASV Annual Meeting was science-based and personally motivating. Members in attendance rose to the challenge of this year's theme, "Be There!" We are fortunate to have veterinarian members and scientists with a vested interest in sharing both their own successes and failures. Some of our worst blunders were laid out on the main stage for a clear view of the present dangers we face. I am not sure any of us enjoy discussions around the high cost of porcine reproductive and respiratory syndrome or the failures of keeping porcine epidemic diarrhea virus (PEDV) out of sow farms; not to mention, we have ever-closer foreign animal diseases on our doorstep.

If you have not yet carved out an evening or weekend to review the papers and share messages with your partners and friends, I challenge you to make that commitment. We have been blessed with helpful plans and experiences which guide the way for better healthcare for our clients. We were even fortunate to hear about the successful control of a scary zoonotic disease entry in Australia, which lead to a massive and aggressive control program to help protect animals and the people who care for them.

I encourage you to check out Dr Chris Richards' clear and direct presentation on Japanese encephalitis virus if you have not read it yet.[1]

Mentorship and student interaction was again a strong focus of the meeting. We are so fortunate to have companies and the AASV Foundation willing to invest in the scholarships and presentation program. We as members now need to focus on how we each foster and develop this strong talent in the years to come. The AASV has started the targeted mentorship program. I was thrilled to also see the large diverse group of students in attendance. Our responsibility as members of the organization is to build on these relationships with mentor relationships. Be there – for the younger members. Share your contact information. Make the call or send the note to foster the relationship. We know the first few years of medicine are very challenging for our newest members.

Tuesday is often a tough time to bring a crowd to the main session of the meeting. Monday celebrations and a long weekend make additional learning on Tuesday hard for some. This year was different. People stayed and participated in an engaging discussion of PEDV elimination followed by nutritionist/veterinarian system operation experiences shared by two premier business groups in our industry, AMVC and JBS. After the robust discussion of PEDV elimination, I was personally motivated to pull together a group from our membership with a clear mission for PEDV elimination. We can do this. We already have the technology and know the disease well.

"We are fortunate to have veterinarian members and scientists with a vested interest in sharing both their own successes and failures."

If not *us*, then *who*? If not *now*, then *when*? We have what we need to eliminate PEDV from the US sow herd. Several production systems joined in the discussion of risks and needs for this to become a reality. Vaccine discussion even raised the reminder that a modified-live virus vaccine in growing pigs could very well be the step we are not trying (with older veterinarians laughing at the connections to the days of pseudorabies virus elimination). Be on the lookout for more discussions to come relative to the elimination of PEDV from the US swine herd. We have the tools. We have the science. We now need the focus and motivation.

William L Hollis, DVM
AASV President

Reference

*1. Richards C, van Dissel J, Suter R, Eastaugh M, Dunlop R, Harrison T, Carr J. When does being prepared pay off? Japanese encephalitis – the Australian experience. In: *Proceedings of the 54th AASV Annual Meeting*. American Association of Swine Veterinarians; 2023:384-385.
https://doi.org/10.54846/am2023/176

* Non-refereed reference.

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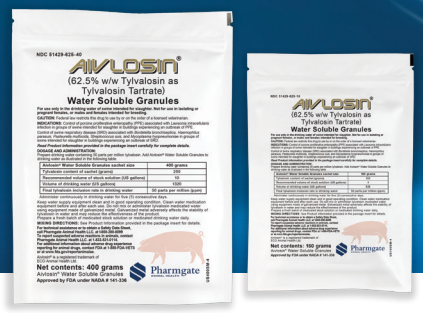

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[1] Stuart et al. Intra-cellular accumulation and trans-epithelial transport of Aivlosin, tylosin and tilmicosin. Pig J 2007; 60: 26-35.

All that's left is to pay the bill

As I write this in late March (very late if you believe the JSHAP folks), we are still wrapping things up from the 2023 Annual Meeting. In some ways it seems like it just ended and in others it seems a long time ago. I guess that is just the cycle of things. At any rate, I am already starting to look towards Nashville. The last time the Annual Meeting was held in Nashville was 2001. We were at the Nashville Renaissance Hotel downtown. I remember that because I got into a taxi from the airport and the driver asked where I was going. I told him the Renaissance downtown and he told me, in a very heavy Tennessee accent (and remember, I am from the south, so I speak southern) that there was no such hotel. After much back and forth, I finally showed him the copy of the hotel confirmation to which he replied, "Oh, you mean the ReNAYzance!"

Anyway, by all accounts, it seems we had a very successful meeting at the Gaylord Rockies. Attendance was up from 2022 at 956 total attendees. International attendance also increased, as did the number of technical tables. Student attendance had declined from pre-pandemic numbers but was similar to 2022. The comments I have received and the survey responses I have seen, have overwhelmingly been positive. Historically, complaints usually fall into 3 categories: meeting room temperature, audiovisual issues, or bad food. This year, it seems attendees were mostly happy with all three.

From what I observed, any issues with the room temperature or seating were addressed quickly and satisfactorily. This year, as last year, we used a third-party audiovisual company. I have to say, from my interaction with them, it was the most positive experience we have had in a long time. They had plenty of staff on site to accomplish set up in a timely manner, the equipment was high quality, and any issues that arose (which they always do – it is technology you know, and Gremlins are real) were addressed promptly and effectively.

As far as the food goes, I have heard more positive comments this year than I have heard in a long time. I challenged the chefs before the meeting ever started that if they were going to do a pork dish, it had better be cooked to the correct temperature, served warm, and not dried out. Personally, I was very pleased with the job they did.

All-in-all, most attendees were very happy with the venue and the content. It was a nice facility layout from a staff perspective in that basically all our meeting space was on one floor and near the registration desk. Although the Gaylord is a big property, once you got to the convention area, it was all very compact and easy to navigate.

If there was a negative comment, it had to do with the isolation of the facility. A few folks mentioned that they preferred a venue with more off-site opportunities. On the other hand, however, I heard just as many comments praising the location because it encouraged and facilitated the interaction with our colleagues. That opportunity to network and spend time with old friends is really why a lot of us come to the meeting. At least it always ranks as one of the best aspects of the Annual Meeting.

Although it was considered one of the best meetings, it did not come cheap. I still have not received the final invoices but as with everything else, prices keep going up. You might ask, why did we go with an outside audiovisual company for instance? Well, the hotel wanted over $150,000 to handle the AV for our meeting. We got it done for less than half of that (which was still more than we have ever paid in the past). Somebody asked me why there was no coffee on the afternoon breaks. I made that decision as an attempt to control food and beverage costs. By the time the hotel adds on the service charge (25%) and taxes, that 8-ounce cup of hot, brown water costs $9.75. The hot tea is even worse. It costs the same, and you have to make it yourself! I made several other decisions to try to keep costs down and I hope those did not negatively impact your meeting experience. We do our best to bring you a high-quality continuing education experience while trying to keep registration fees reasonable.

So, thanks for all the work of the Program Planning Committee under Dr Bill Hollis's direction. They put together a very nice, scientific and challenging program that built on the foundation laid down by other program chairs in previous meetings. In addition, thanks to the hotel staff and audiovisual team for their hard work to make it all functional and enjoyable. Most of all, I want to thank the cadre of AASV staff (Sue, Abbey, and Sherrie) and friends (Lee, Dave, Joel, Miranda, Kay, Lance, Karen, Emily, and Rhea) who gave up their personal time to come out and work long hours for little pay. We could not have done it without them. Most of all though, you showing up with a positive attitude and eagerness to learn and interact are what it is all about. We would not do it without you. Thanks for attending, and I look forward to seeing everyone in Nashville at the Gaylord Opryland in 2024.

Harry Snelson, DVM
Executive Director

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What are your thoughts about wearing other people's underwear?

You are probably asking what the title of this message has to do with JSHAP and graphic design? It is a funny, but shocking experience for me that I will never forget. After starting as publications manager with the AASV in 2000, one of my first missions was to change the JSHAP cover from graphs and figures from manuscripts to photos of swine and swine facilities. I was always looking for a swine barn full of pigs that I could photograph, and Dr Burkgren always had great ideas and knew several producers in Iowa. After moving to Missouri with my farmer husband in 2005, I continued searching for more photo shoot opportunities. It was suggested that I contact the University of Missouri. I did so and was put in touch with Dr Safranski. I typically photographed grower-finisher barns, but Dr Safranski asked if I had ever gone into a shower-in/shower-out swine barn. This city girl had no idea what that even meant. Then came the question about underwear. Most people reading this story will understand the shower-in process where you undress on one side of the shower stall, shower, then step out on the other side where there are clean clothes to dress into. But for a first-timer, who knows whose clothes they were (yikes!). I did not know what to think, but it was not as bad as I had anticipated and makes a great story!

Even as technology continues to evolve, the formatting process has generally remained the same over my 23 years with JSHAP. Manuscripts are run through a rigorous peer-review and editing process (described by Terri and Sherrie in previous issues) before they are formatted into the journal. Once the edited material is received, the sometimes-tedious process of design begins. This may include tables, figures, and photos. Text is carefully formatted onto the pages watching closely for symbols, superscripts, and italic words that typically will not convert from the Word document into the InDesign formatting software we use. The flow of the article is important to provide the reader an easy comprehension of the information. For example, we make sure the figures and tables appear after they are first mentioned in the text and balance the page with the use of white space. Other variables in the text such as measurements splitting between two lines and hyperlinks are just a few things that formatters and editors will check as proofs go back and forth until the paper is marked done and the author proof is created. Other sections of JSHAP, such as ancillary messages and news, the meetings page, and cover art, are formatted similarly.

The JSHAP graphic design team (left to right) Karie Kjos, Tina Smith, Barbara Molnár-Smith, and Natalie Conard.

"Once the edited material is received from the editors, the sometimes-tedious process of design begins"

After all the pages are ready and Sherrie gives me the thumbs up, we put together a "booklist" to determine how many pages will be in that issue. The booklist serves as a blueprint of the journal issue. More times than not, there is a juggle in pagination to account for many variables, including advertisement placement only on left-hand page positions among ancillary messages and news. Most importantly, the total page count for an issue must be a multiple of four for the journal to be printed.

Once the booklist has been approved, the "book" (journal) is created. This is the process of gathering all the pages or documents and linking them to build the publication. Page numbers are automatically applied, and a PDF is made to display how the final journal will appear. Sherrie and Emily are the main proofreaders of this PDF, although Abbey, Rhea, and Sue also look through their sections. A couple of versions will go back and forth until all needed corrections are made and Sherrie calls it done.

We then preflight the journal. This is a process to confirm that the digital files will output into the printer files successfully. Examples of problems that may arise are missing links or fonts, low-resolution images, or overset text. Once the journal passes the preflight stage, we upload the files to the printing company (Walsworth Publishing, Marceline, MO). They use online proofing so the editors can review the pages one last time before it is printed. The journal is printed using state-of-the-art perfecting 4-color presses, after which it is folded and moved through the bindery process where the completed journal will be assembled. Multiple quality-control steps

Editorial Office message continued on page 119

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Editorial Office message continued from page 117

are in place to ensure high-quality printing and binding. The formatting and printing process has changed over the years to include new fonts and design elements and the ability to use more color with new printing press abilities.

I also prepare and send our completed journal files to Dave Brown, the AASV webmaster, who works his magic to convert the journal to html for online publication. I started working with Dave in 2000 when he was the JSHAP publications manager. His vast knowledge was truly incredible, and I learned so much from working with him. He taught me everything that I would need to know about formatting the journal and preparing the files for print, and later online publication.

Soon after learning the journal formatting, I was also asked to format the AASV's 600-page proceedings book. This was a huge project, taking up to 40 hours a week for 2.5 months to finish. As the years passed, the AASV graphic designer job became bigger and more time demanding. Other projects include fliers, pamphlets, auction and program books, table displays, posters, virtual meeting art, and website and mobile app art.

I am contracted labor for the AASV and I run my own graphic and web design business, working with a multitude of businesses and organizations including the American Association of Bovine Practitioners, hospitals, banks, and real estate and auction companies. I started out as a one-person shop and have grown into a 6-person business. My AASV work team grew by three: Natalie Conard is the main formatter, Karie Kjos is the technical formatter, and Barbara Molnár-Smith is graphic design, and I work in all categories managing the team. Some of my team members have been with me for over 12 years, so everyone is very skilled at what they do, and they do a fabulous job! It takes a team to build a book, or in this case … a journal.

The AASV has given me the opportunity to meet people from all over the world at the AASV Annual Meetings. The JSHAP staff is an outstanding group of people to work with and all have become my good friends over the years including the late Dr Judi Bell and retired Karen Richardson.

Tina Smith
AASV Graphic Designer

Erratum

In the article on page 20 of the January/February 2023 issue of the *Journal of Swine Health and Production* (Little et al), the DOI for the Supplementary materials was incorrectly reported as "https://doi.org/10.54846/jshap/1297suppl." The correct DOI for the Supplementary materials is **https://doi.org/10.54846/jshap/1297suppl1**

A sounder of swine: The importance of clustering in the design, analysis, and interpretation of clinical trials

Jan M. Sargeant, DVM, MSc, PhD, FCAHS; Annette M. O'Connor, BVSc, MVSc, DVSc, FANZCVS; Terri L. O'Sullivan, DVM, PhD; Alejandro Ramirez, DVM, MPH, PhD, DACVPM; Chong Wang, PhD

Summary

Clustering of animals at the level of pens, rooms, barns, or farms leads to statistical nonindependence of individual pigs. Failure to consider clustering when determining sample size will result in clinical trials that are too small to detect meaningful differences between intervention groups when clustering is controlled in the analysis. Failure to control clustering in the analysis will lead to inappropriately narrow confidence intervals and increases the probability of a false-positive finding. Thus, failure to consider clustering in trial design and analysis results in research that could misinform decision making on the use of interventions.

Keywords: swine, clustering, nonindependence, sample size, analysis

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Resumen - Una mejora en cerdos: La importancia de la agrupación en el diseño, análisis e interpretación de los ensayos clínicos

La agrupación de animales a nivel de corrales, salas, edificios, o granjas conduce a la no-independencia estadística de los cerdos individuales. Si no se considera el agrupamiento al determinar el tamaño de la muestra, los ensayos clínicos serán demasiado pequeños para detectar diferencias significativas entre los grupos de intervención cuando se controle el agrupamiento en el análisis. Si no se controla el agrupamiento en el análisis, los intervalos de confianza se estrecharán inadecuadamente y se aumentará la probabilidad de encontrar un falso positivo. Por lo tanto, no considerar el agrupamiento en el diseño y análisis de los ensayos da como resultado una investigación que podría desinformar en la toma de decisiones sobre el uso de las intervenciones.

Résumé - Un sondeur porcin: L'importance du regroupement dans la conception, l'analyse et l'interprétation des essais cliniques

Le regroupement des animaux au niveau des enclos, des chambres, des granges, ou des fermes conduit à la non-indépendance statistique des porcs individuels. Le fait de ne pas tenir compte du regroupement lors de la détermination de la taille de l'échantillon entraînera des essais cliniques trop petits pour détecter des différences significatives entre les groupes d'intervention lorsque le regroupement est contrôlé dans l'analyse. Le fait de ne pas contrôler le regroupement dans l'analyse conduira à des intervalles de confiance étroits de manière inappropriée et augmentera la probabilité d'un résultat faussement positif. Ainsi, le fait de ne pas tenir compte du regroupement dans la conception et l'analyse des essais aboutit à des recherches qui pourraient fausser la prise de décision sur l'utilisation des interventions.

Clinical trials (experimental designs in realistic-use settings) provide the highest level of evidence for the efficacy of interventions.[1] However, there is evidence from the published research that trial design, conduct, and analysis is suboptimal in swine trials.[2-4] Previous commentaries in this series have discussed accessibility of research reports,[5] issues relating to selection of interventions and outcomes,[6,7] and reducing risk of bias[8] to maximize the value of swine trial research. In this commentary, we focus on the issue of clustering.

Clustering is an important consideration in swine research because animals are housed in pens, multiple pens may be present within a room, and there may be multiple rooms within a barn. This grouping of animals has implications when designing and analyzing a trial. First, the researcher needs to determine the unit of concern (ie, the unit at which allocation to intervention groups will be conducted). Second, although there will be individual variability in outcomes between animals housed together, animals within a group may be more similar than animals in different groups. This may be related to the location of a pen within a barn, to the sharing of air

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Sargeant JM, O'Connor AM, O'Sulllivan TL, Ramirez A, Wang C. A sounder of swine: The importance of clustering in the design, analysis, and interpretation of clinical trials. *J Swine Health Prod*. 2023;31(3):120-127. **https://doi.org/10.54846/jshap/1315**

space, feed troughs, and water sources among animals when the outcome of interest is infectious, or may relate to differences in the social dynamic between individual animals in a group. An evaluation of grower-finisher mortalities and culling rates found that nearly 70% of the rate variation could be explained by the barn-to-barn variation.[9] This similarity of pigs within groups results in subpopulations, or clusters of pigs, whose performance, health, and other outcomes are not truly independent of each other, which leads to statistical nonindependence of pigs within those groups. This nonindependence violates assumptions used in sample size calculations and statistical analyses.[10,11] However, the potential for clustering often is overlooked in swine trials; clustering was not accounted for in any of the 135 trials included in a meta-analysis on the efficacy of bacterial respiratory vaccines in swine.[3] This is important because control of clustering leads to smaller standard errors which would impact the confidence in the effect size and the weight given to an estimate in meta-analysis. Further, the smaller *P* value would increase the type 1 error risk (increase false-positive results) if null hypothesis testing is used for inference (ie, whether the intervention is beneficial, harmful, or not significantly associated with the outcome). In an evaluation of 67 epidemiological studies in animal populations, it was estimated that the inference based on null hypothesis testing would have changed in 46% of the articles if the authors had adjusted for clustering.[12]

The objective of this commentary is to describe issues related to clustering in swine trials using illustrative examples. The technical sections of this commentary (sample size calculations and statistical analyses) are structured such that the first paragraph describes the important take-home messages for individuals who read, interpret, and use the results of trials conducted in clustered populations. The remainder of each section provides more technical details for individuals who conduct trials in clustered populations.

Setting the stage - how was the intervention given and the outcome measured?

When designing a trial, the researcher needs to consider both the unit of concern and the unit of observation, which may not be the same. The unit of concern (also referred to as the unit of allocation, the unit of randomization, or the experimental unit) refers to the organizational level (eg, animal, pen, or room) at which an intervention is applied.[13] The appropriate unit of concern will depend on the research question, how the intervention is intended to be used in a realistic-use setting, and the nature of the outcome. For instance, if the intervention is a treatment that would be applied to an individual sick pig, then the individual animal would be an appropriate unit of concern (experimental unit). However, if the intervention normally would be provided to a pen, then pen would be the appropriate unit of concern. Examples of interventions applied at a pen-level might include antibiotics administered in the feed or water, diet or dietary formulations, or provision of objects to enrich the environment. If the outcome is infectious by the airborne route, then the appropriate unit of concern may be the room or barn rather than the pen.

The unit of observation is the organizational level at which the outcome is measured, and may correspond to a body part (eg, a limb if the outcome on one limb within a pig is compared to the outcome on another limb of the same pig), an animal, a litter, a pen, a room, or a barn. The unit of observation will depend on the outcome and may vary by outcome within a trial. For example, in a trial to assess the efficacy of batch medications for intestinal infections in nursery pigs, the unit of concern was the pen. The unit of observation varied between 2 included outcomes; the outcome of weight gain was measured at the individual pig level and the outcome of pathogenic bacterial load as determined from pooled fecal floor samples was measured at the pen level.[14]

Why does it matter? Knowing when clustering is an issue

When evaluating the efficacy of interventions, clustering of animals associated with a pen (or other organizational level which defines the cluster such as a room or barn) can be of concern when it results in nonindependence of animals. To illustrate the concept further, consider the following simple hypothetical (but realistic) trial designs:

Design variation I - no clustering

Figure 1 represents a scenario such as a treatment trial, where only some pigs in the pen are eligible for the study (in the figure, gray pigs are not eligible, whereas black and white pigs represent 2 intervention groups). As an example, consider a trial to compare the efficacy of 2 antibiotics (represented by the white pigs and black pigs) for the treatment of respiratory disease in individual pigs. In this scenario, when a pig develops respiratory disease and requires treatment, the pig is randomly assigned to receive 1 of 2 interventions. Importantly this is a single pen design. Therefore, there may be pigs within the pen who do not develop respiratory disease (represented by the gray pig) and therefore are not

Figure 1: Single pen design with intervention groups mixed within the pen. Grey pigs are those not eligible for inclusion. Black pigs represent one intervention group and white pigs represent another intervention group.

