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W. Christopher Scruton

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David Brown

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Ruth Cronje, and Jan Swanson;

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# The future of PRRS in North America: What will the next decade bring?

Scott Dee DVM MS PhD Dipl; ACVM

Swine Disease Eradication Center, university of Minnesota College of Veterinary Medicine

I appreciate the opportunity to present my vision of the future of porcine reproductive and respiratory syndrome (PRRS) in North America. My background consists of twelve years in a swine practice and now almost six years in academia doing applied research on the transmission and elimination of PRRSV. Therefore, I will be addressing this issue from the position of an applied scientist who spends a great deal of time in the field, as well as from the viewpoint of a newly elected member of the AASV executive board. I chose to run for the office of vice president because of the current situation regarding PRRS in North America and, along with the other members of the AASV executive committee, to take advantage of the current opportunity to impact the swine industry and the veterinary profession in a positive way. However, despite the obvious challenges of PRRSV, several important PRRS-related issues also exist within the AASV that need to be dealt with before we can move forward. Therefore, the objectives of this lecture will be to review PRRS from the perspective of the past and the present, discuss the internal and external PRRS-related challenges that currently confront the AASV, and speculate on what we need to do to successfully manage the disease in the future.

## The past

Since the early days of Mystery Swine Disease, PRRS has been a very divisive entity, splintering the profession, causing veterinarians to work against each other on the farm, in the research lab, and in the courtroom. Beginning with the intense competition present throughout the North American scientific community with regard to who would be the first to discover the etiology of PRRS and who would be first on the market with a vaccine, no one worked together. Commercial companies quickly teamed up with university researchers and information became a closely held secret. This proved to be a bad decision, as a team of Dutch scientists quickly solved the problem. Our industry recovered and produced a number of commercial vaccines; however, the incredible demand for a PRRSV vaccine resulted in release of these products before the industry and the veterinary profession was ready. Commercial products were “hyped” by the popular press, oversold by the manufacturers and initially viewed by practitioners as “golden bullets.” Comparisons between

PRRSV and PRV were frequently made, and efficacy akin to PRV vaccines was expected. Unfortunately, in contrast to PRV, little information regarding the biology of PRRSV, its genetic makeup, and the immune response generated by the virus following infection in the pig was known. For the purpose of quick licensure, the initial testing of commercial vaccines was conducted in growing pigs; however, in the field it was immediately applied to the breeding herd. The vaccine was applied incorrectly in the field, frequently without the use of proper diagnostics. This led to the vaccination of pigs after they were infected, resulting in the perception that the vaccine was not efficacious. Furthermore, MLV vaccines induced transient periods of mild fever and leucopenia, could be shed to non-vaccinates, and unbeknownst to many of us at the time, field virus could be moved pig-to-pig by needles during the process of PRRSV vaccination, resulting in the perception that the vaccine was unsafe.

Another important factor that contributed to the problem of control was that the biology of the agent was unlike any other that veterinarians had dealt with before. Practitioners were not familiar with managing single-stranded positive sense RNA viruses in pigs, particularly those that easily underwent genetic change, produced persistent infections, and induced a prolonged viremia in the host. Furthermore, the immune response that PRRSV elicited in the pig was very different than that seen in traditional pathogens, such as SIV or PRV. For the first time, veterinarians had to deal with concepts of intracellular pathogens and cell-mediated immunity, as well as to try to make judgments on the protective immunity and the carrier status of animals without the luxury of commercially available diagnostic tests that could accurately detect and define these parameters.

Finally, about the time that PRRSV was emerging, the North American swine industry was evolving at a rapid rate. Across the continent, producers were expanding and adapting a segregated, commingled model of production. This rapid increase in population size led to the development of PRRSV-infected and -susceptible subpopulations. The commingling of pigs from multiple sow herds, usually with a great degree of variability in PRRS-status within and across those herds, led to the mixing of infected and naïve offspring. Circulation of PRRSV from

pig to pig promoted genetic change, resulting in the development of new and sometimes highly virulent strains. To make matters worse, in conjunction with the supply and demand issues of rapid expansion came the philosophy of certain breeding stock suppliers that there are “two kinds of herds: those with PRRS and those that are going to get it.” This “head in the sand” attitude promoted the sale of infected seedstock from multiple sources without regard to PRRS status, again resulting in the mixing of animals with variable PRRSV-status along with multiple strains of the virus.

