MANAGING DISEASE CHALLENGES IN THE WEANER BARN

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ABSTRACT

A systematic approach is required in order to minimize the effects of disease on production and to minimize the frustration level of the operator. An understanding of the challenge organisms assists greatly in disease management. A well rounded disease intervention plan includes both a review of best management practices in addition to the use of vaccines and other therapeutics.

DISEASE CHALLENGES

Each disease must be identified through an ongoing diagnostic process. The samples can be procured during routine farm visits but more often than not a special trip to the nursery is required to investigate each new disease presentation. Once the diseases are identified they can be prioritized based on their costs to the production system. Disease management plans are then developed both by reviewing the literature and seeking out experts for advice.

"Know the Enemy". The cause of the disease should be explained to staff and owners so that they can have a better understanding of the agent. The more the staff understand the agents strong and weak points the better able they will be to battle the diseases. The use of humour or personification at this stage will help to tell a story or paint a picture about the disease so that the staff can relate to and remember the enemies' weak spots.

The types of organisms within the disease family can also be explained. It is important for the staff to know that not all disease organisms are created equally with respect to the ability to cause disease. From time to time staff will visit with other nursery operators who have the same type of organism but have a more or less virulent strain so that their clinical experience is much different.

The epidemiology of the disease should be explained detailing the age groups most likely to be affected, where the organism lives in the environment, how it is transmitted from pig to pig and what kills it. Is the disease likely to occur only sporadically? Are sites, barns and rooms that are managed with either all in/all out pig flow or continuous flow likely to be affected? If this is a new and emerging disease in the industry then a bit of background to explain why this new disease is causing a problem may help the operator to better understand how to fight the new disease.

" Every solution creates a new set of problems ". This is very true in the pig business. The use of isowean technology coupled with earlier weaning ages has coincided with a greater incidence of the "mucosal diseases" including Strep suis, Haemophilus parasuis and Actinobacillus suis. These "Little Bugs" have filled the void left when Atrophic Rhinitis and Swine Dysentery were eliminated.

Diagnosis of the disease is extremely important for the operator to understand. The nursery operator needs to be able to report clinical signs that are apparent in the nursery as this may sometimes be the best guide for initial treatment. The degree of periarticular edema coupled with the incidence of productive cough in the nursery may be the best way to differentiate a flair up of Glasser's vs. Strep suis. The preliminary diagnosis is most often based on a review of herd history and clinical signs. The gross post mortem findings then help to confirm the suspicions. Having the nursery operator able to use some key criteria will speed up the diagnosis. In the case of Ecoli the classic blue nose, toes and belly with the sunken eyed appearance of dehydration will give some good immediate diagnostic direction. Serology, histological lesions, immunohistochemistry, PCR, culture, and further serotyping will firm up the diagnosis. Don't perform testing unless you know how you will interpret results.

It is important to let the operator know if the disease agent can express itself in more than one way clinically. The expression of A.suis as "Erysipelas like diamond spots" or sudden death fibrinous pleuropneumonia like App or as a simple septicaemia makes it a bit of a chameleon in the nursery. Similarly the sudden onset "puffing pig "may not be recognized as a Strep suis pneumonitis.

In putting together a disease control strategy it is important to ascertain which are the primary diseases of the nursery and which are the secondary diseases. Whenever possible the main thrust has to be to control the primary diseases so that the secondary diseases will hopefully take care of themselves. This is sometimes easier said than done. If the primary disease can not be controlled then the next best thing is to control the secondary diseases. An example of this would be the importance of PRRS stability in reducing the incidence of the " Suis-cide" diseases such as Strep suis and Glasser's.

" Remember to do no harm!" When changing a disease control strategy in a nursery with multiple diseases you must examine the proposed changes and try to anticipate if those changes will allow another disease to express itself because you have altered its' control program.

DISEASE CONTROL CHECKLIST

This disease control checklist is presented as a review of the thought process that should be involved when managing disease in the nursery.

Feed

Energy. Maintain a proper energy to protein balance and use highly digestible sources of energy in the diet for the newly weaned piglets.

Protein. The crude protein and amino acid levels must be adjusted for the age and weight of the pig as well as the average daily feed intake. The inclusion of soybean meal should be limited in the diets for the newly weaned piglets.

Minerals. Review deleterious effects of excesses or deficiencies for the problems at hand.