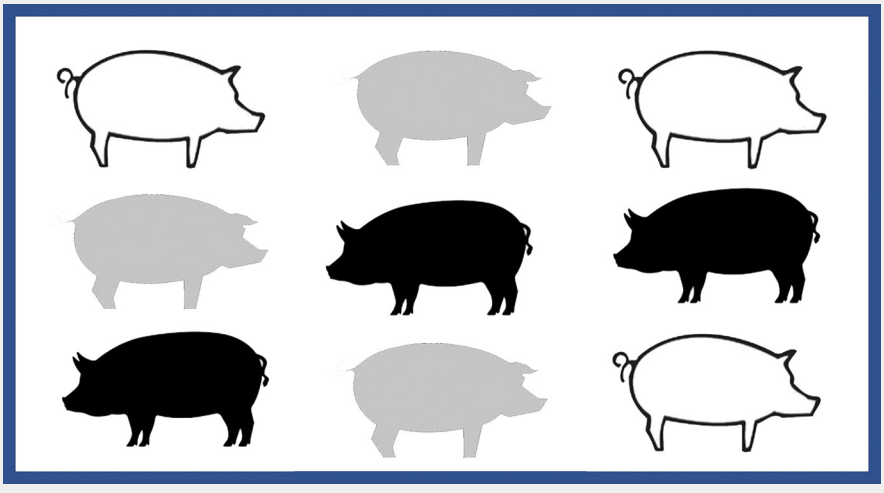
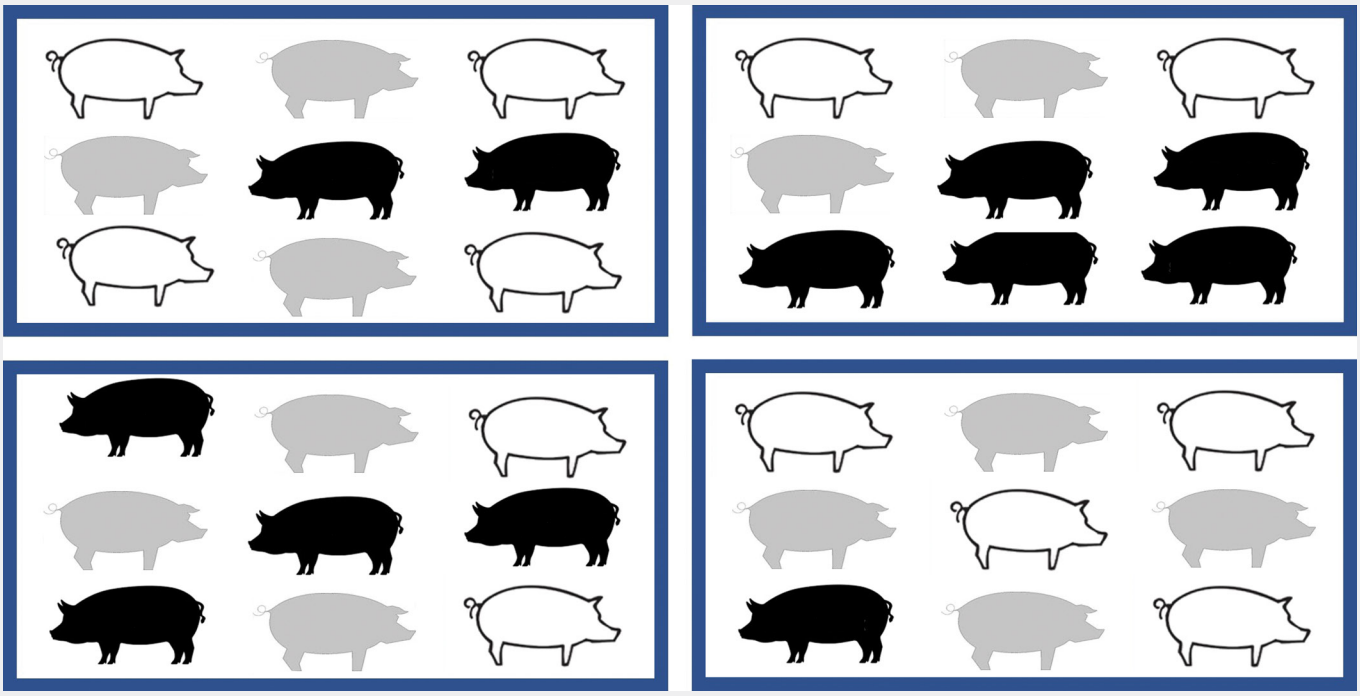


Figure 2: Multiple pen design with intervention groups mixed within the pen. Grey pigs are those not eligible for inclusion. Black pigs represent one intervention group and white pigs represent another intervention group.



treated, or pigs within the pen treated with either of the 2 antibiotics. The pigs in this pen might be more similar to each other than to pigs in other pens in the same barn. However, because there is only 1 pen included in the trial, and both interventions are given within that same pen, the pigs would be considered statistically independent, and clustering is not a concern. In this scenario, given the single pen design, a simple chi-square test can be conducted to evaluate whether the intervention group was associated with clinical cure (binary outcome, yes/no, cured/not cured) or a *t* test could be used to evaluate whether the intervention group was associated with daily gain (continuous outcome).

Design variation II - clustering

Now consider a variation to the trial design as depicted in Figure 2. In this scenario, individual pigs are still randomly allocated to intervention group within pen, but there are multiple pens. If the number of animals allocated to receive an intervention within a pen was not large, then the number within each intervention group may vary between pens. Using the same example of comparing 2 antibiotics for treating respiratory disease in individual pigs, imagine that there were multiple pens of pigs eligible for inclusion in the trial. There may be pens with no sick pigs, pens with all sick pigs only treated with one antibiotic, pens with all sick pigs treated with the other antibiotic, and pens where some sick pigs were treated with the first antibiotic and some were treated with the second antibiotic. In this case, the treatment may be associated with pen-level effects, such as pen area within the barn, level of disease exposure within a pen, difference in ventilation or access to feed or water resources, or differences in many other factors which lead to clustering. Even a small amount of clustering can have a substantial impact on the standard errors (and therefore confidence intervals and *P* values) of an intervention effect.[13] Therefore, more advanced statistical analyses which include control for the effect of clustering factors, such as pen, would be needed.

Figure 3 illustrates a scenario where not all pigs within a pen are eligible for inclusion in a trial (for example, only clinically ill pigs receive an intervention), but where individual pigs within a group receive the same intervention (ie, random allocation to intervention groups at the pen level). While this might not be a common scenario when a pen defines the group, it might occur when the group represents a room or a barn. If there was only 1 group per intervention (as shown in the figure), then "intervention" would be completely confounded by "group", and no meaningful analyses could be undertaken without the assumption that the groups are exactly the same. This situation is referred to as pseudoreplication. An example of this might be a trial comparing 2 antibiotics given to individual pigs with respiratory disease where there were 2 rooms within a barn included in the trial and all treatment pigs within a room were given the same antibiotic. If, however, there were more than 2 rooms included in the trial (and therefore more than 1 room receiving each of the antibiotic treatments), then clustering at the room level would need to be considered during sample size calculations and analysis.

Design variation III - cluster-randomized trial

Figure 4 illustrates a scenario where interventions are allocated at the group level with all pigs within a group receiving the same intervention. This design is referred to as a cluster-randomized trial and likely is the most common design for swine trials because many interventions are given to all animals within a group (eg, at the pen level), at least under commercial conditions. In this scenario, the group might represent a pen, room, barn, or a site. Common examples of this scenario would be vaccine trials,

Figure 3: Multiple pen design with intervention groups allocated at the pen level, where some pigs with a pen are not eligible for inclusion in the trial. Grey pigs are those not eligible. Black pigs represent one intervention group and white pigs represent another intervention group.

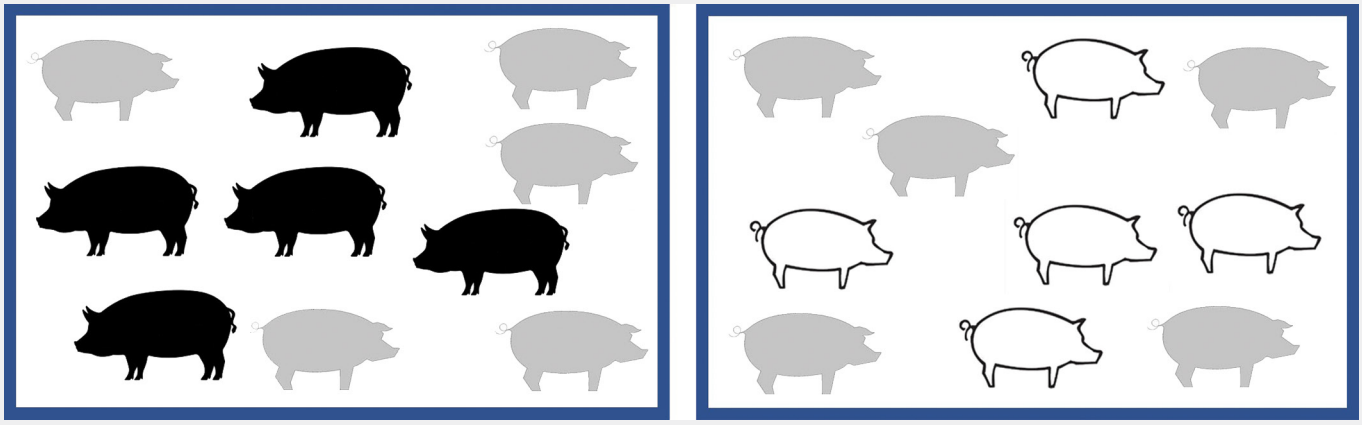
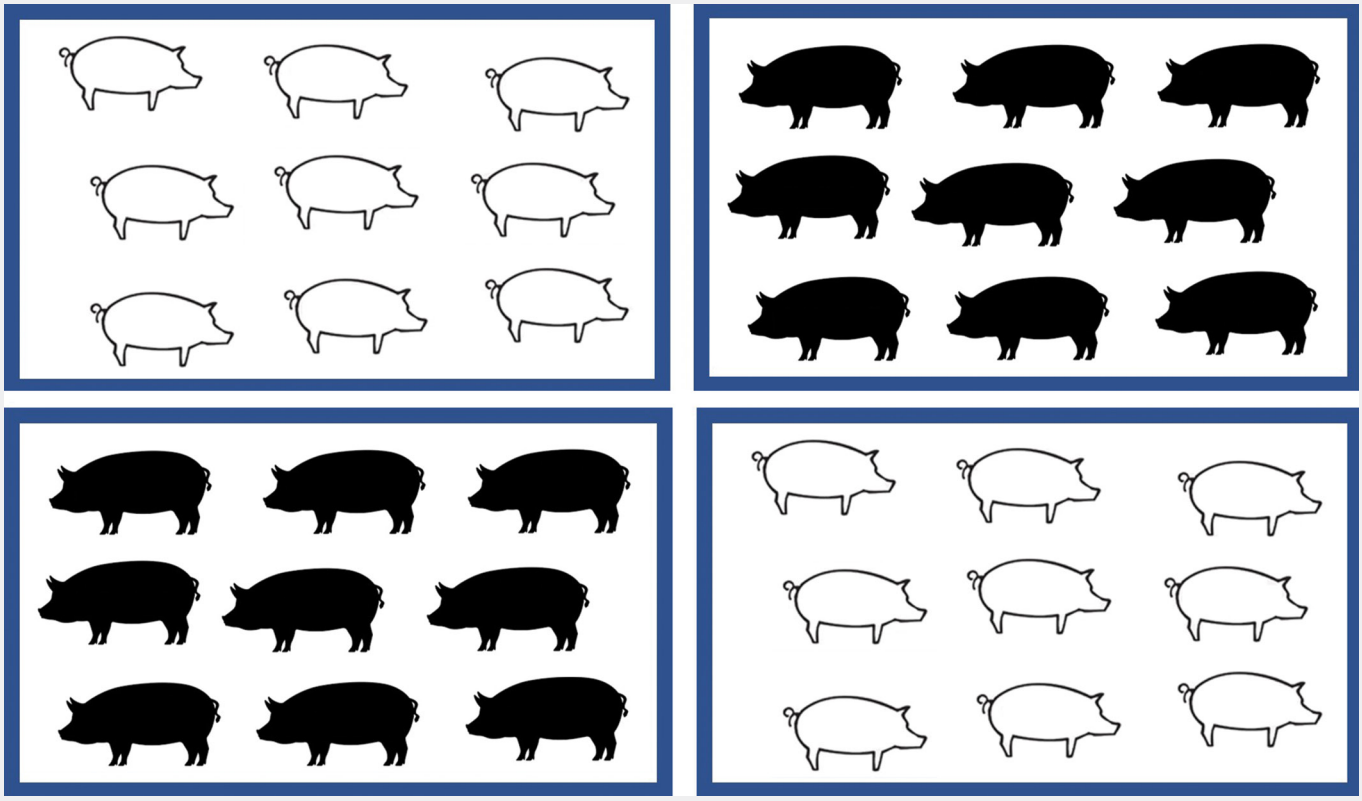


Figure 4: Multiple pen design with intervention groups allocated at the pen level, where all pigs with a pen are included in the trial. Black pigs represent one intervention group and white pigs represent another intervention group.



feed trials, or trials where an intervention is administered in the feed or water. Consider, therefore, an example of a trial comparing animal health (eg, incidence of respiratory disease) between 2 vaccines. In this example, assume that all animals within a pen receive the same vaccine. Therefore, each pen is randomly assigned to vaccine 1 or vaccine 2. The outcome related to respiratory disease could be measured at either the individual level (presence/absence of respiratory disease during the trial period for each pig) or at the room level (percentage of pigs within each room who experienced respiratory disease during the trial period). If the outcome was measured at the animal level, then nonindependence would be present and clustering due to room would need to be considered in the analysis. If the outcome was measured at the room level as the percentage of pigs with respiratory disease, then there is no need to control for clustering due to room. However, the sample size would be determined by the number of rooms rather than the number of animals in the trial, and therefore a larger number of rooms would need to be enrolled in the trial.

These figures and examples illustrate clustering based on 1 organizational level (eg, at the pen level). However, it is common for swine data to be clustered at several levels. For instance, pigs within pens, pens within barns, and barns within sites. It also should be noted that clustering is not always related to housing. When outcomes are measured on the same animal at multiple time points (ie, repeated measures design), there is nonindependence over time as each pig's measurement over time is not independent of its previous measurement. In this commentary, we focus on clustering due to grouping of animals, but the same concepts apply to repeated outcome measures over time.

Take a deep breath and sample size on - sample size considerations for randomized controlled trials

The presence of nonindependence needs to be considered when calculating a sample size for a randomized controlled trial, or the number of animals, pens, or barns included in a trial may not be sufficient to determine whether an intervention is effective. When a trial is designed, the difference (delta) between the groups that the researcher wishes to detect with a specified power (1-beta) is prespecified. Further, an acceptable level of type 1 error (alpha or false positives) is specified. Consider a scenario where the intervention is allocated to pens, the outcome is measured in individual pigs, and the statistical analysis is conducted appropriately to account for clustering. If the sample size was calculated for individual animals without considering the effect of pen, then the sample size will be too small (have less power) to find differences between intervention groups. Alternatively, if the statistical analysis does not appropriately control for the nonindependence caused by clustering, then the probability of a type I error (false positive) is increased, meaning that the trial results may suggest that the treatment is effective when it is not. For readers who need to calculate sample sizes for trials where clustering may be present, the following sections provide more technical details.

The reason that clustering needs to be considered when calculating sample size is because when pigs are aggregated into a group, such as a pen, there are 2 sources of variation in the outcome of interest, variation from the effect of the pig and variation from the effect of the pen. For this reason, the "effective sample size" for statistical analyses is less than the actual number of pigs.[10] The independent population sample size will also differ based on whether the trial is intended to evaluate superiority, equivalence, or noninferiority of interventions.[10,15] When nonindependence is not of concern, online sample size calculators are available for superiority trials (for example, see **http://www.openepi.com/SampleSize/SSCohort.htm**). When nonindependence due to clustering is present, sample size calculations are more complex. A complete discussion of sample size calculations for clustered populations is beyond the scope of this commentary. However, sample size calculations for clustered data require specification of the cluster variation in addition to all the parameters used in the independent population sample size calculation (power, type I error rate, the expected proportion with the event in both groups [with the difference between groups corresponding to the difference the investigator wishes to detect as significant] or, for continuous outcomes, the expected mean in both groups or the expected mean difference, and the standard deviation of the mean or mean difference).[10]

One approach to calculating sample sizes for cluster-randomized trials is to calculate a sample size based on independent units of concern and multiply that number by a "design effect."[16] The design effect is a function of the number of animals per cluster and the intraclass correlation coefficient (ICC), which is a measure of the similarity of individuals within a cluster.[10,16,17] The design effect can be calculated as 1+(n-1)*p, where n is the number of animals per pen (or other unit of allocation such as room or barn) and p is the ICC. An ICC of zero would indicate independence of individuals within the cluster, whereas an ICC of 1 (or 100%) would mean that measurements for all individuals in the cluster would give the same result.

Although conceptually simple, sample size calculations adjusted for clustering using the design effect assume the ICC for an outcome is known, which often is not the case. Some ICC estimates for swine populations are available. Weber et al[14] estimated ICC values of 12.3%, 4.2%, and 22.6% for average daily gain (ADG) from 14 to 35 days post weaning at the herd, batch, and pen level, respectively. Intraclass correlation coefficients for seroconversion between batches within a farm was estimated at 10% for *Actinobacillus pleuropneumoniae* and 50% for *Mycoplasma hyopneumoniae*.[18] Intraclass correlation coefficients have been calculated for a number of other infectious diseases in livestock from observational studies published in the literature; these values range from 0.17% for lamb mortality to 46% for *Brucella* serotitres in cattle[12] and from 4% for *Anaplasmosis* in cattle to 42% for bovine viral diarrhea.[19] In the absence of swine-specific estimates of ICC, a comparison to diseases with similar infectivity might be helpful. However, sample size calculations for clustered populations can be complex and therefore individuals planning a trial where clustering may be an issue should include an epidemiologist or statistician with expertise in sample size calculations for clustered data on the research team.

To illustrate the differences between sample size calculations, the following example calculates a sample size for a superiority trial with no adjustment for clustering, a superiority trial with a low estimated ICC of 4%, and a superiority trial with a high estimated ICC of 50%. For this example, we assume that pigs are housed in pens of 25 animals each and we set the power at 80% and

type I error rate at 5%. We use a binary outcome and assume that the outcome incidence is 30% in the baseline group and that a 10% increase in the proportion with the outcome would justify the use of the intervention of interest. Under these scenarios, the required sample size per intervention group would be 353 pigs/group with no adjustment for clustering (which would correspond to approximately 14 pens/group), 692 pigs/group (28 pens/group) with a 4% ICC, and 4589 pigs/group (183 pens/group) with a 50% ICC. If the intervention was allocated at the pen level, and there was a single outcome measure per pen (ie, the outcome was measured as the percentage of pigs experiencing the outcome), then the sample size calculation would need to be at the pen level. Expanding on the previous example, if the mean anticipated percentage positive in the baseline group was 30%, and an increase in the mean percentage positive of 10% would justify the use of the intervention, an estimate of the expected variability in these percentages also would be needed. However, the required sample size would be larger than the 14 pens/group that was calculated for the previous scenario. The design effect is not only impacted by the ICC, but also by the number of pigs within each pen (or other grouping variable). To illustrate using the same example, but assuming that the unit of allocation is a room of 250 pigs (rather than a pen of 25 pigs), the required sample size with a 4% ICC would be 3869 pigs/group (corresponding to approximately 15 rooms/intervention group).

The final frontier - clustering and statistical analysis

When analyzing data where clustering is present, it is important to control for the resulting statistical nonindependence in the analysis. When the outcome is measured at the individual level, and individual animals are grouped within pens, failure to account for clustering leads to spuriously small *P* values and over-narrow confidence intervals. This increases the chance of a false-positive finding (ie, finding that the intervention is effective when it is not).[20,21] Therefore, when reading a trial report, individuals should consider whether clustering is likely to be present and, if so, look to see whether the authors described controlling for clustering (eg, by controlling for the pen effect). If not, the resulting *P* values and confidence in the effect estimate should be viewed with skepticism. The remainder of this section deals with the more technical aspects of controlling for clustering in statistical analysis and may be more relevant to individuals conducting trials in clustered populations. A complete discussion of analytical solutions is beyond the scope of this commentary. However, relevant references are provided for the interested reader. Researchers may wish to consult these resources for additional information or may wish to include an epidemiologist or statistician with expertise in trial design and statistical analysis of clustered data on the research team.

One approach to controlling for clustering is to conduct the analysis at the level of the unit of allocation.[21] This might involve an outcome measured directly at the level of allocation or could involve aggregating individual animal data to the cluster unit level. An example might be ADG as an outcome. If the researcher allocated pens to 1 of 2 intervention groups, with all animals within a pen receiving the same intervention, then the effect of clustering by pen would need to be considered. The researchers could control for that clustering by conducting the analysis at the pen level, ie, having 1 observation corresponding to the mean ADG for each pen. However, if the analysis is conducted at the level of the unit of allocation, it means that the sample size corresponds to the number of pens, entailing a dramatic reduction in sample size and therefore, a reduction in statistical power.[21]

A conceptually simple method to control for clustering in the analysis of trial data is to adjust the test statistic based on the design effect. Test statistics based on chi-square (eg, comparing proportions) would be divided by the design effect and test statistics based on the *t* test (eg, comparing means) would be divided by the square root of the design effect.[20] However, this approach is an approximation and is only relevant for cluster-randomized trials. Additionally, this approach assumes that the ICC is known or can be calculated with the available data, that the ICC is constant across the pens, and that the number of animals per pen is the same.[13] Therefore, it is not the best of the available approaches.

Another simple approach is to include pen (or other grouping variable) as a fixed effect in a regression model when estimating treatment effects.[22] While this approach is possible, it means that each pen included in the analysis will correspond to a degree of freedom in the statistical calculations, reducing statistical power compared to the methods described below. More importantly, the inference from an analysis which includes fixed effects for the grouping variable (eg, pen) also differs; inferences on the intervention effects are specific to each pen rather than to a more general population of pens of pigs.[13] Researchers conducting trials would not be interested in inferences for a specific pen. Therefore, using a fixed effects approach for pen is a problematic approach to controlling for clustering.