## **The present**

Today, little has changed. PRRSV is evolving genetically, escaping the pig’s immune system, and foiling our attempts to control it. We can eradicate the disease from farms, yet re-infection with a new virus is a frequent occurrence. Why are we not making progress? We have the brainpower, the technology, funding sources, etc. What is missing? In my opinion, the key issue is that a lack of teamwork exists within the industry at this time. Why is this so? Why can we not come to an agreement on how to handle this problem? Why are we not working together? I believe it is due to a lack of trust that exists between the members of our profession. Instead of working together to solve the problem, people are too busy worrying about who is working for which company, wondering how much they are getting paid, and assuming that conflicts of interest automatically bias statements made by others. An example of an issue that is currently promoting distrust and conflict amongst the membership is the highly controversial practice of patenting live organisms and technologies, particularly those that are involved with vaccine production. In the minds of some people, this affects the credibility of AASV members (including elected officials) that are employed by the companies and also for members who consult for said companies.

This problem needs immediate attention. The AASV executive committee has held a series of meetings and discussions with concerned members and representatives from our industrial to develop a strategy for dealing with perceived conflict and the issue of patents. These meetings have been very productive and a list of action items has been generated by the executive committee to further the process. We hope that by taking a proactive stand, leading the discussion and working with industry to develop solutions, the executive committee can provide accurate information for the membership, maximize transparency throughout the organization, and serve as an example for the future leadership of the profession.

## **The future**

So what will the next ten years bring? We are at a crossroads. In my opinion, the future of the North American swine industry and the swine veterinary profession will depend on how we choose to manage PRRS. I believe we have to eliminate this virus from the continent. Despite the opinion of some of our members, I believe there is no golden bullet vaccine tucked away in a freezer and, in fact, one may never be developed in our lifetime. Therefore, the veterinary profession must lead the way to large scale, sustainable eradication of this disease; however, it will take significant change in the industry and the veterinary profession to make this happen. In order to move forward, we must dispel perceptions of conflict, re-build a high level of trust amongst ourselves, and unify the swine veterinary profession and its respective industries. I foresee the need for a “4-point plan” to accomplish this goal. This plan consists of

- disclosure and transparency,
- team building,
- the development of new research models, and
- the fostering of a regional mentality to PRRS.

Let’s look at these points individually.

### **Disclosure and transparency**

My old partner and good friend Rod Johnson used to frequently quote Dale Carnegie, stating that “the basis of worry is operating without the facts.” In my opinion, one way to begin to re-build trust and manage conflict is to promote complete disclosure and transparency throughout the organization. Simply put, we need the facts. Following my election to the AASV executive committee, I was told by two friends that I should begin to disclose my consulting fees and sources of research funding in order for the membership to objectively assess my statements, actions, and publications. I think this is very wise advice, and I believe that disclosure should be practiced by all members of our organization, and it should extend beyond sources of consulting fees and research dollars, to include the disclosure of patent ownership since the patent issue is so central to today’s discussion. To learn about the existing PRRS patents, I suggest the membership check the home page of the US Patent and Trademark Office (USPTO) and conduct a PRRS search. The last time I checked, I found that 37 PRRSV patents existed, involving many AASV members and universities. The inventions covered by these patents ranged from patents on individual viral isolates, diagnostic tests, methods of growing and attenuating PRRSV for the purpose of vaccine production, host susceptibility factors, viral proteins, etc. I must confess that I was quite surprised by this information, and was very interested to learn that there is

more than one patent involving an invention for virus propagation and vaccine production. I suggest that interested members seek out the USPTO website, get the facts, and then make your own informed decision. I think this will be an important first step, and hopefully disclosure of this information will allow us to get the facts and to objectively assess the statements and actions of others, leading to the eventual re-building of a profession-wide trust and the building of teams.

### Team-building

As I mentioned before, I do not feel that our membership, particularly the practitioner segment, is working together. In contrast, members of academia *are* working together; one very good example of academic collaboration is the NC-229 team. This 57-member group, composed of researchers from 20 universities and representatives of numerous industrial partners, proposed a 4.4 million dollar project for work on basic and applied PRRS research that received funding from the USDA/NRI. Therefore—along with the work of Eric Neumann and the NPB—for the first time large sums of research dollars are available for both basic and applied PRRSV research. Now scientists from around the country are working side-by-side with industry in a team effort to solve the problem. A call for proposals has been issued, project review has occurred, and awards have been made to selected teams of investigators. An update of this process will be presented at the Leman Conference. This is very exciting, and I believe the output from the research community will be staggering over the next four years; however, with success comes a great deal of pressure, since these initiatives will be scrutinized very closely. If we engage in “turf wars,” we will fail, looking extremely foolish in the process, and will never get such an opportunity again.