Vitamins. Ensure adequate daily intake to maintain growth and adequate immune function.

Fibre. This is important in the management of diseases such as post-weaning colibacillosis. Fibre may also be helpful in controlling gastric ulcers that are secondary to empty stomachs associated with disease. Often you can cure the pig with antibiotics only to lose them due to a secondary gastric ulcer.

Acidifiers. Acidifiers can be added to feed to help reduce the stomach and intestinal pH. Organic acidifiers such as citric acid, sorbic acid, fumaric acid, lactic acid and formic acid can be added to the feed. Acid salts such as calcium formate and sodium formate can be used. Inorganic acids such as phosphoric acid, hydrochloric acid and sulphuric acid can be added to the feed. It is becoming very clear that management of the acidity of feed is very useful in terms of controlling diseases of the digestive system such as Salmonella. This type of disease control is exciting because we are finding that disease management techniques such as acidification can be used as an alternate strategy to antimicrobials.

Feed Manufacturing. Heat treatment of feed such as pelleting, expansion or extrusion has been suggested to have an impact on several digestive diseases such as gastric ulcers, Salmonella, and Brachyspira pilisicoli. It has been suggested that in an increasing order of importance pelleting, expansion and extrusion will increase the relative risk of enterobacterial proliferation. Reduced particle size will improve feed efficiency but will increase the risk of gastric ulcer.

Feed Management. It is essential that the newly weaned pig begin consuming feed as soon as possible after weaning. Early detection of pigs that are not eating coupled with " gruel feeding" will help minimise losses. Feeders must be managed such that molds and mildew that decrease palatability are minimized.

Feed Additives. Prebiotics such as mannin oligosaccharide and probiotics such as lactobacillus can be considered. Most of the information that is available is based on in vitro experimentation. There are a number of probiotics that have now been registered as growth promoters and there is supportive scientific information to back these claims. Other feed additives that control ammonia should be considered when respiratory disease problems are predominant.

Water

Quantity. Well capacity, water flow rates, pressure, drinker number, type and placement should be assessed. Water flow metres can be used to monitor water consumption and determine whether pigs are consuming an adequate amount of water especially within the first few weeks post entry. A water flow rate at the drinker of 0.5 litres per minute at 10 to 20 pounds pressure is recommended for the nursery. An experienced electrician can check for "stray voltage" if no other cause of reduced water consumption can be found.

Quality. Factors such as mineral content, hardness, total dissolved solids, and pH should be considered. The pH of farm water should normally be between 6.5 and 7.5. The pH should be checked and adjusted on a routine basis to within a range of 5.5 to 6.0 especially during the early post weaning period.

Sanitation. Water sources and delivery systems may become contaminated with disease causing organisms such as E.coli. Total coliforms and fecal coliforms should be assessed at least yearly or when problems arise. Water sanitation can be maintained using chlorine or hydrogen peroxide added to the drinking water. The use of chlorine should be monitored by testing for levels of free chlorine at the level of the water nipple. Hydrogen peroxide does not mix well with some medications and may plug the water lines.

Environment

Ventilation Rate. Air exchange rates are important to disease control through removal of contaminants. Increased ventilation rates may increase air speed, which will in turn reduce the effective environmental temperature potentially causing chilling. Increased relative humidity may increase the survival time of bacteria outside of the pig in the room environment. Minimum ventilation rates are established and maintained by measuring the relative humidity (RH) and then adjusting the minimum ventilation rate in order to maintain 65 % RH in the late fall, winter and early spring. Control of RH in the summer is not practical and the room RH is going to be very close to RH outside the barn. In the summer the rapid air exchange rates for temperature control will be most important for pathogen dilution.

Temperature. Chilling due to wide daily temperature fluctuation, as well as rapid small temperature fluctuations contribute significantly to the increased prevalence of disease by increasing stress levels in affected pigs. Chilling has been observed to reduce the peristaltic activity in the gut of the neonatal pig increasing the accumulation of E.coli and toxins in the intestine. Chilling may also be caused by drafts, damp floors, damp pigs or insufficient floor, wall and ceiling insulation. Significant temperature reduction can occur in drafty barns due to drift of air through the barn caused by outside wind pressure. Air drift accounts for much more barn cooling than poor insulation especially in older facilities. Ventilation and temperature controllers should be adjusted so as to ensure that they are set to control temperature fluctuation and daily variability. Inlet placement and control, as well as thermostat cleanliness, sensitivity and placement are important. Targets should be established for both temperature and relative humidity by stage of production and then closely monitored.