Finally, mixed model regression techniques and generalized estimating equations can be used to control for clustering. These methods offer advantages in terms of fewer assumptions and an ability to deal with different numbers of animals within groups. It also is possible to control multiple organizational levels, such as pen, barn, and site, within the same analysis. These approaches are routine and readily conducted in software such as R, SAS, or Stata. More detailed descriptions of these methods for continuous and binary outcomes are available elsewhere.[13,23,24] If a researcher is not familiar with these approaches or software, they should consider including an epidemiologist or statistician on the research team to assist with the analysis, as well as with calculation of an appropriate sample size.

To illustrate the potential magnitude of this issue, a simple example is provided. Consider a hypothetical trial involving 40 litters of 10 piglets each, randomly assigned to 1 of 2 interventions related to a creep feed supplement. The intervention would be allocated at the litter level, with 20 litters receiving the creep feed supplement and 20 litters receiving no treatment. The outcome is ADG at 21 days of age. Hypothetical results for this example are calculated using 1) no adjustment for clustering within litter with ADG calculated at the individual piglet level, 2) measurement of ADG at the litter level (ie, mean ADG for all 10 piglets within a litter), 3) analysis at the individual piglet level with a *post hoc* adjustment for clustering assuming a 4% ICC and a 1.36 design effect, and 4) analysis at the individual piglet level with a *post hoc* adjustment for clustering assuming a 50% ICC and a 5.5 design effect. Results are shown in Table 1. When clustering was

Table 1: Hypothetical example of a trial with intervention allocation at the litter level and a continuous outcome of average daily gain (ADG), with and without adjustment for clustering within litter

Scenario	Intervention	ADG at 21 days, g	SEM	*P* value
No control of clustering	Creep supplement	230	7	.01
	Placebo	205	7	
Outcome measured at group level	Creep supplement	230	16.1	.298
	Placebo	205	17.4	
Post hoc control of clustering (ICC = 4%)	Creep supplement	230	7	.03
	Placebo	205	7	
Post hoc control of clustering (ICC = 50%)	Creep supplement	230	7	.28
	Placebo	205	7	

not controlled, the intervention effect size was associated with a $P = .012$. In comparison to all other scenarios, that *P* value was inappropriately small.

This commentary illustrates issues related to clustering in clinical trials in swine. If clustering is not accounted for when determining the sample size and when conducting the analysis, then there is an increased probability of a type I error (false-positive finding). If clustering is not accounted for when determining the sample size, but is adjusted for during the analysis, statistical power will be less than the desired level, increasing the probability of a type II error. Therefore, failure to consider clustering in the design and analysis of a clinical trial can lead to an inaccurate evidence base for decision-making about interventions. Thus, failure to adequately address clustering contributes to research wastage and needs to be improved to maximize the research investment in swine trials.

Implications

- Clustering is common in swine trials due to housing pigs in pens, rooms, barns, and sites.
- Consider clustering in sample size calculations to avoid under sampling.
- Failure to control clustering in the analysis increases the probability of a type I error.

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Conflict of interest

None reported.

Disclaimer

Drs O'Sullivan and Ramirez, this journal's executive editor and editorial board member, respectively, were not involved in the editorial review of or decision to publish this article.

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BRIEF COMMUNICATION PEER REVIEWED

An assessment of rope sampling methodologies on pen-level oral fluid samples for detection of PRRSV infection

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Summary

Rope sampling methodologies were assessed for porcine reproductive and respiratory syndrome virus (PRRSV) detection in 6 pens. Results showed that shared ropes detected PRRSV 50% and 66.7% of the time compared to unshared ropes. One rope provided better detection than 2 ropes per pen under the conditions of this study.

Keywords: swine, oral fluids, sensitivity, sampling

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Resumen - Una evaluación de las metodologías de muestreo con cuerdas en muestras de fluidos orales a nivel de corral para la detección de la infección por el PRRSV

Se evaluaron metodologías de muestreo con cuerdas para la detección del virus del síndrome reproductivo y respiratorio porcino (PRRSV) en 6 corrales. Los resultados mostraron que las cuerdas compartidas detectaron al PRRSV en el 50% y 66.7% de las veces en comparación con las cuerdas no compartidas. Una cuerda proporcionó mejor detección que 2 cuerdas por corral bajo las condiciones de este estudio.

Résumé - Évaluation des méthodes d'échantillonnage par la corde sur les échantillons de fluides oraux au niveau des parcs pour la détection de l'infection par le VSRRP

Les méthodes d'échantillonnage par la corde ont été évaluées pour la détection du virus du syndrome reproducteur et respiratoire porcin (VSRRP) dans 6 enclos. Les résultats ont démontré que des cordes partagées ont permis de détecter le VSRRP 50% et 66.7% du temps comparativement à des cordes non-partagées. Une corde permettait une meilleure détection que deux cordes par enclos dans les conditions de la présente étude.

Oral fluid samples are an efficient, common tool for swine diagnostics and monitoring since their introduction as a diagnostic sample in 2010.[1-3] Producers use them for surveillance of the majority of endemic swine pathogens including porcine reproductive and respiratory syndrome virus (PRRSV).[1,4,5] Oral fluid collection techniques vary within the industry, but recommendations are to hang 1 rope per pen[3] to get 80% coverage of the pen.[6] Previous research showed that an increased number of ropes increased overall chewing time, but pathogen detection was not assessed.[6] It is common practice within the industry for rope samples to be hung between pens to increase the number of animals represented within the sample. Detection of PRRSV using oral fluids increases with increasing prevalence and can be less consistent at lower prevalences.[7] Pooled oral fluids collected from pens sampled with 1 rope and oral fluids collected from a litter in a farrowing pen decreased diagnostic sensitivity when prevalence was low compared to oral fluid samples collected from unpooled rope samples and individual animal samples, respectively.[8,9]

The objective of this study was to evaluate the detection of PRRSV vaccine virus spread in pens of approximately 25 pigs using different rope sampling strategies.

Animal care and use

The Pipestone Institutional Animal Care and Use Committee approved the project (Protocol No. 2021-22).

Materials and methods

Study design and sampling

This study was conducted in an air-filtered gilt development unit in southwest Minnesota over the course of 3 weeks in November 2021. During the study, 150 isowean, PRRSV-negative gilts were housed in pens that held between 24 to 27 pigs. No other pigs were in the barn during the study. Sampling began when pigs were approximately 12 weeks of age and 12 kg.

There were 2 sets of 3 pens with an alleyway between (Figure 1) at the end of a 12-pen room. Pens were labeled 1 east (1E), 1 west (1W), 2 east (2E), 2 west (2W), 3 east (3E), and 3 west (3W). The west side pens had an additional ventilation

WC, KAH: Pipestone Research, Pipestone Holdings, Pipestone, Minnesota.

MB, GD, RK, LS, LM, KH: Professional DVM Program, South Dakota State University, Brookings, South Dakota.

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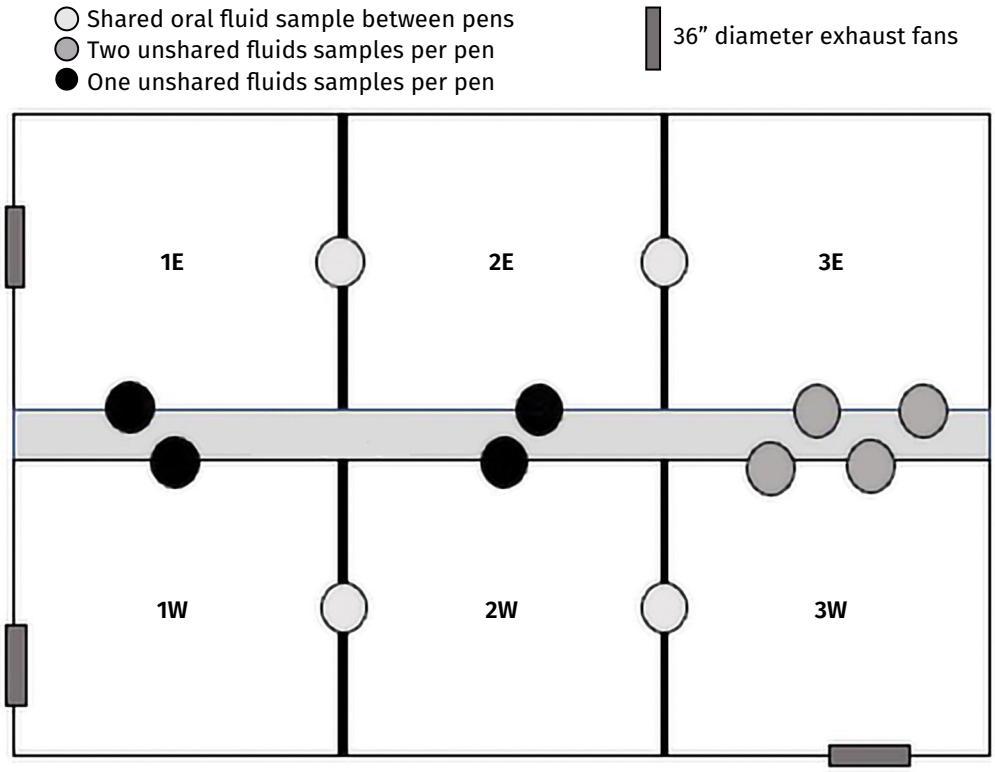
Figure 1: Schematic of the duplicate 3-pen study design used to evaluate pen-level oral fluids sampling methodologies using cotton ropes.



exhaust fan that the east side pens did not. Hard, smooth siding was placed between the pens to prevent direct contact of pigs between pens. One pig in 1E, 1W, 3E, and 3W received 2 mL of the Ingelvac PRRSV modified live vaccine (Boehringer Ingelheim) intramuscularly while restrained using a new needle for each animal. Pen 2E and 2W were control pens and had no vaccinated pigs. Husbandry activities and sample collection occurred in pens 2E and 2W with clean boots, clothes, and tools before the vaccinated pens to maintain biosecurity and reduce cross-contamination.

Individual serum and nasal swabs were collected from all pigs during the study. Serum was collected with serum separator tubes (Becton, Dickinson and Company) using jugular or vena cava venipuncture on 0, 3, 9, 15, and 21 days post vaccination (dpv). Nasal swabs were taken using polyester swabs on a plastic shaft (Fisher Scientific Company) on 0, 3, 5, 7, 9, 12, 15, 18, 21, 24, and 27 dpv. The swab was placed in a sterile polystyrene test tube (Fisher Scientific Company) with 3 mL of phosphate buffered saline (PBS; Cytiva). Pen 2E and 2W were sampled on 0 and 9 dpv (nasal swab and serum), as well as 3 and 21 dpv (nasal swabs). Pens 1W and 2W were sampled through 21 dpv, while 3W was sampled through 24 dpv due to supply shortages on 21 dpv. East pens were sampled through 27 dpv because viral transmission was limited compared to the west side.

Pen-level oral fluids were collected from all pens. Samples were collected as outlined in the nasal swab schedule using unbleached, cotton rope (Boardwalk) with seven, 0.25-inch strands bound using a generic cable tie (QC Supply) that hung for 20 minutes. The strands were placed in a clean plastic bag, fluids wrung out, and poured into a sterile polystyrene test tube (Fisher Scientific Company). One unshared rope was used in pens 1E, 1W, 2E, and 2W and 2 unshared ropes were used in pens 3E and 3W. Shared ropes between pens 1 and 2 and pens 2 and 3 on both sides of the barn were collected too. Three of the cotton strands from the shared rope were accessible to pigs in pen 1 or 3 and the other 3 strands were accessible to pigs in pen 2. The 6 strands were collected as 1 sample. One person encouraged movement in the pens during sample collection to get the greatest number of pigs chewing on all the ropes.

Samples were transported to the South Dakota State University Diagnostic Laboratory and tested using the MagMax Viral RNA extraction kit (Thermo Fisher Scientific) and a real time reverse transcriptase-polymerase chain reaction assay for nucleic acid detection (Tetracore). The cold chain was maintained from collection through testing. All samples were tested individually.

Sequencing of the 5th open reading frame (ORF5) of the genome was conducted and an alignment performed against the reference Ingelvac vaccine strain sequence. The predicted restriction fragment length polymorphisms (RFLP) were also provided.

Data analysis

Data were compiled into spreadsheets using Microsoft Excel version 16.56 (Microsoft Corporation) and analyzed using STATA version 16.1 IC (Stata Corp). The pen prevalence by sample type were compiled over time and compared to pen-level disease classification from the oral fluid results. Further statistical comparisons were not completed due to sample size limitations.

Results

Individual pig samples

Table 1 summarizes the diagnostic results. Serum was PRRSV positive in pens 3E, 1W, and 3W by 3 dpv and 1E became positive on 9 dpv. The seroprevalence numerically increased over time in pens 1W and 3W and remained consistent in 3E. Once seropositive, all pigs remained seropositive for the duration of the study, which was not the case with nasal swabs. Nasal swabs were PRRSV positive starting 6 dpv in pens 1W and 3W. The pigs in these pens remained PRRSV positive for the duration of the study. Individual animal nasal swabs did not consistently remain positive after initially becoming PRRSV positive, but the pen-level nasal swab prevalence increased over time. Nasal swabs were PRRSV negative for the east side of the barn until 24 dpv. On 24 dpv, pens 1E had a 56% (14 of 25) prevalence and pen 3E had a 25.9% (7 of 27) prevalence based on nasal swabs and then fell back to 8% (2 of 25) and 0% (0 of 27) on 27 dpv, respectively. The ORF5 sequencing of 9 samples with the lowest cycle threshold values (< 32.6) from pens 1E (4 samples), 3E (2 samples), and 3W (3 samples) had 100% homology among samples and > 99% homology to the Ingelvac vaccine strain. Serum and nasal swabs from the 2 control pens, 2E and 2W, were PRRSV negative throughout the duration of the study. Sequencing of the ORF5 segment of the genome was performed on virus found in 9 nasal swab samples taken at 24 dpv from pen 1E, 3E, and 3W. The sequences along with the predicted 2-5-2 RFLP confirmed that the PRRSV detected were vaccine strains.

Comparison of individual to pen-level oral fluid samples

The oral fluids from unshared ropes for pen 1W were first PRRSV positive on 6 dpv and remained positive for the duration of the study. The first nasal swab positive with PRRSV collected from pen 1W occurred on 6 dpv. On 3 dpv, 2 serum samples were PRRSV positive in pen 1W. The oral fluid sample collected from shared ropes in pens 1W and 2W was PRRSV positive 50% of the time on 6, 15, and 21 dpv. The oral fluid sample collected from the unshared rope in pen 1W was positive starting 6 dpv through 21 dpv (Table 1). The oral fluid samples collected from the 2 unshared ropes in pen 3W were first positive with PRRSV on 12 dpv and were positive on all remaining days except 18 dpv. The oral fluids sample collected from the shared rope between pen 2W and 3W was not tested on 12 dpv, but samples collected on 15 and 24 dpv were PRRSV positive. The oral fluids from the shared rope were PRRSV positive 2 of 3 times (67%) that the unshared ropes were positive between 15 and 24 dpv. The nasal swabs on 12 dpv gave a pen-level PRRSV prevalence of 11.1%, when 3 days earlier the serum prevalence of the pen was 25.9%. Pen 1E and 1E-2E had a positive oral fluid result on 24 dpv, but no other oral fluids from the east side of the barn were positive.

Discussion

This study indicates that a modified live vaccine can be used as a proxy for infection and provides an effective method to evaluate viral spread in a pen as evidenced by the descriptive data collected and previous literature.[7] The major limitation to this study is the sample size. Further research using a more robust sample size is needed to confirm the results and to provide statistical relevance.

There was a difference in detectability, and potentially the transmissibility, of the vaccine strain between the east and west sides of the room. All conditions, choring procedures, and housing were identical between the east and west sides except the ventilation exhaust fans were present on the west side. The increase in airflow may have created a draft, which could act as an environmental stressor for pigs located in the west pens. This additional stress may have contributed to increased transmission (and hence detection) of the PRRSV seen in the west pens. Airborne transmission of the vaccine virus was not observed as the control pen (2W) remained negative.

The unusually high PRRSV-positivity rate in the nasal swab samples on day 24 dpv suggests contamination or natural infection. Sequencing revealed that the ORF5 sequences and the 2-5-2 RFLP pattern were homologous with the Ingelvac vaccine strain. There were no indications of contamination at the laboratory and the veterinarian and production staff could not identify any unusual stressors among the pigs. It is possible that a contamination event occurred during sampling. On 24 dpv, new supplies and PBS had been purchased and only 1 individual sampled. The PBS was reused on 27 dpv, and no further contamination was noted.

Oral fluid samples are regularly used for diagnostics in the swine industry.[1,2,7] It is common for ropes to be hung between 2 pens, but the impact of this practice on the sensitivity of detection is currently unknown. The results from this study suggest that an oral fluid sample from shared ropes may impact detection when one of the pens is negative. The shared rope between pen 1W and 2W was positive 50% of the time that the unshared rope from pen 1W was positive. The shared rope between pen 2W and 3W was positive only 67% of the time that the unshared ropes were positive. This study also suggests that having more than 1 rope per pen can reduce detection. This may be due to a decreased number of pigs chewing when multiple ropes are present despite increased chewing time,[6] or perhaps the pathogen is greatly diluted when prevalence is lower. The oral fluids from the single unshared rope in pen 1W was positive 6 days prior to the oral fluids from 2 unshared ropes from pen 3W, despite 3W having a higher nasal swab pen-level PRRSV prevalence. Pen sizes and stocking density vary across different production systems, meaning that pens of different sizes may lead to differences in detection rate. Additional research focused on increased sample size, varying pen sizes, and pathogen prevalence are needed to further elucidate the findings of this study.

Although further studies are needed, the preliminary results from this study suggest that oral fluid samples from ropes shared between a positive and negative pen can give inconsistent detection compared to oral fluid samples collected in PRRSV-positive pens from unshared ropes. The oral fluids from the PRRSV-negative pen likely dilute the analyte from the PRRSV-positive pen, decreasing the viral quantity below the limit of detection. The unshared, single rope provided the most consistent detection (Table 1). Given the likely significant health and production costs associated with undetected disease due to a false-negative result and that there is limited scientific guidance on appropriate sample collection methodologies, unshared ropes should be used until evidence shows that oral fluid samples from shared ropes returns a similar sensitivity.

Table 1: Individual and pen-level results from pens with 1 pig inoculated with a modified live PRRSV vaccine, day 0 to 27*

	PRRSV-positive samples/Total samples collected, No. (%)									
Pen	**0 DPV**	**3 DPV**	**6 DPV**	**9 DPV**	**12 DPV**	**15 DPV**	**18 DPV**	**21 DPV**	**24 DPV**	**27 DPV**
Nasal swabs										
1E	0/25 (0.0)	0/26 (0.0)	0 /25 (0)	0/25 (0.0)	0/25 (0.0)	0/25 (0.0)	0 /25 (0.0)	0/25 (0.0)	14/25 (56.0)	2/24 (8.3)
2E	0/27 (0.0)	NA	NA	0/27 (0.0)	NA	NA	NA	NA	NA	0/27 (0.0)
3E	0/27 (0.0)	0/27 (0.0)	0/27 (0)	0/27 (0.0)	0/27 (0.0)	0/27 (0.0)	0/27 (0.0)	0/26 (0.0)	7/27 (25.9)	0/27 (0.0)
1W	0/27 (0.0)	0/27 (0.0)	1/27 (3.7)	2/27 (7.4)	4/27 (14.8)	4/27 (14.8)	2/27 (7.4)	6/26 (23.1)	NA	NA
2W	0/27 (0.0)	NA	NA	0/27 (0.0)	NA	NA	NA	NA	NA	NA
3W	0/27 (0.0)	0/27 (0.0)	3/27 (11.1)	2/27 (7.4)	3/27 (11.1)	3/27 (11.1)	7/27 (25.9)	NA	14/27 (51.9)	NA
Serum										
1E	0/26 (0.0)	0/26 (0.0)	NA	1/25 (4.0)	NA	2/25 (8.0)	NA	1/25 (4.0)	NA	NA
2E	0 /27 (0.0)	NA	NA	0 /27 (0.0)	NA	NA	NA	0 /27 (0.0)	NA	NA
3E	0/27 (0.0)	1/27 (3.7)	NA	1/27 (3.7)	NA	1/27 (3.7)	NA	1/26 (3.8)	NA	NA
1W	0/27 (0.0)	2/27 (7.4)	NA	8/27 (29.6)	NA	11/27 (40.7)	NA	17/26 (65.4)	NA	NA
2W	0/27 (0.0)	NA	NA	0 /27 (0.0)	NA	NA	NA	0/27 (0.0)	NA	NA
3W	0/27 (0.0)	2/27 (7.4)	NA	7/27 (25.9)	NA	11/27 (40.7)	NA	20/27 (74.1)	NA	NA
	Oral fluids qRT-PCR results for PRRSV									
Pen	**0 DPV**	**3 DPV**	**6 DPV**	**9 DPV**	**12 DPV**	**15 DPV**	**18 DPV**	**21 DPV**	**24 DPV**	**27 DPV**
1E	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Positive	Negative
1E-2E	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Positive	Negative
2E	NA	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
2E-3E	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
3Ea	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
3Eb	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
1W	Negative	Negative	Positive	Positive	Positive	Positive	Positive	Positive	NA	NA
1W-2W	Negative	Negative	Positive	Negative	Negative	Positive	Negative	Positive	NA	NA
2W	NA	Negative	Negative	Negative	Negative	Negative	Negative	Negative	NA	NA
2W-3W	Negative	Negative	Negative	Negative	Not Tested†	Positive	Negative	Negative	Positive	NA
3Wa	Negative	Negative	Negative	Negative	Positive	Positive	Negative	Positive	Positive	NA
3Wb	Negative	Negative	Negative	Negative	Positive	Positive	Negative	Positive	Positive	NA

* Pen 1E began with 26 pigs, but one died after day 3 from non-PRRSV related causes. Pens with less than 26 pigs tested did not have tubes with labels that could be matched to an animal ID tag or an animal was missed during sampling.