At the same time, I challenge industry, specifically biological, pharmaceutical, and genetic companies, to unite and develop mutually beneficial ways to share technologies and profits. We don’t need any more lawsuits, especially over patents. Too much time has already been wasted in the courtroom and—as we all could have predicted—only the lawyers have profited. As of this writing, the AASV executive committee has been conducting discussions with industry partners in an effort to explore the flexibility of the patent issues and to maximize the availability of products. However, although we can suggest ideas for future collaboration, it seems unlikely that we will see the development of a vaccine that will provide a greater degree of protection against all strains of PRRSV than is provided by current vaccines.

### New research models

There are still a number of questions that remain unanswered, particularly in the areas of PRRSV genomics, immunology, eradication, and biosecurity. To answer these

questions correctly, I believe we need new models of research that incorporate controlled field settings and involve large populations of pigs in order to “bridge the gap” between university research settings and the real world. Our model at the university of Minnesota is our Swine Disease Eradication Center research farm. This is an actual farm, and thanks to the support of Genetiporc, hundreds of PRRSV-naïve pigs are available to conduct infectious disease research in a commercial setting using large populations of pigs. The lack of these models in the early 1990’s led to the formulation of a number of erroneous conclusions on how PRRSV would behave in the field. A classic example of this is the study from which the fact that the BI PRRSV vaccine would not shed was derived. Had this study been conducted in real world environments utilizing representative numbers of animals, it is unlikely that this erroneous conclusion would have been drawn. Consider not only the cost of lost sales of the product, but more importantly and much more damaging, the loss of industry trust that the company suffered based on these inaccurate results! We cannot afford to make these types of mistakes anymore, and I challenge other universities to adapt our research farm model. Much credit goes to our CVM administration and our chair of the IACUC, Dr. Tom Molitor for being open to the idea and assisting with its implementation. The bottom line is if you want this bad enough, you can make it work.

### Fostering a regional mentality to PRRS

Finally, it is time to challenge the producers in our industry and raise their awareness to the fact that, like the lone scientist or practitioner, an individual farmer cannot win the PRRS war on their own. Producers must collaborate and think/act as a group, a team, a “region”, and not as an individual farm or system, or even a company. This has not been the practice of the average pork producer over the years; however, the time is up for acting alone. Producers must cooperate to achieve the desired goal, just as universities and veterinary practices must do. In particular, US producers should take note that such collaborations are already underway in competing markets and the longer that we delay and do battle amongst each other, the faster we fall behind. Furthermore, new research from our group indicates that recently identified routes of regional spread of PRRSV—such as flies and transport—may be impossible to manage unless producers cooperate and organize regional projects.

### Conclusion: No time like the present!

While the challenge of developing coordinated projects to enhance large-scale control and eradication of PRRS is an enormous undertaking, in my opinion, the timing is perfect to make rapid progress toward answering necessary questions, conducting pilot projects, and sharing the information across the industry. There is no need for wast-

ing time keeping secrets. The NPB and the NC-229 group are prepared for developing information to answer questions and solve problems, followed by communication of that information via extensive outreach efforts. The current AASV executive committee is very experienced with the issues presented by PRRS and is well positioned to lead. However, all will fail without unity within our membership. I am desperately asking each and every one of you to put aside old differences and move on for the betterment of our profession and the industry. I suggest that immediately upon returning home from this meeting, you evaluate your client base for producer groups that have the potential to work together to develop regional projects. Secondly, I suggest that you hold meetings with neighboring practitioners and initiate conversations on how similar projects can be developed in surrounding areas. Support and assistance in these discussions and efforts can come from the AASV executive committee and district representatives, universities, and industrial partners.

To close, thank you for the opportunity to present my views. I hope they have been interesting and thought-provoking. I truly believe that widespread elimination of PRRSV is possible, but only if we work as a team. The bottom line is that we have to become people that solve problems, not create them. What role will you play?

