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HEALTH MANAGEMENT OF THE GROWING PIG

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Health management of the growing pig begins with the breeding herd, a historical perspective:

The period of change from the late 1960's to mid 90's was unprecedented in the US industry and in many other countries of the world. Most of the pigs produced in this country moved into confinement housing during the period. This was a great and continuous experiment with many ideas concerning genetics, health, pen sizes, ventilation, pig flows, weaning ages, herd sizes, hot nurseries, cold nurseries, wean-to-finish, marketing decisions, and a host of the other opportunities or variables associated with pig production. This experimentation goes on today. Pigs were even moved back outdoors in a failed attempt to reduce fixed cost while capturing the advantages of earlier weaning and other strategies of modern production practices. Two ideas that changed the industry more than all the others were the development of multi-loci (site) production and Artificial Insemination (AI) for pigs.

Multi-loci production held the promise of improved health for the offspring by removing the pigs at an early age from the breeding herd. This was based on much early weaning/segregation research which indicated that this would avoid exposure to the health cycles endemic in the breeding herd and continuous flow units. Medicated early weaning and later Isowean techniques were developed to capture this value. We began with all-in, all-out production, then two and three site, and finally to the multi-loci where each site held only a single weeks age. This strategy has proved to be highly efficient, capturing economies of scale with building, feed, labor, transport, and other fixed and variable costs. Perhaps the most disappointing aspect of the multi-loci production strategy has been the difficulties associated with health management. Many factors have been blamed for this failure but none more than PRRS virus, which ascended on the industry during the latter half of the 1980's. To date multi-loci has been attributed to multi health status of growing pigs within systems and the industry. Many have come to realize that the health status of the breeding herd, it's location and biosecurity, are the paramount features of sustainable growing pig health management.

Pig AI has also held much promise as a technology granting opportunity for improved facility design, worker efficiency, speed of genetic utilization/impact, and

reduced health risk. In most cases the promise of AI has delivered but again PRRS and potentially other viral diseases have frequently dealt this technology a fatal blow. The development of the company and the commercial AI stud has brought with it the potential for mass dissemination of disease through thousands of sows in any given day. Low risk but gigantic impact is the reality of the large stud. Many management strategies have developed to alleviate this potential risk. Most notable have been vaccination strategies, routine PCR and other diagnostic tests, prolonged quarantine periods, stud isolation, stringent biosecurity, and establishment of high health studs free of known economically important semen disseminated diseases.

Health management of the growing pig; the challenge of the 21'st century?

Many of the diseases plaguing the last century appear to be behind us. Most notable of these are Progressive Atrophic Rhinitis, Eperythrozoonosis, mange, and Swine Dysentery. These have virtually disappeared - not by modern vaccine but by changing rearing management strategies and utilizing improved diagnostic capabilities. Some vaccines have been effective at control but none have been total eliminators of disease on their own. Control strategies include vaccine but seldom are these vaccines efficacious enough to actually eradicate or in some cases even control disease. This can only be accomplished through more advanced strategies and can only be sustained by establishment of high health status breeding herds, biosecurity, and minimized mixing of offspring between herds of different health status. We have observed numerous new viruses and changing bacteria in the past 15-20 years as the pathogens have adjusted to the new swine industry. New pathogens, most notably PRRS, have appeared from places unknown while an 80-year-old flu virus suddenly decided to recombine with bird and human strains creating new respiratory and vaccine challenges. During the past several years we have observed another new health challenge called PRDC or Porcine Respiratory Disease Complex. This appears to be a complex of agents that we are familiar with but old strategies of control have been particularly ineffective. PRRS is certainly responsible for a part of this but I suspect that there may be a new agent or agents involved although none have been clearly identified.

All this leads us to the question of what should we do with our designated system of pig flow, design of our buildings, and the health status inherent to our production process? This is the challenge we face – what is best for our production system? How do we avoid health crisis, reduce the chronic effects of disease, and maximize productivity. Unfortunately there are no "magic bullets" – no universal vaccine or antibiotic – no single strategy or program. The following is a philosophy more than a recipe to success. Sometimes the problem must be viewed from both high above and close up to find the best choices. Hopefully some of the following ideas will help in the management of both day to day problems and long term health solutions. The need for quality and routine veterinary services is essential for strategic and timely intervention and disease therapy.