† This sample was collected but compromised, and so was not tested.

PRRSV = porcine reproductive and respiratory syndrome virus; DPV = days post vaccination; NA = samples were not collected or tested.

Implications

Under the conditions of this study:

- Shared rope samples between positive and negative pens may decrease detection.
- Two unshared rope samples per pen may reduce viral detection compared to 1.
- Studies using a more robust sample size are needed to further elucidate results.

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Conflict of interest

The study site and the pigs involved are a customer of Pipestone Management.

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Feeding strategies to increase sow colostrum quality and yield

Madie R. Wensley, MS; Mike D. Tokach, PhD; Jason C. Woodworth, PhD; Robert D. Goodband, PhD; Joel M. DeRouchey, PhD; Jordan T. Gebhardt, DVM, PhD

Summary

Effects of nutritional strategies on colostrum quality and yield are variable as influenced by sow colostrum production capacity, parity, farrowing induction protocol, and gestation length. The greatest opportunity to maximize colostrum yield and quality is through proper management of body condition in gestation such that sows are not in a negative energy balance when entering farrowing. Total colostrum fat percentage can be increased through the addition of dietary fat or oil. Colostrum fatty acid composition can also be changed by addition of dietary oil or increased branched chain amino acids. Colostrum protein and immunoglobulins are more challenging to influence.

Keywords: swine, colostrum yield, colostrum quality, feeding strategies, sow nutrition

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Resumen - Estrategias de alimentación para aumentar la calidad y el rendimiento del calostro de las cerdas

Los efectos de las estrategias nutricionales sobre la calidad y el rendimiento del calostro son variables, ya que están influenciados por la capacidad de producción de calostro de la cerda, la paridad, el protocolo de inducción al parto, y la duración de la gestación. La mejor oportunidad para maximizar el rendimiento y la calidad del calostro es a través de un manejo adecuado de la condición corporal durante la gestación, para que las cerdas no tengan un balance energético negativo al iniciar el parto. El porcentaje de grasa total del calostro se puede aumentar mediante la adición de grasa o aceite en la dieta. La composición de ácidos grasos del calostro también se puede cambiar mediante la adición de aceite dietético o aumentando los aminoácidos de cadena ramificada. Las proteínas del calostro y las inmunoglobulinas son más difíciles de influir.

Résumé - Stratégies d'alimentation pour augmenter la qualité et la quantité de colostrum chez les truies

Les effets des stratégies d'alimentation sur la qualité et la quantité de colostrum sont variables et influencés par la capacité de production de colostrum par la truie, la parité, le protocole d'induction de la parturition, et la durée de la gestation. La plus grande opportunité de maximiser la quantité et la qualité du colostrum est obtenue par la gestion appropriée de la condition corporelle lors de la gestation afin que les truies ne soient pas en balance énergétique négative lors du début de la parturition. Le pourcentage de gras total du colostrum peut être augmenté par l'ajout de gras ou d'huile alimentaire. La composition en acides gras du colostrum peut également être modifiée par l'ajout d'huile alimentaire ou l'augmentation des acides aminés embranchés. Une influence sur les protéines et les immunoglobuline du colostrum représente un plus grand défi.

Adequate colostrum intake (≥ 250 g is recommended) after birth is essential for piglet survival.[1] As litter sizes have increased in recent years, the demand for colostrum proportionately increases to achieve this desired level of intake. The lactose and fat content of colostrum provides energy, which is needed to maintain piglet body temperature early in life.[2] Additionally, colostrum protein includes immunoglobulins (Ig) for passive immunity, which is necessary for long-term survival.[2] The concentration of these nutrients rapidly changes over the first 24 hours of lactation with the percentage of total solids and protein decreasing over time and the percentage of fat and lactose increasing (Figure 1).[3] The ability for piglets to consume these nutrients is a balance between piglet demand (nursing interval, duration of nursing, and physical capacity to remove colostrum) and the sow's capacity to produce colostrum.[4] This practice tip will cover prefarrowing feeding strategies and potential nutritional interventions that can be used to increase colostrum quality and yield, while also briefly discussing common herd management practices that impact colostrum synthesis.

Prefarrowing feeding strategies that affect colostrum yield

The effect of sow nutrition on colostrum yield is not well understood. Likewise, the multi-faceted nature of colostrum yield and extreme variation between individual sows makes it challenging to consistently detect meaningful differences in the amount and composition of colostrum.[5] Based on the formation of lipid droplets in mammary tissue and increased prolactin levels (due to

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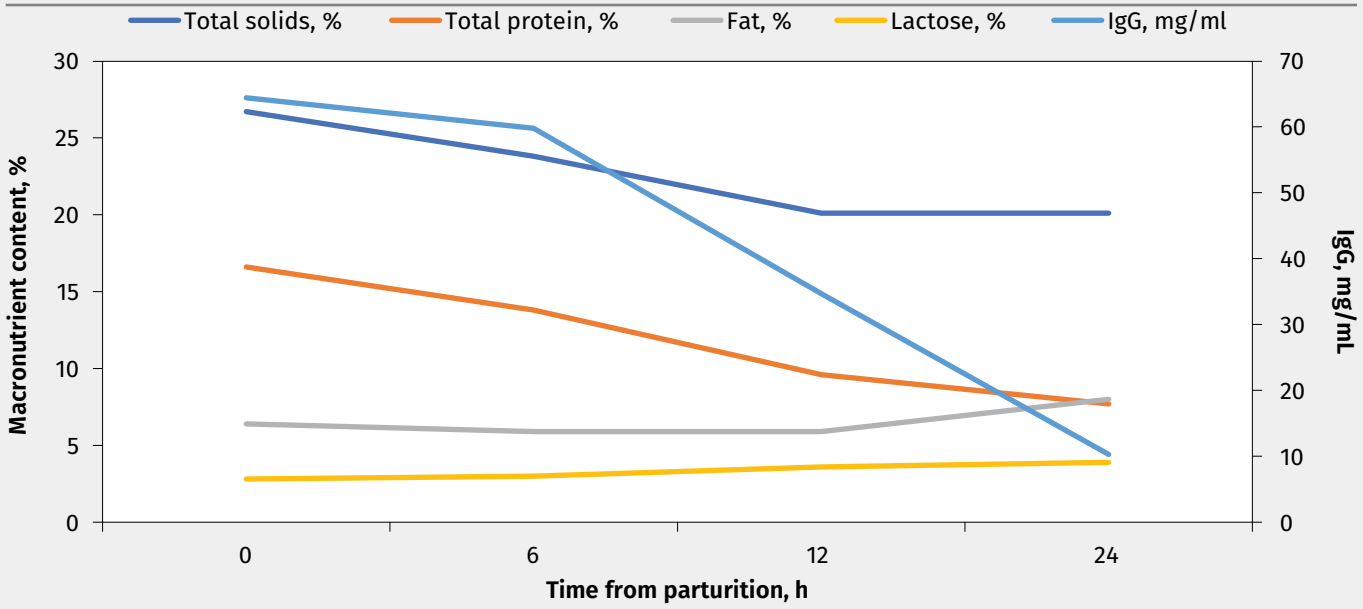
Figure 1: Average reported concentrations of macronutrient components and immunoglobulin G (IgG) of sow colostrum. Figure adapted from Hurley, 2015.[3]



decreased progesterone), it is believed that colostrum production begins during the last 7 to 10 days of gestation and continues through parturition[1,4,5] During this time period, mammary tight junctions are considered "leaky," which allows for the transfer of hormones, growth factors, and Ig into alveolar cells for storage until suckling stimuli occurs.[5] While the role of endocrine hormones in regulating colostrogenesis is not fully understood, the data available may suggest that nutritional strategies applied during the last 7 to 10 days of gestation could provide the greatest opportunity to increase colostrum yield. Likewise, little is known about the metabolic state of sows in colostrogenesis; thus, implementing feeding strategies to manage sow body reserves in late gestation may be an additional opportunity to improve colostrum yield. Supplying more nutrients through increased feed allowance is thought to decrease sow catabolism, therefore increasing the amount of nutrients available for colostrum synthesis and body condition (BC) maintenance.[6] This should prevent excessive body tissue mobilization which can negatively affect colostrum yield and composition. For example, females that were underfed (1.0 kg/d) the last 14 days prior to farrowing had a greater percentage of colostral fat and reduced colostral protein.[7] The authors speculated that this response was because underfed sows were synthesizing colostrum directly from body tissue. Increased colostral fat concentrations have also been observed in sows with innately low colostrum production. Although the authors did not address this response, low yielding sows exhibited a leakier mammary epithelium and reduced colostral lactose concentrations. These responses were related to delayed reductions in prolactin prepartum,[8] which may suggest that underfed sows have an abnormal endocrine response due to inadequate nutrient intake. More research in this area is needed to understand the potential mode of action between nutrient status and endocrine control.

Overfeeding sows during gestation has negative implications on colostrum yield. This is largely associated with BC because fat sows (backfat > 23 mm) often exhibit decreased colostrum yield, which is thought to be associated with increased fat accumulation in mammary tissue.[6,9] Because a high BC is generally a consequence of over feeding for an extended period, it is important to make sure females enter farrowing with an appropriate BC to maximize colostrum yield. In contrast, prefarrowing feed allowance appears to have a low impact on colostrum yield. Data by Gourley et al[10] showed no difference in colostrum yield if females were fed increased lysine and energy from day 107 or 113 of gestation to farrowing. Colostrum yield was also similar for females that were fed 2.7 kg/d or *ad libitum* starting at day 113 of gestation.[11] However, Decaluwé et al[6] observed a tendency for increased colostrum yield when sows were fed 4.5 kg/d compared to 1.5 kg/d starting at day 108 of gestation, with the greatest yield observed for sows that entered the farrowing house with a moderate BC (backfat = 19 mm). The feed allowance of 1.5 kg/d for control sows was below the sow maintenance requirements which could explain the response observed. While it appears that prefarrowing feed allowance has limited effects on colostrum yield, these data highlight the importance of making sure sows are fed at or slightly above requirement during colostrogenesis to prevent the use of body fat and protein reserves for colostrum production. These data are supported by earlier reports that showed increased serum non-esterified fatty acids and decreased backfat the week prior to farrowing were negatively associated with colostrum yield.[12]

Nutritional impacts on colostrum quality

Colostrum quality can be defined by the concentration of macronutrients, including carbohydrates (lactose), fat, and protein (specifically IgG) within a colostrum sample. Several experiments have been conducted to better understand the effects of sow nutrition on colostrum composition, however, the data lacks consistency. Of the macronutrients, colostral fat is the most easily changed through nutritional strategies.[13] Increasing the

energy density of gestation diets through the addition of fat, such as choice white grease, tallow, soybean oil, or corn oil, provides the greatest opportunity to increase total colostrum fat.[14-17] Oil inclusion has also been shown to alter the fatty acid profile of colostrum,[18,19] regardless of prefarrowing timing (day 107 vs 112).[20]

Supplementing diets with high levels of leucine (Leu), valine (Val), and isoleucine (Ile) while maintaining the Leu:Ile:Val ratio may be another option to change the fatty acid profile of colostrum.[21] Valine by itself has also been shown to increase colostrum fat and protein concentrations when fed above NRC requirements.[22,23] Furthermore, some studies suggest that prefarrowing feed allowance influences protein and Ig concentrations, but the results are variable. Decaluwé et al[6] observed that increasing feed allowance from 1.5 to 4.5 kg/d starting on day 108 of gestation resulted in decreased colostrum protein percent, but not total protein. This also did not translate to differences in Ig content, which suggests that increased feed allowance did not change the nutrient composition of colostrum, but rather had a dilution effect. In contrast, Gourley et al[10] observed that increasing feed allowance from 2.7 to 3.8 kg/d starting on day 113 of gestation resulted in increased colostrum IgG concentrations (107 vs 125 mg/mL for gilts; 114 vs 131 mg/mL for sows) but not total protein percent (14.8% vs 14.9% for gilts; 15.3% vs 14.9% for sows). Other data suggests that supplementing the diet with conjugated linoleic acid, beta-carotene, or high levels of vitamin D can increase Ig.[24-27] Additional data has been generated for other nutritional strategies, but results are generally variable and additional research is needed to understand further. Protein levels in colostrum appear to be negatively correlated with lactose level,[28] which suggest a greater emphasis should be put on total colostral protein rather than lactose because of the Ig fraction of protein and its role in passive immunity.

Management impacts on colostrum quality and yield

Parity structure, farrowing induction, and gestation length contribute to variations in colostrum yield.[28] Nutritional influences on colostrum are challenging to replicate for this reason, which suggests management strategies may provide a better influence on colostrum yield and quality. The sow farm parity structure will influence colostrum output, consequently impacting litter performance. More specifically, multiparous females tend to have greater colostral IgG concentration than primiparous females, whereas primiparous females tend to have higher colostral fat concentrations.[10,29-32] Likewise, colostrum yield is generally greater in parity 2 and 3 sows compared to parity 4 and higher.[12] In addition to parity, sows that are induced prior to their expected farrowing date often exhibit decreased colostral fat and Ig concentrations. If early induction protocols are in place, feeding increased dietary energy prefarrowing can help mitigate these negative effects.[14] More recent data also suggests that administering oxytocin early post farrowing (75 IU oxytocin given twice daily beginning 12 to 20 hours after farrowing the last piglet for a total of 4 injections) will delay the tightening of mammary tight junctions, therefore increasing the output of colostrum protein and Ig.[33] However, follow up research is needed to identify if these results are able to be replicated. Gestation length is another factor that should be taken into consideration when assessing colostrum outputs, although it is often confounded with induction protocols. Increasing the gestation length beyond a sows expected farrow date will likely result in decreased colostral IgG concentrations.[14,30]

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Conflict of interest

None reported.

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Feeding strategies to improve sow satiety in pen gestation housing

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Summary

Feeding systems should focus on providing sows protection when eating and equal feeding opportunities to prevent competition. Sows should be allowed to consume their entire meal during a single visit to the feeder to minimize aggression at mealtime. Generally, 30% neutral detergent fiber has been recommended to increase satiety; however, soluble fiber on a gram per day basis may be more useful to determine optimal fiber source and inclusion levels to achieve sow satiety. When combining the limited data available, increasing soluble fiber above 100 g/d appears to have the greatest potential to improve satiety.

Keywords: swine, group housing, pen gestation, sow satiety, feeding strategies

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Resumen - Estrategias de alimentación para mejorar la saciedad de las cerdas en corrales de gestación

Los sistemas de alimentación deben centrase en ofrecer a las cerdas protección cuando comen y oportunidades similares para prevenir la competencia. Para minimizar la agresión a la hora de comer, las cerdas deben consumir su ración completa en una sola visita al comedero. Generalmente, se recomienda una inclusión de 30% de fibra detergente neutra para aumentar la saciedad; sin embargo, la fibra soluble en gramos por día puede ser más útil para determinar la fuente óptima de fibra y los niveles de inclusión para lograr la saciedad de las cerdas. Al combinar la información limitada disponible, aumentar la fibra soluble sobre 100 g/d parece tener el mayor potencial para mejorar la saciedad.

Résumé - Stratégies d'alimentation pour améliorer la satiété des truies en hébergement dans des enclos de gestation

Les systèmes d'alimentation devraient viser à fournir une protection pour les truies lorsqu'elles s'alimentent ainsi que des opportunités égales de se nourrir afin de prévenir la compétition. On devrait permettre aux truies de consommer l'entièreté de leur repas au cours d'une visite unique à la mangeoire afin de minimiser les agressions au moment du repas. Généralement, une proportion de 30% de fibres détergentes neutres est recommandée pour augmenter la satiété, toutefois, la quantité de fibre soluble sur une base de gramme par jour serait plus utile pour déterminer la source optimale de fibre et les niveaux d'inclusion pour atteindre la satiété des truies. En combinant la quantité limitée de données disponibles, une augmentation de la quantité de fibre soluble au-delà de 100 g/j semble avoir le plus grand potentiel pour améliorer la satiété.

As group housing systems for gestating sows continue to replace individual housing systems, strategies to manage social interactions have become increasingly important. Because gestating females are limit fed to prevent excessive weight gain rather than being fed to satiety, motivation to express foraging behavior often goes unmet.[1] In response, sows may become increasingly frustrated, developing stereotypic behaviors that result in aggressive interactions towards pen mates.[2-4] Social hierarchy establishment elicits intense aggression that is generally resolved 2 days after initial mixing, whereas aggression related to pen resources is more chronic[5] and can occur throughout gestation,[1] particularly when sow satiety is not reached. Sow satiety is often measured by assessing self-directed or substrate-directed stereotypic behavior.[6] Self-directed behaviors include sham-chewing, teeth-grinding, and tongue-playing, while substrate-directed behaviors involve substrates such as floor rooting, chain manipulation, bar chewing, or interactions with pen mates. This practice tip will focus on feeding and management strategies that decrease stereotypic behavior immediately after mixing and throughout gestation.

Nutritional strategies

Feeding system

Feeding systems should offer sows protection from pen mates to avoid high levels of aggression during mealtime. This is particularly important for submissive sows that are more likely to be the recipient of aggressive behavior, which can lead to feeder displacement and subsequent reductions in feed intake and body condition compared to dominant sows.[4,7] In general, electronic sow feeders (ESF) or free access stalls with hind

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gates offer sows more protection at mealtime and, therefore, greater access to feed resources within a pen compared to short stanchions or floor feeding.[7,8] However, ESF systems require sows to eat in sequence, which goes against their natural tendency to feed in groups. This presents a unique set of challenges regarding feeding order and potential aggressive interactions around ESF systems.[9] Hence, there is no perfect feeding system.

Feed allowance

The common practice of limit feeding gestating sows leads to increased activity around the feeder prior to mealtime. Daily feed allowance and number of feedings per day are important considerations when assessing ways to increase sow satiety and decrease aggressive behavior. The amount of feed individual sows receive depends on the energy concentration of the diet and should be based on achieving a target body condition score such that over conditioned sows receive less feed than under conditioned sows. Unfortunately, the optimal number of feedings per day to meet the target daily allowance is less clear. In human studies, decreasing the time interval between meals helps sustain satiety[10]; however, in group housed sows it appears that increasing meals from 1 to 2 or 2 to 6 times per day increased vocalization and decreased skin lesions with no effect observed in group housed gilts.[11,12] Although significant, these differences were small. Hence, this response may be related to the natural eating habits of gestating sows who eat on average 1.17 meals per day when given a choice.[13] Likewise, since aggressive interactions around the feeder increase at feeding time, one strategy which may provide a benefit would be to allow sows to consume their entire meal during a single visit to the ESF or stanchion rather than receiving multiple meals per day. In a similar fashion, since aggression is highest at the time of mixing, it may be helpful to feed sows their full daily allowance while in individual stalls immediately prior to mixing. This practice could ensure a level of satiety at mixing that may reduce aggressive interactions. Some also suggest that increasing feed allowance for up to 4 days after mixing is beneficial in reducing fights, although there is limited research available that supports this recommendation.[5]

Dietary fiber

Outside of providing sows *ad libitum* feed, which can have negative consequences on body condition, fiber concentration in the diet has the greatest potential to increase sow satiety. The response to dietary fiber is largely dependent on source, inclusion rate, and physicochemical properties of the chosen fiber source.[14,15] Present data indicate solubility (which is often a proxy for fermentability), fatty acid production, water-holding capacity, and digesta passage rate are the most important characteristics when selecting a fiber source.[6] Solubility and fermentability are typically used interchangeably throughout the literature, but vary slightly in functionality, although these differences are not fully understood. Nevertheless, the main physicochemical properties that affect short-term and long-term satiety differ. Shortly after feeding, bulkiness or abdominal discomfort appears to elicit satiety, whereas fermentability and solubility have the greatest influence on long-term satiety.[15] Sows fed ingredients that are high in slowly fermented or soluble polysaccharides, such as sugar beet pulp, soybean hulls, or resistant starch, exhibit prolonged reductions in physical activity (increased satiety) compared to other fiber sources such as pectin, inulin, guar gum, and lignocellulose.[14,16,17] Fermentable fibers provide a gradual supply of glucose throughout the day due to increased gastrointestinal retention of nutrients.[18,19] Likewise, increased water binding capacity and short-chain fatty acid (SCFA) production from fermentation in the colon may contribute to glucose and insulin stabilization, which increase satiety related hormones such as glucagon-like peptide-1 and peptide YY.[14,20] For example, Serena et al[21] observed a more uniform uptake of SCFA and less variation in blood glucose and insulin levels when feeding 111 g of soluble fiber per day to nonpregnant sows compared to 44 g of soluble fiber.

Duration of satiety may also be affected by energy intake, which decreases with the addition of fiber in the diet.[14,22] This is a particular concern if daily feed allowance is not increased as fiber concentration of the diet is increased. Inclusion of fiber without changing dietary energy supply has been shown to decrease stereotypic behaviors and general restlessness shortly after feeding, but such effect tends to decrease over time.[22,23] This is likely a result of gastrointestinal distension wearing off over time and the metabolic energy demand of the sow not being met. Specifically, glucagon-like peptide-1 and peptide YY are secreted from the gut in relation to caloric intake, thus if the caloric density of the diet is reduced because feed allowance is maintained or feed intake is limited, satiety related hormones could also be reduced.[24] More recent studies have shown that increasing fermentable fiber in the diet improved satiety regardless of lower metabolizable energy intake.[14,16] This may be a result of the physicochemical property of the fiber sources fed. Despite these inconsistencies, it is important to ensure that the energy requirements of the sow are being met when high-fiber diets are fed to prevent reductions in body condition. This can be achieved by increasing feed allowance, or if economically feasible, adding fat to the diet. The level and source of fiber in the diet will determine to what extent feed allowance should be increased to maintain body condition. In general, 30% neutral detergent fiber (NDF) is recommended to increase satiety.[15,23,25] However, this level of NDF is difficult to achieve using a single fiber source unless a highly fermentable ingredient, such as soybean hulls or sugar beet pulp, is fed where a 40% or 60% inclusion level is needed, respectively. At these levels, bulkiness of the diet increases and there is risk that physical capacity for feed intake could be reached prior to meeting the energy requirements of the sow leading to reductions in body condition.[26] Likewise, significantly decreasing the bulk density of the diet will require more feed deliveries because less weight is delivered per truck load. Therefore, it may be more practical to feed a diet containing 20% NDF which can be achieved by feeding 25%, 15%, or 5% soybean hulls in a corn-soybean meal diet containing 0%, 20%, or 40% dried distillers' grains with solubles (DDGS), respectively. As soybean hulls in the diet decrease and DDGS increase, NDF on a gram per day basis decreases from 440 to 396 g/d when adjusting for a metabolizable energy intake of 6.0 Mcal/d. Unfortunately, the literature available on the benefit of feeding a diet with less than 30% NDF to reduce stereotypic behavior is not consistent. It appears that satiety inducing responses observed are dependent on basal diet formulation, source of fermentable fiber, level of inclusion, duration of feeding, and feed allowance.

A review by Reese et al[27] suggested that feeding 350 to 400 g/d NDF could improve sow reproductive performance. While sow behavior and reproductive performance are two separate traits, Sapkota et al[19] used a similar approach to assess sow satiety by evaluating NDF on a gram per day basis rather than a percentage. Three diets containing either sugar beet pulp, soybean hulls, or resistant starch were formulated to a constant energy level to achieve a 17.5% NDF or 350 g/d NDF (using Reese et al[27] as a reference) and fed for 21 days prior to mixing. A significant reduction in biting frequency was observed in sows fed resistant starch in the first hour after mixing compared to the other fiber treatments, but no differences were observed thereafter. This response is likely tied to the soluble fiber percentage as resistant starch diets contained 11% (221 g/d) soluble fiber and sugar beet pulp and soybean hull diets contained less than 5% (under 100 g/d) soluble fiber. However, this did not affect long-term satiety. In the same review, Reese et al[27] suggested that sows did not need to consume more than 46 g/d of soluble fiber to elicit a reproductive benefit, but soluble fiber levels appear to be required at higher levels to elicit satiety. This is supported by the work of Serena et al[21] in which 111 g of soluble fiber was needed to decrease variation in glucose and insulin levels when sows were fed once per day. Hence, using soluble fiber intake on a gram per day basis may be a better approach to determine the optimal fiber source and inclusion level needed to achieve sow satiety in group housing systems compared to percent NDF. Regrettably, limited trials specifically designed to test this hypothesis are available. Lastly, some suggest that feeding high-fiber diets prior to mixing will increase fullness, therefore reducing aggression at mixing; however, the responses observed using this strategy have been minimal.[5,19]

Management considerations

To ensure successful husbandry of group housed females, parity differences should be considered. In group housing systems, increased aggression is observed in sows of parity 3 or greater compared to younger sows resulting in increased injury scores in gilts when older parity sows are housed with gilts.[28] Likewise, it is suggested to house parity 1 and 2 sows separate from older parity sows[1,29] because gilts eat slower than sows.[13] Aside from parity, timing of mixing is one of the most important management tools to minimize the consequences of mixing aggression and subsequent reduction in gestation feed intake. While much of the available literature contradicts itself, it is best to avoid high levels of stress from day 11 to 16 post insemination when maternal recognition of pregnancy occurs.[1] Hence, females should either be mixed within the first week of insemination or 3 to 4 weeks following insemination. Floor space allowance, group size, and pen layout also contribute to the social behaviors of group housed sows. When combined, the primary goal is to ensure group pens allow for separate sleeping, eating, and defecating areas, while also providing enough space for sows to avoid one another and escape aggression as needed.[4] A more detailed review on these management strategies can be found elsewhere.[1]

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Conflict of interest

None reported.

Disclaimer

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* Non-refereed reference.

Conversion tables

Weights and measures conversions

Common (US)	Metric	To convert	Multiply by
1 oz	28.35 g	oz to g	28.35
1 lb (16 oz)	0.45 kg	lb to kg	0.45
2.2 lb	1 kg	kg to lb	2.2
1 in	2.54 cm	in to cm	2.54
0.39 in	1 cm	cm to in	0.39
1 ft (12 in)	0.3 m	ft to m	0.3
3.28 ft	1 m	m to ft	3.28
1 mi	1.6 km	mi to km	1.6
0.62 mi	1 km	km to mi	0.62
1 in^2	6.45 cm^2	in^2 to cm^2	6.45
0.16 in^2	1 cm^2	cm^2 to in^2	0.16
1 ft^2	0.09 m^2	ft^2 to m^2	0.09
10.76 ft^2	1 m^2	m^2 to ft^2	10.8
1 ft^3	0.03 m^3	ft^3 to m^3	0.03
35.3 ft^3	1 m^3	m^3 to ft^3	35.3
1 gal (128 fl oz)	3.8 L	gal to L	3.8
0.26 gal	1 L	L to gal	0.26
1 qt (32 fl oz)	0.95 L	qt to L	0.95
1.06 qt	1 L	L to qt	1.06

Temperature equivalents (approx)

°F	°C
32	0
50	10.0
60	15.5
61	16.1
65	18.3
70	21.1
75	23.8
80	26.6
82	27.7
85	29.4
90	32.2
102	38.8
103	39.4
104	40.0
105	40.5
106	41.1
212	100.0

°F = (°C × 9/5) + 32
°C = (°F - 32) × 5/9

Conversion chart, kg to lb (approx)

Pig size	Lb	Kg
Birth	3.3-4.4	1.5-2.0
Weaning	7.7	3.5
	11	5
	22	10
Nursery	33	15
	44	20
	55	25
	66	30
Grower	99	45
	110	50
	132	60
Finisher	198	90
	220	100
	231	105
	242	110
	253	115
Sow	300	136
	661	300
Boar	794	360
	800	363

Conversion calculator available at: amamanualofstyle.com/page/si-conversion-calculator

1 tonne = 1000 kg
1 ppm = 0.0001% = 1 mg/kg = 1 g/tonne
1 ppm = 1 mg/L

Are you and your clients prepared to respond to a Foreign Animal Disease?

Get ready with the **CERTIFIED SWINE SAMPLE COLLECTOR** training program

1. Contact the State Animal Health Official (SAHO) in the state(s) in which you plan to train or use Certified Swine Sample Collectors (CSSCs) to confirm participation eligibility prior to participating in the program.
2. Review the CSSC Program Standards.
3. Identify individuals who could be trained to collect and submit samples on your behalf.
4. Access CSSC training materials at securepork.org/cssc.
5. Conduct classroom and hands-on training.
6. Submit a list of trained individuals to SAHO(s) in state(s) trainees will be collecting samples.

CSSC

For more information on the training program ←

If you are ready to start training, contact the state animal health officials in the state in which you wish to train individuals ←

For additional information or if your state isn't listed, please contact Pam Zaabel at pzaabel@pork.org.

NPB-SHIC collaboration key to prevention, preparedness, and response

In all walks of life, partnerships are vital. And networking is empowering. Success requires sharing both credit and challenges, and not working in silos. Together, National Pork Board (NPB) and Swine Health Information Center (SHIC) have formed such an impactful partnership, providing vetted information about emerging diseases, both domestic and transboundary, to protect the health of animals, the food supply, and producers' livelihoods.

"SHIC was formed with Checkoff funds in 2015 with the sole purpose of focusing on emerging disease," says Dr Paul Sundberg, executive director of SHIC. "When the porcine epidemic diarrhea outbreak started in the United States in 2013, it became apparent we needed more attention on preparation, prevention, and response."

In harmony with American Association of Swine Veterinarians (AASV), National Pork Producers Council, US Department of Agriculture, and others, NPB is committed to African swine fever (ASF) outbreak prevention, preparedness, and response, as it is the number one emerging swine disease concern globally. It is SHIC's role to supplement the activities with feedback, additional ideas, and funding if it is needed.

"Producer leaders direct NPB functions," said Dr Dusty Oedekoven, chief veterinarian for NPB. "For swine health, we have a producer-led task force to provide input for research and education. Last fall, we took producers from varying operation types and sizes to the European Union.[1] It was beneficial to get their feedback on how other countries handled ASF and how the lessons learned could direct US planning and reaffirm the ASF priorities set by the industry."

Producer input takes the technical aspects of SHIC and NPB research to on-farm practicality. Oedekoven continued, "it is the producers' dollars, and our cooperative work needs to fit the business needs of producers."

The network benefits the producer through veterinarians, who work together to share animal health challenges and proposed solutions. With the help of the Swine Medicine Education Center at Iowa State University, AASV and SHIC organize technical webinars on emerging diseases throughout the year.

"The US pork industry is unique," added Sundberg. "We all have our own audiences, like AASV focuses on veterinarians while the other organizations' are producers. But when we go together to the state or federal animal health officials or the public health officials like CDC, our information has been vetted through all the organizations on behalf of pork producers, and we are in unison in our messaging and objectives."

Stay updated with SHIC's research, emerging disease information sheets and webinars by visiting **swinehealth.org.** Reference producer-focused, on-farm resources for ASF at **porkcheckoff.org**.

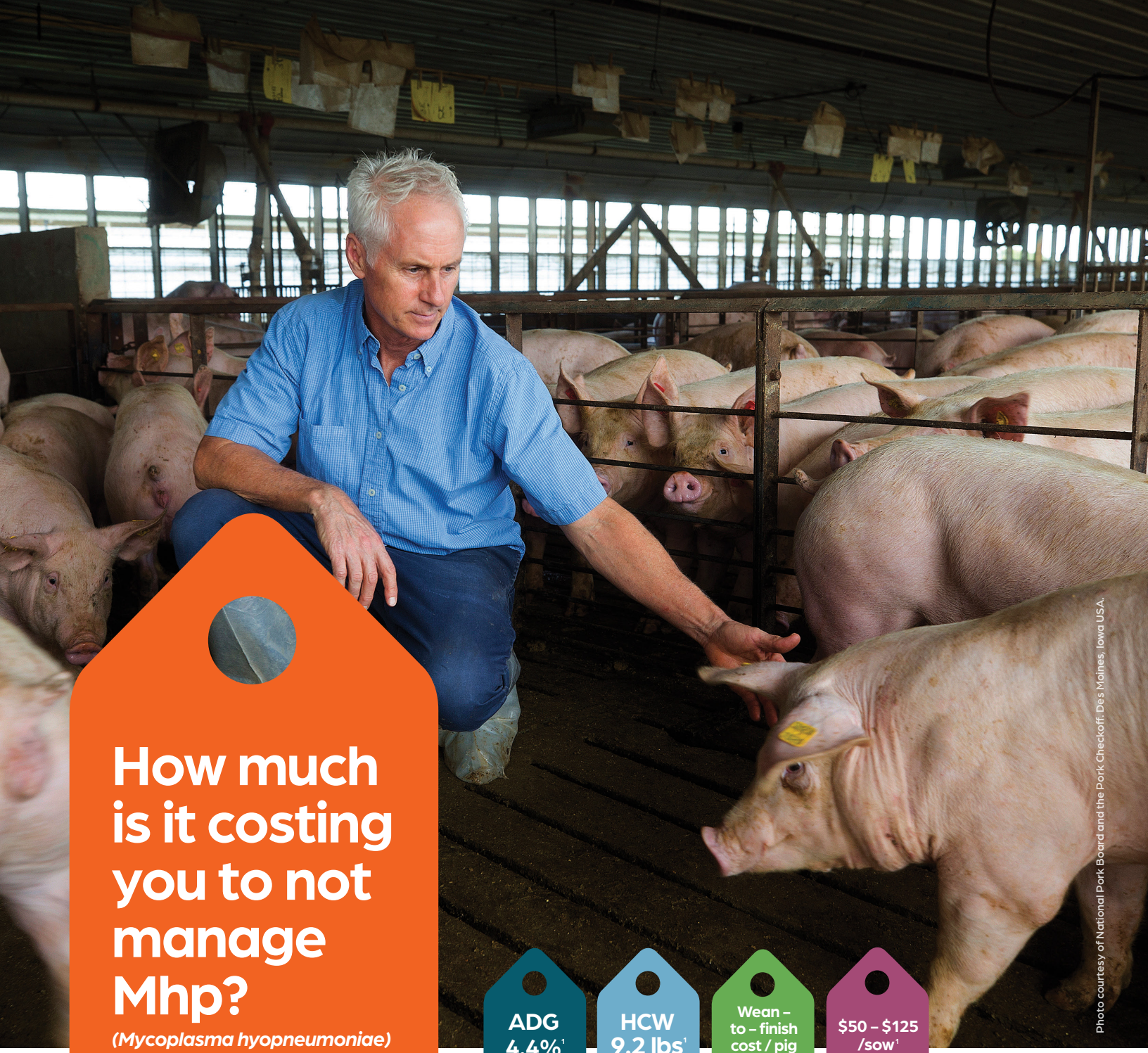
Reference

*1. National Pork Board. US delegation visits the EU to learn insights on ASF prevention, preparedness, and response [editorial]. *J Swine Health Prod*. 2023;31(2):93-95.

*Non-refereed reference.

SHIC's collaboration on Japanese encephalitis virus

SHIC's international monitoring resulted in early identification of an outbreak of the zoonotic Japanese encephalitis virus (JEV) in Australia in early 2022. As a result, SHIC funded a comprehensive literature review focused on the unique serotype of JEV that caused the outbreak and an updated assessment of risk to the United States. In addition, they hosted international webinars and seminars, and gathered producers, researchers, and public health officials from Australia and the United States to identify how the United States could prevent, prepare, or respond.



How much is it costing you to not manage Mhp?

(Mycoplasma hyopneumoniae)

ADG 4.4%[1] ↓

HCW 9.2 lbs[1] ↓

Wean – to – finish cost / pig $2 – $5[1] ↑

$50 – $125 /sow[1] ↓

Photo courtesy of National Pork Board and the Pork Checkoff, Des Moines, Iowa USA.

Protect your pigs and profits with a comprehensive *Mycoplasma hyopneumoniae* (Mhp) management plan tailored to your operation. The Mhp Guardian four-step process helps you move positive herds into a negative or more stable status and keep them there.

Take the first step, visit www.zoetisus.com/MhpGuardian

Mhp Guardian
Personalized Management Program

STEP 1	STEP 2	STEP 3	STEP 4
Establishing herd status	*Assessing* intervention options	*Implementing* intervention strategies	*Monitoring* intervention outcomes

These are general guidelines only. Producers should consult with their veterinarian.

[1]Yeske, 2016. *Mycoplasma hyopneumoniae* elimination, 2016 AASV Annual Meeting Proceedings, pg. 376-380. https://www.aasv.org/library/swineinfo/item.php?AASV/2016/376_Yeske.pdf

zoetis

AASV installs 2023 officers

Dr William Hollis was installed as president of the American Association of Swine Veterinarians on March 7, 2023, during the association's 54th Annual Meeting in Aurora, Colorado. He succeeds Dr Michael Senn, who is now immediate past president. Dr Angela Baysinger has ascended to president-elect. The newly elected vice president is Dr Locke Karriker.

AASV President Dr William Hollis (Illinois '96) was born in Bushnell, Illinois, where he attended high school. During 1986-1987, Dr Hollis served as the Illinois FFA president, and the National FFA vice president during 1988. He received his BS in agriculture and DVM from the University of Illinois. Dr Hollis is currently a partner and veterinarian of Carthage Veterinary Service and serves as the president of Professional Swine Management, the Carthage swine service management company. Dr Hollis was named the AASV Swine Practitioner of the Year in 2019. He is a Pork Quality Assurance Plus Advisor, served on the National Pork Producers Council Animal Health Food Security Policy Committee, and served on the National Pork Board Swine Health Committee. He has served on the American Veterinary Medical Association House of Delegates representing AASV, and on the AASV Board of Directors representing District 5. Dr Hollis is an active participant in the National Pork Board Operation Main Street program giving local presentations to raise awareness about modern pork production.

When asked to comment on his thoughts about the future of AASV and his tenure as president, Dr Hollis said, "Our members are facing a new set of challenges. Not tougher than those of earlier generations, just different. We have such a global presence today. Our clients' profitability depends on a robust export market. Foreign animal diseases are moving closer to our borders, making the stakes and risks incredibly high. We also face internal disease pressure which is worsening. Significant population losses from infectious disease have become too commonplace. We as an association must face these challenges with confidence in the scientific knowledge of disease prevention and control, while further challenging the status quo. We cannot accept a progressively worse disease challenge environment. We must rise to the challenge to protect our clients, improve the health and security of our pigs, and further the leadership position of the AASV."

Dr Hollis and his wife, who is also a veterinarian, have been married 27 years and have raised two children.

AASV President-elect Dr Angela Baysinger (Missouri '92) currently serves as the North American Animal Welfare Lead for all species for Merck Animal Health. Dr Baysinger completed her undergraduate studies in animal science and her DVM at the University of Missouri. She received a master of science in epidemiology from the University of Nebraska. Additionally, she received a master of science in international animal welfare, ethics, and law in December of 2021 from the University of Edinburgh, partially funded by the AASV Alex Hogg Memorial Scholarship. Dr Baysinger was honored with the AASV Meritorious Service Award in 2021 and delivered the prestigious Howard Dunne lecture in 2022. She has served on multiple AASV committees as a member and chair and on the AASV Board of Directors representing District 8. Dr Baysinger lives near Bruning, Nebraska with her family.

AASV Vice President Dr Locke Karriker (Mississippi State '99) grew up on a small, diversified farm in Eastern North Carolina. Dr Karriker received his BS in 1995 from the University of North Carolina at Chapel Hill where he attended as a Morehead Scholar. He earned his DVM and MS from Mississippi State University. He was awarded Diplomate status from the American College of Veterinary Preventive Medicine in 2006. After practicing in an integrated production system, he joined the faculty at Iowa State University Veterinary Diagnostic and Production Animal Medicine Department where he is currently a Morrill Professor and holds the Dr Douglas and Ann Gustafson Professorship for Teaching Excellence in Veterinary Medicine. He is also the director of the Swine Medicine Education Center, with a mission to teach every swine medicine skill and provide a place for students to practice those skills in modern farm environments. Dr Karriker joined AASV as a veterinary student in 1996. He has served the association as District 6 Director, cochair of the Collegiate Activities Committee, member of

AASV officers (left to right) Dr Mike Senn (past president), Dr William Hollis (president), Dr Angela Baysinger (president-elect), and Dr Locke Karriker (vice president).

AASV news continued on page 147

Shaping the future **of piglet care**

Prepare, protect, and support resilience in your piglets.
As your partner, we provide local swine expertise and complete, tailor-made solutions to help you achieve your goals. Together, we can create a new future for piglet care.

If not us, who? If not now, when?

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- ESSENTIAL PRODUCTS
- PERFORMANCE SOLUTIONS + BIOMIN®
- PRECISION SERVICES

DSM
BRIGHT SCIENCE. BRIGHTER LIVING.

AASV news continued from page 145

the Program Planning Committee, member of the Pharmaceutical Issues Committee, member of the AASV-National Pork Board Task Force on Antimicrobial Resistance, and member of the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria. He delivered the 2011 Howard Dunne Memorial Lecture and was honored with the AASV Howard Dunne Memorial Award in 2014.

Commenting on his upcoming role as vice president, Dr Karriker said, "I am looking forward to working with the phenomenal leadership, staff, and members of the association as we tackle ever more complex health challenges to insure pig health and well-being."

Dr Karriker lives in Ames, Iowa with his wife, Racheal, and children Adley and Vaughn.

AASV Past President Dr Michael Senn (KSU '91) has served AASV with two terms on the board of directors, as a committee member, as chair of the Foreign Animal Disease Committee, as a student presentation judge, and on the AASV Foundation Board of Directors. During his career, he has worked as a mixed-animal practitioner, swine production veterinarian, and as a technical services veterinarian, providing technical support for products and focused on clinical research, antimicrobial resistance monitoring, antibiotic regulatory issues, and emerging infectious disease surveillance. He continues to work as an independent consultant and looks forward to continued opportunities to serve AASV. Dr Senn lives in Newton, Kansas with his wife, Stephanie, and his children Annika and Jakob, who are KSU students.

Salary Survey 2023

The AASV is conducting its 8th survey of swine-veterinarian income and benefits. Active members of the AASV (non-retired veterinarians) in the United States or Canada can access the survey by logging into their AASV member account at **aasv.org/members**.

Your participation is important, even if your work only partially involves swine-related activities! Similar surveys have been conducted every 3 years since 2002. Members have found the resulting salary and benefit summary useful when seeking employment or preparing to hire veterinary professionals in the swine industry. The survey results have also been used to inform veterinary students about the career opportunities available in swine medicine.

Members of AASV are divided into 2 survey groups according to their employment type. The *practitioner* survey should be completed by members engaged in private practice, as well as those who oversee pig health for a production or genetics company. Members who work for a university, corporation, or government and are engaged in education, research, technical services, public health, or regulatory work should complete the survey for *public/corporate* veterinarians.

In addition to 2022 income and benefits, the survey requests information about education and training, employment type, and hours worked. Responses are confidential and the results are reported in a manner to ensure participant anonymity.

The overall results of the salary and compensation survey will be published and distributed for use by AASV members and students. Previous survey results are available for members to access on the AASV website.