The Diseases of Importance - Nursery to Finish:

The following list is not all-inclusive but represents what appears to be the more important health challenges in many systems today.

Bacteria:

1. Mycoplasma hyopneumoniae (Mycoplasma):

   Together with PRRS this old agent has taken on new significance in modern pig production. The corner stone of Porcine Respiratory Disease Complex (PRDC), mycoplasma has become one of the more economically important diseases of the US industry over the past 20 years. There has been much debate concerning the change in apparent pathogenicity. Has the bacteria evolved or is our failure to control the result of facility design, large populations of susceptible pigs, improper or ill timed vaccine use, concurrent diseases (PRRS), duration of vaccine immunity, and the list goes on. I know of herds that have remained free of mycoplasma clinical illness for nearly 20 years. The 24K question may be is it practical to develop systems free of the disease. Many of us think that elimination of PRRS may be all that it takes to manage the disease. We also believe that it may be possible to eliminate Mycoplasma concurrently with PRRS. This has not been applied to large herds or systems.

2. 2. E.coli scours and Edema Disease:

   Two varieties of E.coli that seem to be specific to the nursery cause these diseases. Both diseases are due to the attachment to the gut wall by E.coli bacteria and the toxins subsequently produced. Certain lines of pigs are genetically resistant since they lack receptor sites for the bacteria to attach and do its damage. Antibiotics as both preventative and treatment have limited success. The bacteria are often resistant and both susceptibility and timing are essential factors in success. Vaccine has not been especially effective but some autogenous modified live oral inoculations are beneficial in controlling Edema Disease. All-in, all-out and sanitation are essential for good control. Organic acids in the water and zinc oxide in the feed appear to diminish the severity of these diseases. Rooms or sites should be hot water washed utilizing a detergent, a rinse, and disinfectant effective for E.coli.

3. Actinobacillus pleuropneumonia (App) and Actinobacillus suis (A.suis):

   Both agents can cause serious respiratory disease in the nursery and finisher. App is a renowned killer of growing pigs. Along with PRRS and other agents such as Mycoplasma, it can cause devastating losses in performance. Vaccines have not been especially effective at eliminating the severity of App and A.suis has no licensed product available. A.suis is present in most herds and largely economically unimportant. Sometimes it can cause disease outbreaks and occasional death. While App is resistant to vaccine and antibiotic therapies, A.suis is almost always responsive to antibiotic treatment. Recently a new antibiotic has been approved for control of App. Pulmotil provides effective control but the cost of drug and vaccine programs are prohibitive in many market years. Both diseases are stress related and often triggered by curtain failure, mixing, chilling, feed changes etc. It is best to raise pigs from breeding herds free of App. It is a disease not easily spread other than pig to pig exposure. A.suis has become a more diagnosed disease in recent years but its overall economic importance is doubtful. It has been demonstrated that App can be eliminated in small herds through management strategies but large herds or systems have not been able to successfully eliminate the disease to date without depopulation.

4. Streptococcus suis:

This disease agent was once a devastating disease in Western Europe but never appeared to fully develop as a pathogen in most systems in the United States until PRRS arrived. There are numerous genetic variants all with differing degrees of severity. Genetic susceptibility is not known to exist but the association with PRRS virus is well documented. Even mild strains of PRRS including live vaccine appear to increase nursery and finisher death losses. Strep. suis vaccines have been notoriously ineffective in the past but new vaccinology approaches may hold some hope for the future. Piglets are colonized by the bacteria early in life - likely during or shortly after farrowing. MEW and Isowean strategies have not eliminated this disease from pigs. To my knowledge no breeding stock companies have supplies of Strep. suis free pigs. Control measures include freedom from PRRS (best strategy), proper diagnosis/treatment, strict AIAO by age groups, strategic medication, proper nursery cleaning, proper acclimatization of breeding gilts/boars, and vaccine use.

5. 5. Haemophilus Parasuis (Hps):

The agent often mimics Strep. suis in clinical signs with meningitis and joint infections as the major observations. Like Strep. suis the bacteria can cause pneumonia and is more often associated with mild respiratory signs shortly after mixing with pigs of different ages or breeding herd. Hps has long been associated with high health status pigs but more likely related to earlier weaning and mixing pigs of different ages or breeding herd source (multi loci). Like so many other disease agents, PRRS appears to potentate the effects of the bacteria. This agent has been in the industry for many years (Glasser's Disease) and was often associated with respiratory breaks long before PRRS.