AASV proceedings and seminar papers online

Were you unable to attend the AASV Annual Meeting? Or perhaps you could not attend all the presentations you were interested in. Good news: the conference proceedings are available online to all AASV members at **aasv.org/library/proceedings/** (2023 membership dues-paid status required).

The proceedings papers are available in several formats:

- "Big book" of the papers for the regular meeting sessions in a single PDF file with a linked table of contents
- Seminar booklets - PDF file for each seminar
- Individual papers in the Swine Information Library (**aasv.org/library/swineinfo**)

Happy reading!

Attendees heed the call to "Be There!" at the 54th AASV Annual Meeting

The American Association of Swine Veterinarians (AASV) held its 54th Annual Meeting in Aurora, Colorado, March 4-7, 2023, at the Gaylord Rockies Resort and Convention Center. The theme this year, "Be There!", emphasized the importance of being present in each moment. Program Chair and AASV President-elect Dr William Hollis called on all members to be there. He said, "When we choose to 'be there,' we have made the decision to engage in the debate while also making the choice to respect the needs of others in our association."

The meeting drew 956 total attendees, including 535 paid registrants and 75 veterinary students from 19 universities. The total attendance also included 241 exhibit representatives from 94 companies and organizations and 6 media representatives. Including the United States, 23 countries were represented.

The meeting participants enjoyed the opportunity to listen to 227 speakers and poster presenters by attending numerous educational sessions, including 11 preconference seminars, 2 general sessions, 3 break-out sessions, 1 Research Topics session, 3 Industrial Partners sessions, the Student Seminar, and a poster session featuring posters from students, researchers, and industrial partners.

Preconference seminars included topics about porcine reproductive and respiratory syndrome (PRRS) virus monitoring and diagnostics, pen-housing in gestation, antibiotic stewardship and sustainability, pig survivability, boar stud health and biosecurity, data integration to support real-time decision making, new technologies, and understanding swine business. Several committees collaborated to offer professional development across the categories of physical, mental, financial, and social health. Saturday's PRRS Monitoring and Diagnostics preconference seminar drew the most preregistered attendees. As always, the Swine Medicine for Students preconference seminar was well attended by veterinary students. Sunday afternoon, veterinary students highlighted their research and experience to a large crowd during the Student Seminar.

The ever-popular practice tips session, named in honor of the late Dr Max Rodibaugh this year, was voluntarily judged by Drs Daniel Boykin, Lauren Nagel, and Tom Painter, and chaired by Dr Melissa Billing. Dr Jim Kober's presentation titled, "Never say 'Why me?'" received the top prize, followed by Dr Terri Specht-Benson's "Teasing boars: Epididymectomy in farrowing house pigs" and Dr Brent Sexton's "High-volume bronchoalveolar lavage: Long name, quick process for *Mycoplasma hyopneumoniae* exposure."

Dr Egan Brockhoff, independent contractor serving as the Veterinary Counselor for the Canadian Pork Council, opened the Monday general session with the Howard Dunne Memorial Lecture. During his presentation titled "Be there: Be the leader for the pig, the client, the customer," he noted that while leaders come in all forms, they must be engaged. Those who show up make decisions and govern those who do not. "Now more than ever, veterinarians within the swine sector are needed to help shape and inform agriculture, food, and trade policy at all levels." He closed with a challenge to the audience: do hard things.

Dr Attila Farkas, a veterinarian at Carthage Veterinary Service, Ltd, presented the Alex Hogg Memorial Lecture titled "Seizing opportunity within swine veterinary medicine." After a tribute to Dr Hogg and the many mentors and experiences that shaped his life, Dr Farkas encouraged attendees to welcome collaboration, embrace change, influence developments, and adapt to what the future brings. He asked the audience, "What are you willing to do, learn, and try?"

Speakers during the second half of the Monday general session described next generation challenges for which swine veterinarians should be prepared, shared challenges experienced by the egg industry, and offered suggestions for the swine industry.

The Monday afternoon concurrent sessions challenged veterinarians to think critically about biosecurity, evaluate current disease challenges, and consider how to best be prepared for foreign animal diseases. The Tuesday general session facilitated important conversations in porcine epidemic diarrhea virus control and elimination and in nutrition and animal health.

Dr William Hollis, AASV president-elect and program chair welcomes attendees to the 54th Annual Meeting.

Attendees saw an exciting change at the Monday luncheon. The AASV Foundation cosponsored the lunch with AASV. Recipients of AASV Foundation-funded programs, including veterinary student scholarships, Alex Hogg Memorial Scholarships, Dr Conrad and Judy Schmidt Family Student Debt Relief Scholarships, and research grants, were announced. The Foundation also honored its newest Heritage and Legacy donors. The recipients of the AASV Student Podcast Award and the practice tip winners were also announced.

For the second year in a row, the AASV Human Health, Safety, and Well-Being Committee prepared a member scavenger hunt to help attendees welcome new faces, get to know and appreciate their AASV colleagues, and promote well-being and inclusivity at the Annual Meeting. Participants walked away with AASV-logoed luggage tags and stocking caps. In addition, 15 AASV committees met during the annual meeting to discuss

important issues in swine health, public health, animal well-being, and membership services.

The AASV Awards Reception was held Monday night, followed by the AASV Foundation's annual fundraising auction. Dr Nathan Winkelman, 2019 AASV president and 2023 AASV Awards Selection Committee chair, introduced the recipients of the Swine Practitioner of the Year Award, the Howard Dunne Memorial Award, the Meritorious Service Award, the Outstanding Swine Academic of the Year Award, the Technical Services/Allied Industry Veterinarian of the Year Award, and the Young Swine Veterinarian of the Year Award.

Swine Practitioner of the Year

Dr Tara Donovan was named the 2023 Swine Practitioner of the Year. The award is given to the swine practitioner who has demonstrated an unusual degree of proficiency and effectiveness in the delivery of veterinary service to clients.

Growing up on a diversified livestock farm near Loup City, Nebraska, Tara never wavered in her desire to work with farm animals later in life. Her advocacy for agriculture started early as a member of 4-H, a Nebraska State FFA officer, and a recipient of the American FFA Degree.

Dr Donovan earned her BS from the University of Nebraska-Lincoln and DVM from Kansas State University College of Veterinary Medicine. She also completed a food-animal medicine internship at Kansas State University. She is currently enrolled in the master of veterinary science program at the University of Illinois.

Dr Tara Donovan, recipient of the AASV Swine Practitioner of the Year Award.

Dr Donovan is the vice president of health and management for HANOR Company, where she oversees the veterinary management for 85,000 sows and 1.9 million grow-finish pigs. She is responsible for preventive health programs, pharmaceutical management and compliance, animal caregiver training, and on-farm swine health practices. She is appreciated for her ability to provide and communicate science-based and realistic recommendations for the animals under her care. She is well known for networking her peers for knowledge sharing about a disease or on-farm animal care practices.

Truly a devoted servant leader, Dr Donovan has dedicated countless volunteer hours to AASV. She has served on the Transboundary and Emerging and Infectious Diseases, Human Health and Safety, Pig Welfare, and Pharmaceutical Issues Committees, the PRRS Task Force, and the Center for Veterinary Biologics AASV working group. She represented AASV in the American Veterinary Medical Association House of Delegates and is currently a state delegate for the Swine Health Improvement Plan. She served as AASV president in 2012.

Dr Donovan has been recognized for her service and dedication to swine medicine by other organizations. She is a recipient of the Iowa State University Science in Practice award, the Wisconsin Pork Association Agri-Communicator award, and the Wisconsin Pork Association Distinguished Service Award. She was the 2015 Alumni Fellow for the Kansas State University's College of Veterinary Medicine.

Asked to share her thoughts about receiving this award, Dr Donovan replied, "I am deeply honored to receive this award. I am grateful to all the wonderful people at The HANOR Company I have had the privilege to work with the past 24 years. Thank you to all my friends, colleagues, and mentors at the AASV for teaching me as I learned along the way and to my family for their love and support."

While Dr Donovan's list of professional achievements is impressive, she is most proud of her family. Tara and her husband, Dirk, who is also a large-animal veterinarian, have 2 children, Gus and Tekla. She considers seeing her children grow into adulthood to be her greatest accomplishment.

Howard Dunne Memorial Award

Dr Joseph Connor received the 2023 Howard Dunne Memorial Award. The award recognizes an AASV member who has made important contributions and provided outstanding service to the association and the swine industry.

The Carthage, Illinois native was always interested in livestock and farming and gravitated to swine because of an interest in population medicine and epidemiology. Dr Connor received his BS and DVM from the University of Illinois, and his MS from the University of Minnesota.

Dr Connor founded Carthage Veterinary Service, LTD after purchasing the CVS practice in 1980. A leading swine veterinarian in the world, he considered it a privilege to be involved in the swine industry during a time of significant transformation and assisted producers in other countries wanting to see similar transformations. He was recognized for his international efforts by being named the first honorary member of the Japanese Association of Swine in 2008.

A true leader in swine health, Dr Connor has led the AASV for decades. After serving on the AASV Board of Directors, he was elected president of the association in 1988. He continues to serve the association as a member of the Transboundary and Emerging Diseases Committee, and Foundation Investment Committee. Colleagues regard Dr Connor as an icon in the swine industry and are grateful for his tremendous contributions and outstanding service to the AASV.

Dr Joseph Connor, recipient of the Howard Dunne Memorial Award.

Dr Connor has been recognized by his peers for his exemplary service to swine medicine as the AASV Swine Practitioner of the Year (1995) and as the recipient of the Allen D. Leman Science in Practice Award (2004). He was inducted into the PIC Hall of Fame in 2016 and more recently into the Swine Web Hall of Fame.

He has contributed to the greater knowledge of swine medicine for veterinarians and producers as a featured speaker and author of countless peer-reviewed journal articles, abstracts, educational manuals, and book chapters. He delivered both the Alex Hogg Memorial Lecture and Howard Dunne Memorial Lecture at past AASV Annual Meetings.

When asked to comment on what the award means to him, Dr Connor said, "I am incredibly humbled and honored to receive the Howard Dunne Memorial Award and have my name added to the list of AASV icons who have served and guided the swine veterinary community through the years. I am indebted to countless mentors, colleagues, and friends who have educated and challenged me along this journey. I would like to thank our clients and industry friends, my veterinary group, and above all my family for contributing support to me in countless ways."

Meritorious Service Award

David Brown was named the 2023 recipient of the Meritorious Service Award. The award recognizes individuals who have provided outstanding service to the AASV.

Mr Brown serves as the association's webmaster and information technology specialist. By chance, the New York native applied for a desktop publishing position at the University of Minnesota. The employer was Dr Bob Morrison seeking help to start a new journal for the American Association of Swine Practitioners (AASP). Over the years, he adapted his work for the AASV to focus on the increasing number of services offered online, including the *Journal of Swine Health and Production*.

As expected of a recipient of the Meritorious Service Award, Mr Brown has worked tirelessly for the AASV. He has been instrumental in many facets of the membership interface, including the JSHAP, weekly electronic newsletter, website, online commerce, the triennial salary survey, Annual Meeting proceedings, Annual Meeting recordings, student podcasts, and general communications. Every AASV member has benefited from his dedicated service.

Grateful for the association, Mr Brown stated, "It has been a pleasure to grow professionally along with the AASV's changing needs for more than half my (and its) life."

David's wife, Rebecca, and daughter, Sophia, have also worked for AASP/AASV over the years.

Mr Brown earned his BA from St. Olaf College and later an MS from the University of Rhode Island. In addition to his work for AASV, Mr Brown is a part-time faculty member at the University of Rhode Island where he teaches software engineering. He also develops the hardware, electronics, software, documentation, and manufacturing process for the University of Rhode Island Laser Scarecrow, a component of Dr Rebecca Brown's research program.

Outstanding Swine Academic of the Year

Dr Gary Althouse was named the 2023 Outstanding Swine Academic of the Year. The award is given annually to an AASV member employed in academia who has demonstrated excellence in teaching, research, and service to the swine veterinary profession.

Dr Althouse received his BS from Sul Ross State University, his MS from Texas A&M University, and his DVM and PhD from Iowa State University. He is a board-certified specialist in the American College of Theriogenologists.

Dr Althouse joined the School of Veterinary Medicine faculty at the University of Pennsylvania (Penn Vet) in 2001. In 2011, he was named the Marion Dilley and David George Jones Endowed Chair in Animal Reproduction. In 2019, Dr Althouse was appointed Associate Dean of Sustainable Agriculture and Veterinary Practices.

With focused efforts on global food supply and food security, Dr Althouse is the founder and director of Penn Vet's Reference Andrology Laboratory which provides both critical research and clinical services in large-animal production. He currently provides services to clientele throughout North America with a direct impact on about one-third of the US swine breeding herd. He is currently the attending veterinarian for the largest multi-genetics boar stud system in North America with health and production flow oversight of facilities located in

David Brown, recipient of the AASV Meritorious Service Award.

3 states. Globally, he provides veterinary consultation services in the remaining Americas, Europe, Asia, and Australia.

Collectively, these experiences are woven into Dr Althouse's teaching, research, and outreach efforts in the areas of swine production medicine and theriogenology. Peers praise Dr Althouse for being exceptionally influential in advancements in assisted reproductive technologies and boar stud management. His initial work in establishing quality standards for boar semen led to advances in automated evaluation and quality control systems. He has also helped many swine veterinarians work through sow farm reproductive issues.

Dr Gary Althouse, recipient of the Outstanding Swine Academic of the Year Award.

Dr Althouse has a long history of service to the AASV as a member of the Swine Health Management, Program Planning, Boar Stud, and Collegiate Activities Committees. In addition to his service to AASV, he has served on committees for the International Pig Veterinary Society and International Conference on Boar Semen Preservation. He is a past president of both the Society for Theriogenology and the American College of Theriogenologists.

Appreciative of his career in academia, Dr Althouse stated, "My work as a clinician scientist in academia has been personally fulfilling. Generating new knowledge, solving problems in the field, and developing and mentoring our future colleagues are the pillars of my career. The AASV's recognition of these efforts reinforces my passion and commitment to the profession."

Technical Services/Allied Industry Veterinarian of the Year

Dr Lisa Becton was named the 2023 Technical Services/Allied Industry Veterinarian of the Year. This award recognizes swine industry veterinarians who have demonstrated an unusual degree of proficiency and effectiveness in delivery of veterinary service to their companies and their clients, as well as given tirelessly in service to the AASV and the swine industry.

Dr Becton received her BS from Lenoir-Rhyne College, DVM from North Carolina State University, MS from Michigan State University, and a public health certificate in field epidemiology from the University of North Carolina, Chapel Hill. She is a Diplomate of the American College of Veterinary Preventative Medicine.

Dr Lisa Becton, recipient of the AASV Technical Services / Allied Industry Veterinarian of the Year Award.

Even without a background in farming, Dr Becton never doubted her career path; from a young age, she was set on becoming a veterinarian. After connecting with veterinary mentors in the swine industry as a student, her path led her to swine internships and swine research projects. She has been involved in swine production since graduation.

Since 2008, Dr Becton has dedicated her career as a subject-matter expert in swine health and production. As the National Pork Board Director of Swine Health, she has oversight of the producer and veterinary task force for swine health research, which includes identifying and funding key project areas; developing and delivering resources related to domestic and foreign animal diseases of swine; coordinating and promoting surveillance activities, depopulation, and disposal techniques; and collaborating with external organizations on key areas identified by producers as priorities for swine health.

She is valued for her incredible historic knowledge of the National Pork Board-funded research projects and her ability to use those research results to lead the creation of key materials for producers and veterinarians.

Dr Becton's extensive voluntary service and leadership on AASV committees began when she joined AASV over 20 years ago. She has served on the AASV Pharmaceutical Issues Committee and is a long-time member of the AASV Transboundary and Emerging Diseases Committee and PPRS Task Force. She serves the industry as a member of the American Veterinary Medical Association Animal Agriculture Liaison Committee, the National Animal Disease Preparedness and Response Program Consultation Board, the Foundation for Food and Agriculture Research Advanced Animal System Advisory Council, the US Animal Vaccinology Coordination Network Advisory Board, and the US Animal Health Association Committee on Swine.

Upon acceptance of the award, Dr Becton commented, "I am very humbled and honored by this award and by the support of the veterinary and producer community. Working in the agriculture sector fuels my passion for swine medicine and research. I am grateful every day to have the opportunity to assist producers and veterinarians as they manage pork production!"

Dr Becton lives in North Carolina where she enjoys the outdoors and riding motorcycles to sample BBQ and seafood with her husband, Gordon. They have two Labradors, Mongo and Charlie, and a Frenchie, Mick.

Young Swine Veterinarian of the Year

The Young Swine Veterinarian of the Year Award was presented to Dr Jessica Davenport. The award is given annually to an AASV member five or less years post veterinary graduation who has demonstrated the ideals of exemplary service and proficiency early in their career.

A Charleston, South Carolina native, Dr Davenport received her BS from Clemson University (2012) and DVM from the University of Georgia (2017). She first became interested in swine during a swine production internship while at Clemson. She further solidified her interest in swine through a veterinary internship with Smithfield, an internship with the Swine Medicine Education Center, and several swine veterinary rotations and preceptorships during her clinical year at the University of Georgia. Dr Davenport was recognized for her dedication to swine medicine with the Food Animal Production Medicine Clinical Proficiency Award.

Dr Davenport is currently a staff veterinarian for JBS Live Pork where she is responsible for the health of more than 60,000 sows, gilt multiplication, and

Dr Jessica Davenport, recipient of the AASV Young Swine Veterinarian of the Year Award.

nursery and grow-finish. Additionally, she oversees specialty health management programs and disease management strategies for her region.

Nominated for this award by many mentors, colleagues, and clients, all spoke to Dr Davenport's innate qualities and abilities, especially in communication. She has a unique ability to interact with and read and understand individuals. She expresses empathy, humility, and sincerity in every situation.

Dr Davenport partners with the University of Missouri College of Veterinary Medicine's food-animal production rotation to expose veterinary students to swine medicine and production and provide on-farm experiential opportunities. Her passion for cultivating student interest in swine medicine will help recruit and retain the next generation of swine veterinarians.

Distinctive for someone early in their professional career is Dr Davenport's commitment to servant leadership. She is a member of the AASV Pig Welfare Committee, chair of the AASV Communications Committee, and the Missouri delegate to the Swine Health Improvement Plan.

As stated in one of her nomination letters, she truly embodies the entire mission of the AASV.

Upon acceptance of the award, Dr Davenport commented, "I am extremely humbled and honored to have been selected as the 2023 AASV Young Swine Veterinarian of the Year. To be recognized for such an esteemed award is truly a privilege, as I work alongside some incredible individuals within this industry that I hold so much admiration and respect for. I would not be the person or the veterinarian that I am today without the support from my family, my peers, and the team within JBS Live Pork. To be successful with the pigs, you have to be passionate about the people, and JBS has truly allowed me the independence to cultivate those relationships with the producers and colleagues that I work with. This award is a direct reflection of the caliber of people that have mentored and guided me in my early years, and I am excited to see what the future holds."

Dr Davenport resides in central Missouri with her fur and feathered children: two dogs, three cats, and five laying hens.

AASV annual business meeting

American Association of Swine Veterinarians President Dr Mike Senn reported on the association's membership and activities during the annual business meeting on Tuesday, March 7. Current total membership was 1510, including 204 students from 36 universities, 961 members residing in the United States, 35 members residing in Mexico, 125 members residing in Canada, and 185 international members residing in 35 additional countries. The 2023 AASV officers, Drs Bill Hollis, president; Angela Baysinger, president-elect; Locke Karriker, vice president; and Mike Senn, past president, were installed. The board congratulated re-elected district directors Drs Sara Hough (District 2), Attila Farkas (District 5), and Susan Detmer (District 11) and welcomed newly elected district director Dr Alyssa Betlach (District 9). Dr Senn thanked outgoing District 9 Director Dr Chase Stahl for his service. Dr Senn also welcomed Alexis Berte (Iowa State University, class of 2025) as incoming alternate student delegate to the AASV Board of Directors and thanked outgoing Student Delegate Sydney Simmons (North Carolina State University, 2023). Hunter Everett (North Carolina State University, 2024) assumes the role of student delegate. Honored guests at the business breakfast included Drs Lori Teller (American Veterinary Medical Association president), Dick Sullivan (AVMA executive board representative), and Paul Sundberg (Swine Health Information Center executive director).

Dr Lori Teller, AVMA president, addresses attendees during the 2023 AASV annual business meeting.

AASV officer installation during the 2023 annual business meeting.

Encouraging students to pursue life-long careers as swine veterinarians

The American Association of Swine Veterinarians encourages veterinary students to attend the AASV Annual Meeting and offers a variety of activities for student participation during the conference to help fulfill part of AASV's mission to "mentor students, encouraging life-long careers as swine veterinarians."

Once again, the AASV Annual Meeting offered excellent opportunities for students to learn about swine medicine, network with each other, connect with swine faculty, and meet veterinarians and mentors.

Registration to the Annual Meeting is free for student members and includes access to all educational sessions and activities, including the preconference seminars on Saturday and Sunday. As usual, AASV's Student Engagement Committee offered several conference activities designed specifically for veterinary students, including the Swine Medicine for Students preconference seminar, a vet hunt, a speed networking opportunity for upper-class students, and the Swine Student Trivia event.

Student Trivia

Merck Animal Health hosted and sponsored prizes for a pub-style trivia event. Sixty students from 13 veterinary schools participated in the friendly competition. Prizes were awarded for the top 3 teams, with the winning team receiving Bluetooth speakers, tumblers, and Safe-Guard coolers. The AASV student delegates Hunter Everett and Alexis Berte coordinated the sign-ups, Dr Megan Inskeep welcomed the students and reviewed the benefits of AASV student membership, and AASV Student Engagement Committee Chairs Drs Chelsea Hamilton and Jamie Madigan emceed the event. While only student teams were eligible to participate, anyone attending the Annual Meeting was welcome to observe and cheer on the teams.