Control of the agent is difficult. Vaccines often fail unless they contain the farm specific strain(s) that is responsible. Strict AIAO, strategic medication, single source nursery flow, proper acclimatization/age of breeding gilts, vaccine strategy, proper nursery environment, and rapid diagnosis/treatment of individuals/groups.

6. 6. Salmonellosis (Salmonella sp.)

Salmonella is a bacterial agent that is widespread in the swine industry as well as other livestock and poultry production systems. The group can cause both clinical disease in swine and pose a food safety risk for consumers. The bacterium has received much press in recent years and is the center of the debate for elimination of feed antibiotic growth promoters and feed grade therapeutic antibiotic use in general. There are several bacteria in this group that can affect pig growth and health. Both nursery and grow-finish age pigs are subject to infections. The bacteria can cause rapid death, chronic wasting, scours, poor weigh gains, and public health concerns.

Control measures include proper diagnosis/rapid action, strategic drug usage, modified live vaccines, strict AIAO by age group, proper gilt/boar acclimatization, cleanup and drying of buildings between groups, feed type/ingredient verification, serological monitoring, single breeding herd source, and transport sanitation.

Modified live vaccines have been beneficial for control and prevention in recent years.

7. Erysipelas:

No paper on swine diseases is complete without mention of Erysipelas. This bacteria is present in most swine herds but generally undiagnosed. Clinical signs include acute death, severe systemic illness, diamond skin disease, heart disease, and arthritis. Humans can be infected through cuts while performing Postmortem procedures.

Natural control has resulted from modern AIAO and Multi loci production. Vaccine remains the major control method in the industry and although failures occur they are uncommon.

8. 8. Proliferative Enteropathy (Ileitis)

Ileitis is a common disease of modern production systems. It occurs in two forms -chronic scours and acute hemorrhagic diarrhea often leading to death. The hemorrhagic form of the disease is usually associated with farm stockings or mixing of breeding age pigs or following transport stress. Antibiotic preventative therapy is generally successful in both forms of the disease. Antibiotic intervention is also successful if intervention is quickly implemented in growing pigs and an accurate diagnosis made, but failures occur. There are no licensed vaccines at this time but there is some hope for vaccines in the near future. Control measures include AIAO, preventative feed medication, sanitation/disinfection, stable low stress environment, and managed exposure.

Viruses:

1. 1. Porcine Reproductive and Respiratory Syndrome Virus (PRRS):

There is little doubt that PRRS virus has become the most costly disease of the US pig industry. The virus first appeared in the last half of the 1980's spreading quickly through much of the industry by 2000. There have been numerous estimates of what cost this disease levies on our industry but my own estimate ranges from $4.00 to $15.00 per pig produced in many units or multi-unit systems. The cost to integrators may at the high end of this spectrum or even higher due to the further loss of meat value as a result of growing pig mortality. As veterinarians we have found this disease to be particularly difficult to manage. The biologics industry has yet to develop an efficacious vaccine against all genetic types of PRRS leaving many herds with little if any cross protection. This along with the ability of PRRS field strains to change by means of both mutation and recombination has made management of the virus very difficult in many herds and systems. Elimination success has grown the past three years with the method of area spread the last hurdle to understanding the key risk factors associated with herd breakdowns. The bottom line on this disease is we have not found effective ways to live with it but are very close to developing effective methods of permanent elimination. Developing continuous elimination strategies through control of pig flow will likely find a lasting place in the industry unless effective vaccines are developed.

2. 2. Pseudorabies Virus (PRV):

The most significant characteristic of this Herpes virus is its ability to remain hidden in the pig after recovery from the disease. Vaccine is a very effective control method but does not eliminate the carrier state. The virus also attacks other species causing fatal infections. It was first reported in the US during an

outbreak of “Mad Itch” in cattle in 1814. It has been the focus of a national eradication program for more than a decade and the end is in sight. Key factors in the success of this program have been the development of effective vaccines, differential tests, control of pig movement, slaughter monitoring, test and removal and total depopulation plans with financial assistance to producers. Other than regulatory and elimination issues the virus no longer causes significant losses in our industry but we must not loose sight of the importance of total and final elimination from the US.