Vet Hunt

The Vet Hunt encouraged veterinary students to network with veterinarians. Students introduced themselves to and visited with at least 10 veterinarians who voluntarily participated in the Vet Hunt for a chance to win swine swag or other prizes sponsored by Merck Animal Health. Thank you to the 75 veterinarians that participated in the Vet Hunt and welcomed students to the annual meeting.

Speed Networking

Speed networking during the Annual Meeting provided a fun way to meet swine-savvy students and mentors, future interns, or even potential new employees or employers. Seventeen upperclass veterinary students met with 13 veterinarians, spending 3 minutes to visit with each other in speed-dating style.

Students made meaningful connections and appreciated the opportunity to practice their interviewing and networking skills even if participating veterinarians were not hiring. In addition to helping students become more proficient at discussions with potential employers, veterinarians also used the opportunity to screen potential candidates for jobs or preceptorships.

Podcasts

The AASV provided an opportunity for students to earn a $200 stipend by conducting a recorded interview of an AASV speaker for podcasting. Twenty-two students from 9 universities participated. Students selected a speaker, prepared questions in advance, and interviewed speakers during the Annual Meeting. The end products are 5- to 15-minute MP3 audio recordings available to members in the AASV Podcast Library at **aasv.org/podcast**.

Student Reception

Always a favorite, the Student Reception sponsored by Merck Animal Health, drew a large crowd on Sunday evening. Students, veterinarians, researchers, and industry representatives spent the evening interacting with each other in an informal setting. The reception was filled with plenty of snacks, beverages, and magical entertainment.

Students practiced their interview and networking skills at the Student Speed Networking event.

AASV Foundation announces Student Seminar awards and scholarships

The American Association of Swine Veterinarians Foundation awarded scholarships totaling $25,000 to 15 veterinary students.

Jack Korenyi-Both, The Ohio State University, received the $5000 scholarship for top student presentation. His presentation was titled "Water-based foam depopulation in swine: Evaluating brain activity, animal behavior, and logistical aspects." The Zoetis Foundation provided the financial support for the Top Student Presenter Award.

Additional scholarships totaling $20,000 were funded by Elanco Animal Health.

Four veterinary student presenters received $2500 scholarships: Carly Bates, Iowa State University; Hope Dohlman, Iowa State University; Taylor Jansen, Purdue University; and Rachel Kanefsky, Tufts University.

Five veterinary student presenters received $1500 scholarships: Ellen Gibbs, University of Missouri; Alyssa Ruston-Bray, University of Illinois; Gregory Shanks, University of Tennessee; Adam Tatnall, University of Illinois; and Amber Vegter, Iowa State University.

The student presenters receiving $500 scholarships were Erin Russell, Lincoln Memorial University; Kendall Sattler, Purdue University; Adam Steffensmeier, Iowa State University; Mallory Wilhelm, Iowa State University; and Dylan Wulfekuhle, Iowa State University.

Thirty-five veterinary students from 14 universities submitted abstracts for consideration by student abstract volunteer judges Drs Abigail Redalen, Bill Minton, Dwain Guggenbiller, Jordan Gebhardt, Katie Beckman, and Susan Detmer. From those submissions, 15 students were selected to present during the Annual Meeting. Drs Andrew Bowman and Justin Brown chaired the student seminar, which was judged by those individuals who judged the abstracts. The Zoetis Foundation funded a $750 award for each student selected to participate.

$5000 STUDENT SEMINAR WINNER

Dr Rick Swalla (left) presented the $5000 scholarship for Top Student Presenter Award to Jack Korenyi-Both, The Ohio State University. The award is funded by the Zoetis Foundation.

$2500 STUDENT SEMINAR WINNERS

Dr Pat Hoffmann (left) presented scholarships sponsored by Elanco Animal Health. Recipients of the $2500 AASV Foundation scholarships were (from left) Carley Bates, Hope Dohlman, Rachel Kanefsky, and Taylor Jansen.

$1500 STUDENT SEMINAR WINNERS

Dr Pat Hoffmann (left) presented scholarships sponsored by Elanco Animal Health. Recipients of the $1500 AASV Foundation scholarships were (from left) Gregory Shanks and Amber Vegter. Not pictured: Alyssa Ruston-Bray, Adam Tatnall, and Ellen Gibbs.

$500 STUDENT SEMINAR WINNERS

Dr Pat Hoffmann (left) presented scholarships sponsored by Elanco Animal Health. Recipients of the $500 AASV Foundation scholarships were (from left) Erin Russell, Adam Steffensmeier, Kendell Sattler, Dylan Wulfekuhle, and Mallory Wilhelm.

Student Poster Competition awardees announced

The American Association of Swine Veterinarians provided an opportunity for 15 veterinary students to compete for awards in the Veterinary Student Poster Competition. United Animal Health sponsored the competition, offering awards totaling $4000.

Thirty-five veterinary students from 14 universities submitted abstracts for consideration by student abstract volunteer judges Drs Abigail Redalen, Bill Minton, Dwain Guggenbiller, Jordan Gebhardt, Katie Beckman, and Susan Detmer. Based on scores received in the original judging of abstracts submitted for the AASV Student Seminar, the top 15 abstracts not selected for oral presentation at the Annual Meeting were eligible to compete in the poster competition. A panel of 3 AASV practitioner volunteers, Drs Jim Kober, Rachel Schulte, and Amy Woods, interviewed the competing students and scored their posters to determine the scholarship awards. Drs Andrew Bowman and Justin Brown chaired the competition.

Dr Joel Spencer, United Animal Health, announced the following awards during the AASV Luncheon on March 6:

$500 scholarship: Brenna Werner, University of Minnesota – Top Student Poster titled "An investigation of the number of pigs in gestation pens that will chew on a rope during oral fluid collection."

$400 scholarships: Juan Hernandez Cuevas, The Ohio State University and Morgan Johnson, Iowa State University.

$300 scholarships: Sarah Albers, University of Wisconsin; Paul McDonald, Purdue University; and Kaci Way, The Ohio State University.

$200 scholarships: Alexis Berte, Iowa State University; Alexandra Bishop, Iowa State University; Bridget Cincotta, University of Pennsylvania; Austin Janssen, Iowa State University; Erin Larsen, Lincoln Memorial University; Amanda Patev, University of Pennsylvania; Elisha Snezek, University of Georgia; and Braden Steidley, Oklahoma State University.

In addition to the poster competition awards, each student poster presenter received a $250 award funded by the Zoetis Foundation.

$500 POSTER WINNER

Recipient of the $500 scholarship for Top Student Poster was Brenna Werner, University of Minnesota.

$400 POSTER WINNERS

Dr Joel Spencer (left) presented scholarships sponsored by United Animal Health. Recipients of the $400 AASV Foundation scholarships were (from left) Morgan Johnson and Juan Hernandez Cuevas.

$300 POSTER WINNERS

Dr Joel Spencer (left) presented scholarships sponsored by United Animal Health. Recipients of the $300 AASV Foundation scholarships were (from left) Kaci Way, Sarah Albers, and Paul McDonald.

$200 POSTER WINNERS

Dr Joel Spencer (left) presented scholarships sponsored by United Animal Health. Recipients of the $200 AASV Foundation scholarships were (from left) Alexis Berte, Austin Janssen, Elisha Snezek, Braden Steidley, Alexandra Bishop, Erin Larsen, and Amanda Patev. Not pictured: Bridget Cincotta.

Student Podcast Award

Sarah Albers, a third-year student at the University of Wisconsin School of Veterinary Medicine, was awarded the Student Podcast Award for the most accessed podcast from the 2022 AASV Annual Meeting. Sarah interviewed Dr Tom Gillespie about his practice tip presentation titled "Ghost piglets." Sarah was announced as the winner of the $500 award, sponsored by Huvepharma, during the 2023 AASV Annual Meeting.

Each year, up to 30 AASV student members select a speaker to interview during the AASV Annual Meeting for a podcast. The podcasts are then posted to the AASV website and promoted by the students in a friendly competition to gain the most traffic leading up to the following year's Annual Meeting. This is a great networking opportunity for students that also helps develop a wonderful AASV member resource. We would like to thank AASV student members for their continued involvement and Huvepharma for their continued support of the Student Podcast Award.

These and other podcasts can be found in the AASV Podcast Library at **aasv.org/podcast**.

Recipient of the Student Podcast Award: Sarah Albers, University of Wisconsin. Pictured with Sarah is Dr Tom Fangman (right) of Huvepharma, sponsor of the Student Podcast Award.

Thank You, Sponsors and Exhibitors!

Over the past year, AASV members have seen the cost of food, fuel, and other necessities – including veterinary continuing education – increase at a startling rate. While this year's meeting attendees experienced higher rates for transportation, lodging, meals, and registration, the cost of attending the 2023 AASV Annual Meeting would have been even greater - or the quality of the meeting experience reduced - if it were not for the financial support provided by sponsors for refreshments, meals, and social activities, as well as for travel stipends, awards, and scholarships for veterinary students. Considerable financial support was also provided by the 94 companies and organizations in the 2023 Technical Tables exhibit.

Please join AASV staff in expressing your personal appreciation to representatives of the following companies for their generous support of the 2023 AASV Annual Meeting:

SCHOLARSHIP AND EVENT SPONSORS

- **AASV Foundation** (Monday Luncheon, Praise Breakfast, Debt Relief Scholarships, Research Grants)
- **DSM Animal Nutrition & Health** (Yoga Class)
- **Elanco Animal Health** (AASV Foundation Veterinary Student Scholarships)
- **Hog Slat** (Refreshment Break Cosponsor)
- **Huvepharma** (Student Podcaster Award)
- **Merck Animal Health** (AASV Awards Reception, Student Reception, Veterinary Student Trivia Event, AASVF-Merck Veterinary Student Scholarships)
- **Newport Laboratories** (Veterinary Student Travel Stipends)
- **Stuart Products** (Praise Breakfast)
- **United Animal Health** (Veterinary Student Poster Awards)
- **Veterinary Pharmaceutical Solutions** (Refreshment Break Cosponsor)
- **Zoetis Foundation** (AASV Student Seminar and Poster Session, AASV Foundation Top Student Presenter Scholarship)

TECHNICAL TABLE EXHIBITORS

Acuity/Fast Genetics

AgCreate Solutions/Pork Avenue Training Portal

Allflex Livestock Intelligence

Alltech

American Board of Veterinary Practitioners

Animal Health International

Anpario

APC

ARKO Laboratories

Arm & Hammer

Aurora Pharmaceutical

Automated Production

Bimeda

BioChek

BioSec

Boehringer Ingelheim

Cambridge Technologies

Celemics

Central Life Sciences/ClariFly

Ceva Animal Health

Chr Hansen

Christian Veterinary Mission

CID Lines, an EcoLab Company

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Cloudfarms

DNA Genetics

DPI Global

DSM Animal Nutrition & Health

Eastman

Elanco

Endovac Animal Health

Essential Ag Solutions

Feedworks USA

FERA Diagnostics and Biologics

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Genesus Genetics

GlobalVetLink

Heritage Vet Partners

HIPRA

Hog Slat

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IDEXX

IMV Technologies USA

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Innovative Heating Technologies

Insight Wealth Group

IPVS & ESPHM 2024

ISU Office of Innovation Commercialization

Kemin Animal Nutrition & Health

LANXESS Corporation

Longhorn Vaccines & Diagnostics

MAI Animal Health

Maximus

MB Swine Reproduction

Medgene

Merck Animal Health

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MWI Animal Health

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Natural Biologics

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Newport Laboratories

Norbrook

NutriQuest

Pharmacosmos

Pharmgate Animal Health

Phibro Animal Health Corporation

PIC

PigCHAMP

PigKnows

PMI

PrairiE Systems

Precision Health Technologies

Purina Animal Nutrition

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SEPPIC

Stuart Products

Summit SmartFarms

Swine Health Information Center

SwineTech

TechMix

Tetracore

Thermo Fisher

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Wilson's Prairie View Farm

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Zoetis

ENDOVAC-Porci®
with Immune Plus

MORE Than *Just* a Vaccine

Studies have determined that ENDOVAC-Porci; a core antigen vaccine with an immunostimulant, provides pigs broad-spectrum protection against the enteric & respiratory effects of gram-negative bacterial diseases.

Lawsonia Intracellularis Challenge:
ENDOVAC-Porci vs. Porcilis® Ileitis vs. Controls

- **29.0%** (7.7 lb) higher weight gain over controls
- **No** statistical difference in weight gain compared to Porcilis Ileitis
- **40.9%** better clinical scores than controls
- **8.2%** better clinical scores than Porcilis Ileitis
- **37.6%** better fecal scores to controls
- **18.2%** better fecal scores than Porcilis Ileitis

Clinical & Fecal Scores

Study days 58-70:
Clinical Scores: 0 Normal, 1 Mild, 2 Moderate, 3 Severe
Fecal Scores: 0 Normal, 1 Soft, 2 Loose, 3 Watery

Scoring	Saline	ENDOVAC-Porci®	Porcilis® Ileitis
Clinical	24.7^{a}	14.6^{b}	15.9^{ab}
Fecal	27.4^{a}	17.1^{b}	20.9^{ab}

Treatment means with different superscripts differ from each other ($P < 0.05$)

E. coli and Pasteurella Challenge:
ENDOVAC-Porci vs. Controls

- **11.1%** pre-wean survivability advantage
- **7.9%** (1.05 lbs) higher average weaning weight
- **13.6%** (3.3 lbs) higher final 42-day weight
- **61.9%** less mortality over the entire study
- **75.6%** better clinical scores
- **50.8%** better fecal scores

Clinical & Fecal Scores

Study days 22-35:
Clinical Scores: 0 Normal, 1 Mild, 2 Moderate, 3 Severe
Fecal Scores: 0 Normal, 1 Soft, 2 Loose, 3 Watery

Treatment	Saline	ENDOVAC-Porci®	P-value
Clinical	1.19	0.29	.05
Fecal	1.95	0.96	.05

Effect of treatment ($P < 0.01$)

AASV Foundation awards $100,000 for research

As part of its mission to fund research with direct application to the profession, the American Association of Swine Veterinarians Foundation awarded $100,000 in funding for research. Dr Ross Kiehne, chair of the AASV Foundation, announced the selection of 4 research proposals for funding during the AASV and AASV Foundation cosponsored luncheon on March 6 held during the AASV Annual Meeting in Aurora, Colorado. The foundation granted funds to support efforts by principal researchers, from the University of Minnesota and Iowa State University.

University of Minnesota researcher Dr Kimberly VanderWaal and coinvestigators were awarded $29,997 to fund the proposal titled "Fine-scale classification of PRRSV-2: Moving past RFLPs to improve sequence interpretation for disease control and management." The 2 objectives of the study are to evaluate and compare potential alternative systems for classifying and naming porcine reproductive and respiratory syndrome virus-2 (PRRSV-2) variants and to develop procedures for prospective implementation and expansion that would meet the needs of diagnostic laboratories and practitioners.

The foundation granted $22,440 to Dr Daniel Linhares and coinvestigators from Iowa State University to fund the proposal titled "Probability of Influenza A virus RNA detection at different pooling levels for commonly used sample types in breeding herds." The objective of the project is to compare the probability of influenza A virus RNA detection at different levels of pooling for different sample types.

Dr Linhares and coinvestigators also received $24,855 to fund the proposal titled "Comparison of a novel rapid tonsil sampling method to serum, oral fluid, and tonsil scraping to detect PRRSV in sows." The objective of this study is to compare the new tonsil-oral sample type with serum, oral fluids, and tonsil scraping in terms of probability of PRRSV detection and cycle threshold values with sows at different time points post whole-herd exposure.

The foundation partially funded Dr Linhares' proposal, "Assessing the performance of tongue tips as an additional tool to monitor PRRSV in breeding herds undergoing virus elimination," at $22,708. The objective is to determine the dynamic of PRRSV-RNA detection in tongue tips in breeding herds undergoing PRRSV elimination.

Investigators will share results at various swine meetings and in peer-reviewed publications.

Dr Brett O'Brien chaired the scientific subcommittee responsible for reviewing and scoring the 17 proposals received for consideration, and she joins the AASV Foundation in thanking Drs Rebecca Robbins, Christine Mainquist-Whigham, Wesley Lyons, Eva Jablonski, Megan Potter, Emily Mahan-Riggs, and Todd Williams for their participation on this important subcommittee.

An overview of past and current projects funded by the AASV Foundation is available at **aasv.org/foundation/research.htm**. The foundation will issue its next call for research proposals in fall 2023.

The AASV Foundation granted funds to support research efforts of Dr Kimberly VanderWaal from University of Minnesota.

The AASV Foundation granted funds to support research efforts of Dr Daniel Linhares from Iowa State University.

AASV Foundation announces recipients of Hogg Scholarship

Drs Claire LeFevre and Emily Mahan-Riggs were named the 2023 recipients of the American Association of Swine Veterinarians Foundation Hogg Scholarship during the American Association of Swine Veterinarians 54th Annual Meeting in Aurora, Colorado on March 6.

Established in 2008, the scholarship is named for Dr Alex Hogg who was a leader in swine medicine and pursued a master's degree in veterinary pathology after 20 years in a mixed-animal practice. The scholarship is awarded annually to an AASV member who has been accepted into a qualified graduate program to further their education after years as a swine practitioner. Former Hogg Scholarship recipients Drs Angela Baysinger, Kate Dion, and Jessica Seate reviewed the 2023 applications.

Since receiving her DVM in 2017 from the University of Wisconsin-Madison, Dr LeFevre has worked as a swine production and herd health veterinarian for Carthage Veterinary Services, Ltd. She is currently pursuing a master of veterinary science (MVS) at the University of Illinois College of Veterinary Medicine. Her desire to apply to graduate school was deeply rooted in further developing her capabilities as a veterinarian to better serve the direct needs of her clients and farm teams. Dr LeFevre serves as cochair of the AASV Early Career Committee. She is a participant and program planning subcommittee member of the inaugural AASV Participant-Led, Early-Career Swine Veterinarian Development Program.

Drs Emily Mahan-Riggs (left) and Claire LeFevre were recipients of the AASV Foundation Hogg Scholarship.

Dr Mahan-Riggs earned her DVM from North Carolina State University (NCSU). She is currently a production veterinarian for Smithfield Hog Production and an adjunct professor at the NCSU College of Veterinary Medicine. A current student in the MVS program at the University of Illinois, she views the program as a continuation of her lifelong commitment to learning. She foresees the knowledge gained through the program as an opportunity to enhance the quality of veterinary services she provides and better training to students she encounters. Dr Mahan-Riggs has been a member of the AASV Student Engagement, Collegiate Activities, Early Career, Foundation Auction, and Foundation Research Committees. As a student, she served on the AASV Board of Directors as a nonvoting student delegate member.

Three AASV members receive Dr Conrad and Judy Schmidt Family Student Debt Relief Endowment Scholarship

Three $5000 scholarships were awarded to early-career swine practitioners through the Dr Conrad and Judy Schmidt Family Student Debt Relief Endowment. Recipients Drs Katie Beckman, Alyssa Betlach, and Daniel Brown were announced March 6 during the American Association of Swine Veterinarians 54th Annual Meeting in Aurora, Colorado.

The purpose of the $5000 scholarship is to help relieve the student debt of recent veterinary graduates engaged in swine practice who still have significant debt burden. Qualified applicants must have been engaged in private practice with at least 50% of their time devoted to swine, providing on-farm service directly to independent pork producers. All 3 recipients have been continuous members of the AASV since joining as students, and each attended the Annual Meeting during their veterinary education.

Dr Beckman, a 2019 Purdue University DVM graduate, is a swine veterinarian at AMVC Management Services in Audubon, Iowa. She provides veterinary services to sow farms and wean-to-finish sites in Iowa, and she teaches Swine Medicine Education Center students through AMVC. She enjoys spending time on farm and building strong relationships with dedicated and passionate growers eager to improve herd health. She cites mentorship from AASV colleagues as an essential building block to a strong foundation as a swine veterinarian, and she hopes to support new graduates in the future.

Dr Betlach is a 2018 DVM and 2021 PhD graduate of the University of Minnesota. She is an associate swine veterinarian and researcher at the Swine Vet Center where she works with producers in the midwestern United States to optimize herd health, biosecurity, and production. She also conducts and oversees applied research related to disease control and elimination, production, and nutrition to provide science-driven advancements to Swine Vet Center clientele. Dr Betlach was inspired to pursue swine medicine after attending the AASV Annual Meeting as an undergraduate research presenter.

The AASV Member Student Debt Relief Scholarship was awarded to (from left) Drs Katie Beckman, Daniel Brown, and Alyssa Betlach.

Dr Brown, a DVM graduate of the University of Illinois, has been a veterinary consultant at Four Star Veterinary Service since graduation in 2020. He provides veterinary services to all types of producers across 7 states. He views AASV as a great educational resource that has been indispensable to his career, providing internships and externships to early career development programs.

The AASV Foundation thanks Drs Ross Kiehne, Jeff Harker, Pete Thomas, and Jason Kelly for reviewing the applications.

The scholarship was initiated with a generous $110,000 contribution to the foundation by the Conrad Schmidt and Family Endowment. Dr Schmidt, a charter member of AASV, explained, “Together, Judy and I noticed that many new DVM graduates interested in swine medicine begin their professional life with heavy educational debt obligations. As a long-time AASV member and animal industry supporter, it was our desire to help AASV members who have dedicated their professional skills to swine herd health and production. We hope that this endowment will grow over time to assist in reducing the educational debt load of AASV members as they begin their professional journeys.”

Merck Animal Health supports future swine practitioners through AASV Foundation partnership

Merck Animal Health continued its commitment to the swine industry's next generation of veterinarians by partnering with the American Association of Swine Veterinarians Foundation (AASVF) to sponsor the 2023 recipients of the AASVF/Merck Animal Health Veterinary Student Scholarships.

Scholarships totaling $50,000 were awarded to 10 veterinary students for 2023. The recipients were announced at the 54th AASV Annual Meeting, held in Aurora, Colorado on March 6.

The following 10 students were each awarded a $5000 scholarship:

- Don Banks, North Carolina State University, Class of 2024
- Alexis Berte, Iowa State University, Class of 2025
- Antonia DeGroot, Ontario Veterinary College, Class of 2025
- Hope Dohlman, Iowa State University, Class of 2025
- Hunter Everett, North Carolina State University, Class of 2024
- Ellen Gibbs, University of Missouri, Class of 2025
- Jack Korenyi-Both, The Ohio State University, Class of 2024
- Conrad Schelkopf, Kansas State University, Class of 2024
- Adam Tatnall, University of Illinois Urbana-Champaign, Class of 2025
- Dylan Wulfekuhle, Iowa State University, Class of 2025

Dr Jack Creel (back left) presented the $5000 AASVF-Merck Veterinary Student Scholarships to (row 1 from left) Alexis Berte, Ellen Gibbs, Hope Dohlman, Jack Korenyi-Both, (row 2 from left) Hunter Everett, Don Banks, and Dylan Wulfekuhle. Not pictured: Adam Tatnall, Antonia DeGroot, and Conrad Schelkopf.

"Merck Animal Health is proud to honor these students who represent the next generation of veterinary leaders for the swine industry," said Justin Welsh, DVM, executive director of livestock technical services, Merck Animal Health. "Through our partnership with AASVF, these exemplary students embody Merck Animal Health's mission to advance the science of healthier animals. We are excited to see what the future holds as they embark on their veterinary careers."

The scholarship program assists the foundation's mission to support the development and scholarship of students and veterinarians interested in the swine industry. Second- and third-year students enrolled in American Veterinary Medical Association-accredited or recognized colleges of veterinary medicine in the United States, Canada, Mexico, South America, and the Caribbean islands are eligible for the scholarship. The AASV Foundation thanks Drs Jason Kelly, Ross Kiehne, Pete Thomas, and Jeff Harker for judging this year's applications. Learn more at **aasv.org/foundation**.

Oklahoma State University veterinary student receives David A. Schoneweis Scholarship at AASV Annual Meeting

Braden Steidley, a third-year student at Oklahoma State University's College of Veterinary Medicine, was awarded the David A. Schoneweis Scholarship during the American Association of Swine Veterinarians Annual Meeting held in Aurora, Colorado.

The children of the late Dr David Schoneweis established a scholarship in his memory to benefit swine-interested students from Kansas State University (KSU) and Oklahoma State University (OSU). The $1000 scholarship is awarded to a student or students from KSU or OSU who participate in the student oral or poster presentations during the AASV Annual Meeting, based upon a selection rubric prepared with the oversight and approval of the Schoneweis family.

Steidley presented his research, "A field study examining the effects of a novel maternal pheromone on performance and livability of weaned pigs," during the AASV Student Poster Session. He was one of 20 students presenting a poster.

Dr Schoneweis was born in Clay Center, Kansas and earned his DVM from Kansas State University in 1956. He served 2 years in the Army Veterinary Corps before teaching clinical sciences at Oklahoma State University for 6 years. After 2 years in private practice in Lawrence, Kansas, he joined the KSU College of Veterinary Medicine faculty in 1966, where he received his master's degree in surgery and medicine in 1971 and taught food animal medicine for 30 years. Dr Schoneweis was a charter member of the American Association of Swine Practitioners (AASP) and served on the association's board of directors in the late 1970s and early 1980s. In 1997, he received the AASP Meritorious Service Award for his lifetime of support for the association and in recognition of his work with students as a professor of food animal medicine at KSU and OSU.

Thankful for the scholarship, Steidley said, "It is an honor to be considered and chosen for the David A. Schoneweis Scholarship. I am thankful for the family of Dr Schoneweis and their generosity in providing this award that supports my career path in this industry."

Braden Steidley, an Oklahoma State University veterinary student, was the recipient of the David A. Schoneweis Scholarship.

AASV Foundation Legacy Fund named

The American Association of Swine Veterinarians Foundation is committed to fund research, scholarships, externships, tuition grants, and other programs and activities that benefit the profession of swine veterinary medicine. The foundation relies on the generous support of donors to fulfill this commitment.

During the recent AASV and AASV Foundation Luncheon held March 6, 2023 at the AASV's 54th Annual Meeting, AASV Foundation Chair Dr Ross Kiehne announced a new Legacy fund established in the name of Dr Max and Carol Rodibaugh. The contribution was made to honor Dr Rodibaugh's long-time involvement and commitment to the AASV Foundation and its mission.

AASV Foundation news continued on page 167

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*See labels and reference sheets for a complete list of efficacy claims, contact times, additional features and directions for use.

AASV Foundation news continued from page 165

Support the Foundation – It's the Wright thing to do!

Dr KT Wright passed away September 29, 2022. Friends, family, and colleagues remember his legacy as a staunch and active supporter of the AASV Foundation. KT was a tremendous believer in the mission of the foundation and the obligation of all AASV members to use the foundation as a mechanism to give back to the profession and support the next generation of swine veterinarians.

To raise awareness of the foundation's programs among the AASV membership, a pledge program in memory of KT was launched during the AASV Annual Meeting. KT was well known for his ability to convince others to support the foundation. In fact, he is still urging members to give back. Watch "The Pitch," featuring Drs KT Wright and Conrad Schmidt, created by Dr Sarah Probst Miller and AgCreate Solutions, at **aasv.org/foundation/thepitch**.

Consider supporting the AASV Foundation. It's the Wright thing to do!

Leman

Named for the late industry leader and former AASV president Dr Allen D. Leman, this giving program confers the title of Leman Fellow upon those who contribute $1000 or more to the foundation endowment.

Heritage

The Heritage Fellow program recognizes contributions of $5000 or more. In addition to monetary donations, other giving options such as life insurance policies, estate bequests, and retirement plan assets may be used.

Legacy

A donor, multiple donors, or a veterinary practice may establish and name a Legacy Fund with a gift of $50,000 or more. The fund may be named after the donor or another individual or group.

The donor designates which of three foundation mission categories the fund's proceeds will support: 1) research, 2) education, or 3) long-range issues.

If you are ready to lend your support and help build the endowment to ensure future support of the swine veterinary profession, visit **aasv.org/foundation** or contact the foundation by phone, 515-465-5255, or email, **foundation@aasv.org**.

Lively auction honors past leaders, raises funds for the future

Thanks to record-setting cash contributions – many made in memory of longtime foundation leader and donor Dr KT Wright – and spirited bidding in the live and silent auctions, the AASV Foundation's 2023 fundraiser achieved its second-highest total ever, and the most in the past ten years: $129,140! The funds raised by the auction support scholarships, research grants, travel stipends, externship grants, student debt relief, and more. The annual fundraiser was held in conjunction with the AASV Annual Meeting in Aurora, Colorado.

Electronic bidding for silent auction items opened on ClickBid in February and continued during the meeting until the evening of Monday, March 6. A leaderboard near the AASV registration desk kept attendees apprised of the current winning bidder for each item. In the end, the 62 donated items generated $13,890 in winning bids. As donors have done in previous years, they shipped their items directly to the winning bidders after the auction.

For the twelfth consecutive year, AASV member Dr Shamus Brown generously contributed his auction-calling skills to the live auction, which featured a hybrid electric bicycle, vacation opportunities, firearms, hunting and fishing trips, sporting events, diagnostic lab training, and more.

The five "tailgate paloozas" offered in the live auction proved popular again this year. The football tickets and tailgate parties hosted at schools across the country (Illinois, Iowa State, Kansas State, Minnesota, and North Carolina State) generated $20,000 in total proceeds. Bidding was fast and furious to secure the school of choice, and the top palooza bid of $5250 was made for the North Carolina State Wolfpack.

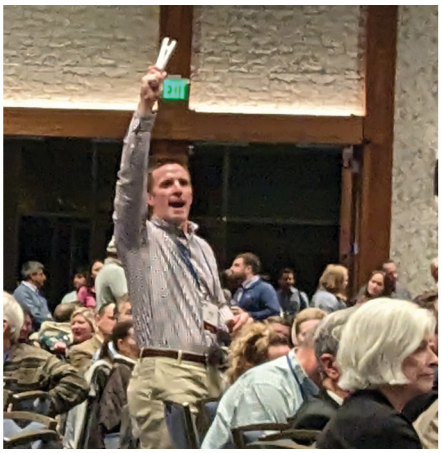
The live auction concluded with the sale of an original ink and watercolor painting by Carol Rodibaugh titled "Witness Love." The painting was created in memory of her husband, former AASV President Dr Max Rodibaugh, and featured an inspirational quote that held meaning for Max and his family as he battled the glioblastoma that ultimately claimed his life.

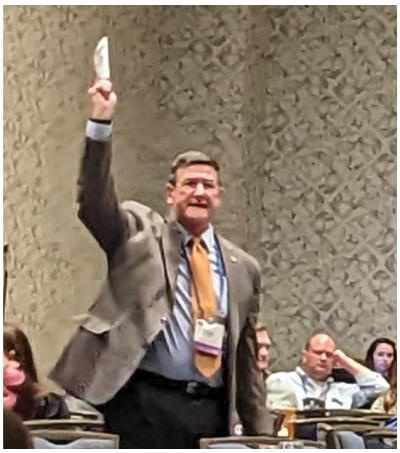
Bidding for the painting took off like a shot and bids flew rapid-fire across the room from one bidder to another and back again as several individuals and groups vied for the painting. When the winning bid was finally called at $10,400, the entire assembly rose in a standing ovation. It was only after the clapping subsided and everyone was seated again that the buyer was revealed to be Andrew Kleis of Insight Wealth Group.

The live auction items raised $58,450, slightly more than the $56,800 in generous monetary contributions, bringing the grand total (including $13,890 from the silent auction) to $129,140. For the complete list of donors and auction items, including the winning bids and bidders, see **aasv.org/foundation/2023/auctionlist.php**.

Andrew Kleis was the winning bidder of the watercolor painting by Carol Rodibaugh created in memory of her husband, Dr Max Rodibaugh.

Dr Brown was assisted in the auction by Wes Johnson, who served as auction clerk, and ring men Drs Jordan Graham, Levi Johnson, Andy Kryzer, Chase Stahl, John Van Blarcom, and John Waddell. The 2023 Auction Committee was led by cochairs Drs Chase Stahl, John Waddell, and Butch Baker.





And the winners are...

Thank you to ALL who made a contribution, donated an item, or placed a bid on items in the auction. Thanks to your generosity, the auction raised $129,140 for the AASV Foundation!

We are pleased to recognize the winning bidders who purchased one or more items at the auction:

Matt and Missy Ackerman
Thomas Adams
Matt Anderson
Randy Anderson
Paul Armbrecht
Angela Baysinger
Lisa Becton
Mike Brown
Brandi Burton
Cambridge Technologies
Carthage Veterinary Service
Cesar Corzo
Scanlon Daniels
Todd Distad
Doug Groth
Dwain Guggenbiller
Cara Haden
Mark Hammer
Perry Harms
Peggy Anne Hawkins
Jason Hengeveld
Jonathon Hoek
William Hollis
Megan Hood
Clayton Johnson
Kerry Keffaber
Todd Kelly
Ross Kiehne
Andrew Kleis
John Kolb
Scott Kramer
Chris Kuster
James Lehman
Merlin Lindemann
Jim Lowe
Tiffany Lyle
Rodger Main
Dale Mechler
Michelle Michalak
Elizabeth Noblett
Michael O'Neal
Megan Potter
Rebecca Robbins
Brian Roggow
Rachel Schulte
Sue Schulteis
Trevor Schwartz
Mike Senn
Chris Sievers
Linda Spindler
Matthew Turner
Dennis Villani
Tony Weldon
Warren Wilson
Nathan Winkelman
Pam Zaabel

The American Association of Swine Veterinarians is committed to providing members with resources to promote and enhance well-being - the state of being comfortable, healthy, and happy.

The nine dimensions

Well-being isn't a single measure of health.

It is composed of nine unique dimensions that touch upon every aspect of our lives: occupational, intellectual, spiritual, social, emotional, physical, financial, creative and environmental. These dimensions work together, and collaboratively contribute to our overall well-being.

Intellectual
Learning new things; participating in activities that foster critical thinking and expand your worldviews.

Environmental
Taking an active role in preserving, protecting, and improving the environment.

Social
Surrounding yourself with a network of support built on mutual trust, respect, and compassion.

Emotional
Being able to identify and manage your full range of emotions, and seeking help when necessary.

Physical
Taking care of your body (e.g., getting enough sleep, eating a well-balanced diet, exercising regularly).

Financial
Being aware of your personal finances and adhering to a budget that enables you to meet your financial goals.

Creative
Participating in diverse cultural and artistic experiences.

Occupational
Being engaged in work that gives you personal satisfaction, and aligns with your values, goals, and lifestyle.

Spiritual
Having a sense of inner harmony and balance.

AASV committees plan work for 2023

The AASV's issue- and membership-based committees met virtually during the 2023 winter months and in-person at the AASV Annual Meeting in Aurora, Colorado. The AASV Board of Directors establishes committees to address specific issues associated with swine veterinary medicine and provide recommendations for action to the AASV leadership. The AASV committees are a critical part of the leadership structure within AASV, and they also serve as a great way for members to participate in developing positions for the association, learn about important issues, network with other members, and develop their own leadership skills.

AASV members, leaders, and staff greatly appreciate the efforts of more than 300 volunteer members who serve on at least one committee.

The following are some highlights from the committee meetings:

- After careful review and consideration of the name and mission of the group, the **Porcine Reproductive and Respiratory Syndrome (PRRS) Task Force** is recommending changes to the Board. Members discussed the need for educational materials on the use and interpretation of whole genome sequencing.

- The **Boar Stud Biosecurity Committee** held a preconference seminar during the 2023 AASV Annual Meeting. The seminar drew 47 registered attendees.
- The **Committee on Transboundary and Emerging Diseases** plans to update the foreign animal disease portion of the AASV website.
- The **Collegiate Activities Committee** has been investigating swine medicine curriculum and resources in US and Canadian schools of veterinary medicine and intends to publish their findings. The committee discussed potential causes and solutions for a trending decline in the number of student abstract submissions for the AASV Annual Meeting.
- During the upcoming year, the **Communications Committee** plans to add videos to the AASV Heritage Video library featuring Drs Angela Baysinger, Lisa Tokach, and Conrad Schmidt.
- In collaboration with the Human Health, Safety, and Well-being Committee, the **Diversity, Equity, and Inclusion Committee** held a preconference seminar highlighting multiple topics in human and social health at the 2023 Annual Meeting. The committee plans to explore how other organizations are collecting and using member demographic information to improve their organizations.
- The **Early Career Committee** learned that 5 participants enrolled in the MentorVet pilot program. The committee will consider a second cohort after evaluating the 2023 pilot program. They heard updates about the USDA-National Institute of Food and Agriculture Veterinary Services Grant Program funded AASV Participant-Led Early-Career Swine Veterinarian Development Program. Capacity was met with 25 participants. The program will continue through July 2025. The committee discussed how to best collect information from veterinarians who have left swine practice to learn about factors influencing that decision.

"The AASV Board of Directors establishes committees to address specific issues associated with swine veterinary medicine and provide recommendations for action to the AASV leadership."

- For a second year, the **Human Health, Safety, and Well-being Committee** encouraged member interaction through an attendee scavenger hunt at the Annual Meeting. Those who completed a bingo received an AASV-logoed luggage tag and stocking hat. The committee is exploring opportunities to host an auditory and respiratory fitness testing clinic at the 2024 AASV Annual Meeting.
- The **Influenza Committee** is considering how herds may be classified by influenza status. They learned the USDA is hosting a virtual influenza workshop for veterinarians, scientists, and producers March 29-30, 2023.
- Discussions of the **Nutrition Committee** centered around providing AASV members with educational resources and learning opportunities in nutrition. They directed members toward the AASV Early Career Committee's podcast describing nutrition basics, available in the AASV Podcast Library at **aasv.org/podcast**.
- The **Operation Main Street (OMS) Committee** learned the National Pork Board made a strategic decision to fully sunset the program at the end of April 2023.

Advocacy in Action continued on page 173

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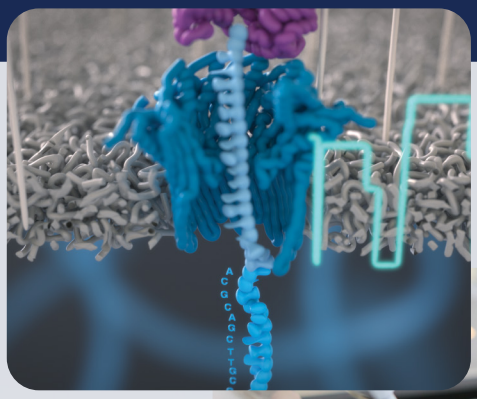

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Advocacy in Action continued from page 171

The Student Engagement Committee met at the 2023 Annual Meeting to discuss AASV initiatives to attract and foster development of future swine veterinarians.

- The **Pharmaceutical Issues Committee** reviewed the revisions to FDA's draft Guidance for Industry *#152 Evaluating the Safety of Antimicrobial New Animal Drugs with Regard to Their Microbiological Effects on Bacteria of Human Health Concern,* which contains the list of drugs classified by medical importance in Appendix A. The committee provided comments to submit to FDA. The committee continued discussing the need for a database listing withdrawal times for countries outside the United States. Members previewed an antimicrobial stewardship course for students and practitioners in development by the Swine Medicine Education Center.
- The **Pig Welfare Committee** recommended revisions to two AASV position statements regarding pig welfare during stop movement situations.
- The **Pork Safety Committee** is monitoring the US Department of Agriculture's Food Safety and Inspection Service actions toward the 2022 proposed performance standards for *Salmonella* in raw pork.
- The **Student Engagement Committee** recommends AASV continue supporting *The Swine Medicine Talks: An AASV series for Veterinary Students*. The committee discussed decreased student attendance and declining abstract submissions at the AASV Annual Meeting.

Almost all committees need additional members who are swine veterinary practitioners. If you are interested in learning more about the committee activities, visit the committee web pages on the AASV web site (**aasv.org/members/only/committee**). Contact the committee chair or the AASV office to join a committee.

Abbey Canon, DVM, MPH, DACVPM
Director of Public Health and Communications

The Early Career Committee had fun at the 2023 Annual Meeting discussing programs and resources that benefit AASV members in the first 10 years post veterinary graduation.


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UPCOMING MEETINGS

Animal Agriculture Alliance Stakeholders Summit

May 4 - 5, 2023 (Thu-Fri)
Arlington, Virginia

For more information:
Animal Agriculture Alliance
2101 Wilson Blvd, Suite 810B
Arlington, VA 22201
Web: **animalagalliance.org/initiatives/stakeholders-summit**

Safepork 2023

May 15 - 17, 2023 (Mon-Wed)
New Orleans, Louisiana

For more information:
Web: **regcytes.extension.iastate.edu/safepork**

2nd US Precision Livestock Farming Conference (USPLF 2023)

May 21-24, 2023 (Sun-Wed)
Knoxville, Tennessee
A hybrid event

For more information:
Web: **usplf2023.utk.edu**

World Pork Expo

June 7 - 9, 2023 (Wed-Fri)
Iowa State Fairgrounds
Des Moines, Iowa

For more information:
World Pork Expo
10676 Justin Drive
Urbandale, Iowa 50322
Web: **worldpork.org**

ISU James D. McKean Swine Conference

June 28, 2023 (Wed)
Scheman Building
Iowa State University
Ames, Iowa

For more information:
Web: **regcytes.extension.iastate.edu/swinedisease**

AVMA Convention

July 14 - 18, 2023 (Fri-Tue)
Denver, Colorado

For more information:
Web: **avma.org/events/avma-convention**

Allen D. Leman Swine Conference

September 16 - 19, 2023 (Sat-Tue)
Saint Paul, Minnesota

For more information:
Web: **lemanconference.umn.edu**

Pig Research Summit - THINK Piglet Health & Nutrition 2023

September 21 - 22, 2023 (Thu-Fri)
Crowne Plaza Copenhagen Towers
Copenhagen, Denmark

For more information:
Danish Agriculture & Food Council
Web: **tilmeld.dk/thinkpiglet2023/conference**

127th US Animal Health Association Annual Meeting

October 12 - 18, 2023 (Thu-Wed)
Gaylord National Resort and Convention Center
National Harbor, Maryland

For more information:
Web: **usaha.org/meetings**

American Association of Swine Veterinarians 55th Annual Meeting

February 24 - 27, 2024 (Sat-Tue)
Gaylord Opryland Resort and Convention Center
Nashville, Tennessee

For more information:
American Association of Swine Veterinarians
830 26th Street
Perry, Iowa 50220
Tel: 515-465-5255
Email: **aasv@aasv.org**
Web: **www.aasv.org/annmtg**

27th International Pig Veterinary Society Congress & 15th European Symposium of Porcine Health Management

June 4 - 7, 2024 (Tue-Fri)
Congress Centre Leipzig
Leipzig, Germany

For more information:
Web: **ipvs2024.com**

For additional information on upcoming meetings: aasv.org/meetings

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