3. 3. Transmissible Gastroenteritis Virus (TGE):
TGE has been a problem in the US swine industry since the mid 1940’s. Migratory flocks of starlings and other birds were known to spread the disease to the outdoor farms of the day. The disease continued to cause losses long after we moved into confinement housing. Lack of bird proofing and trucks continued the annual spread. It is interesting that in Europe the virus has all but disappeared after the emergence of Porcine Respiratory Corona Virus (PRCV) which is a closely related but non-pathogenic Corona Virus of swine. PRCV is also present in the US but has not completely eliminated TGE’s importance. TGE is a biosecurity disease that can be easily prevented and eliminated in most farms and systems.

4. Porcine Parvovirus (PPV):
Once upon a time this virus was credited with most of our reproductive failures. PRRS virus has changed the status of PPV to a distant number two. Even so PPV losses continue in the industry. Modern production practices of AIAO especially in age group sites may produce many unexposed breeding stock replacements. Natural exposure prior to breeding and vaccination are the only successful control methods. It is my experience that both are required especially natural exposure. The use of cull sows for acclimatization before breeding may not be the best method of exposure. Feedback utilizing farrowing house manure, placenta, and especially mummies is essential for control. As an industry we have discontinued feedback as a natural exposure method due to the fear of spreading and enhancing the damage of PRRS. Vaccine failures are common due to persistent maternal antibodies, vaccine efficacy, or improper administration. Statistical sampling of replacement gilts should be a routine diagnostic for all farms and systems to avoid losses. Once natural exposure occurs followed by booster immunity from vaccines, a lasting and predictable protection develops.

Final Analysis:

There are numerous other bacterial and viral diseases that may cause losses in the US industry. The ones listed are what I consider most important today. There is little doubt that PRRS is the most costly of these. Many production losses also exist which are not directly associated with a disease agent. Examples are gastric ulcers, premature culling and mortality of breeding females, lameness, hemorrhagic bowel syndrome, and piglet crushing. The greatest risk for the US industry other than market economics is the opportunity for entry of exotic viruses such as foot-and-mouth virus, African Swine Fever,

or Classical Swine Fever (Hog Cholera). As an industry we must remain vigilant and responsive to this risk.

The future control of swine diseases in growing pigs is not likely to find success in older strategies of individual vaccination, individual drug treatment, mass medications in the feed or water, or strategic monitoring for intervention (serial and snap shot serology). Three methods of disease control that center on the breeding herd will find success. These are stocking free of economically significant disease, elimination of disease, and health stabilization. Elimination of PRRS and perhaps Mycoplasma will be the subject of much discussion over the next few years. Methods of accomplishing elimination have been advanced and appear to be reasonably successful where discipline and control exist. Those that are early adopters of these strategies will have a clear economic advantage over others in the industry if long term freedom or stabilization can be maintained.

In swine dense areas this may be an unrealizable challenge. Stabilization may be an economically more feasible opportunity for most of the industry today. This centers on gilt introduction and system biosecurity. Pig flow segregation by parity (P1 pigs from the rest), and gilt and sow only farms may also be economically more viable strategies than systems of today.

It is apparent that methods of acclimatization of replacement stock have not been successful in many systems. The need for better methods of disease exposure and recovery, mass vaccination, gilt management for disease elimination/stabilization, disease discover technology (especially in studs), strategic discovery/intervention therapies for growing pigs, specific disease resistant pigs, easy to deliver efficacious vaccines and so forth are all needed.

Today the best we can do on a day to day basis is stick to the basics of animal husbandry where pigs are kept in comfortable sanitary environments free of stress and provided adequate quality nutrition. Vaccinations and strategies that surround their use should be based on sound diagnostics and adjusted through continuous monitoring. Lengthy and proper acclimatization of healthy breeding stock is essential for breeding herd stabilization. PRRS elimination will decrease the severity of many other diseases. The boar stud must be thoroughly protected from PRRS introduction and careful monitoring is essential. “Real time” strategies must be developed for individual units and systems to allow rapid and effective responses.