Manure Management. The incidence of postweaning scour in general is greater in pigs housed on solid floors with no bedding and in pens where the flooring does not stay clean. This relationship is presumably due to an increase in the pathogen load. Manure levels that approach the slats will allow heavy manure gases to enter the pig's resting area and may have a deleterious effect on feed intake.

Sanitation

" The solution to pollution is dilution". Although most diseases can be seen in brand new facilities that have never previously housed pigs it is still important to ensure that facilities are properly sanitised between crops, so as to reduce the pathogen challenge level on an ongoing basis.

Washing. Improperly cleaned pens that are left contaminated are a source of pathogens in the next group of newly weaned pigs. Rooms should be washed thoroughly with hot water, using a high-pressure sprayer in order to remove all visible signs of organic matter from floors, walls, feeders and drinkers. The use of a detergent while washing will help to remove any organic film that will interfere with proper disinfection. Water should be removed from feeders after washing. Washing should be done as early in the downtime period as possible so as to allow the maximum clean and dry period. This will greatly reduce the population of the pathogens.

Disinfection. A product designed to kill bacteria and viruses on barn surfaces should be used at the appropriate concentration. Equipment used to apply disinfectant must be properly calibrated to deliver an adequate amount of disinfectant without excessive waste. Water lines can also be sanitised between batches of pigs. Special attention should be given to water drinkers or bowls as well as stock tanks used in water medication programs as some pathogens may proliferate in these areas. Thermal fogging of disinfectants can be used to disperse the disinfectant widely throughout the room.

Drying. Leaving a room to completely dry is one of the most effective ways of killing bacteria and viruses.

Concurrent Disease

It is possible that some other concurrent disease may worsen the incidence and severity of the primary disease that you are trying to control.

Internal Parasites. Ensure that the weaners are not exposed to a significant internal parasite burden. An effective breeding herd parasite control program should be in place.

External Parasites. Mange and lice can reduce the effectiveness of the pig's immune system. Sows should be routinely treated for external parasites prior to farrowing. Mange and lice eradication programs should be investigated. These are quite well understood and work in a high percentage of cases when the protocols are diligently followed.

Sort Pen/Hospital Pen/Recovery Pen

"Overstock and Sort". "The sick are the greatest challenge to the healthy!" This refers to the practice of placing 5% to 15% more pigs in the pens as pigs are placed in the nursery. Because only the target numbers for the nursery are placed in total there are a number of empty pens that are left at the beginning of the nursery stage. As non-competitive pigs or sick pigs arise, they are removed from the overstocked pens and placed into a sort pen or hospital/recovery pen. This procedure allows for a non-competitive environment for the least competitive pigs. This practice also allows for removing or streaming the sick pigs from the group. This subsequently reduces the disease challenge to the "at risk" pigs in the pen. The 5% to 15% is adjusted based on genetic variability of growth and expected incidence of disease. If variabilty or disease is less than anticipated then the pens will still need to be thinned down before the end of the batch in order to allow for the growth of the pigs. This strategy is much preferred over sorting between pens where pigs are mixed throughout the barn to " even them up" by size or health.

Stallouts. Thin and dehydrated pigs that are slowly recovering from disease should be collected as a group to enable provision of extra nursing care. Mash feeds, wet feeds or floor feeding are all techniques that can encourage the stallout pig to begin eating again.

Medication

Injectable. Injectable medications should be selected based on the antibiogram of the bacterial isolates. Entire pens including affected and "at risk" pigs may be treated with injectable medication in order to stem the spread of disease.

Water. An appropriate water soluble antimicrobial can be selected based on the antibiogram of the bacterial isolates involved. Electrolyte dispensers for individual pens are available so that more potent electrolyte solutions can be administered to affected pigs. The ability of electrolyte preparations to replace electrolyte losses as well as correct metabolic acidosis will vary from product to product.

Feed. Medications can be selected based on the sensitivity pattern of the isolates. More often than not the medications available in feed will not cover all of the diseases present. In some cases the medication is pulsed at certain stages. As the pig ages and progresses to the next phase of feed another medication can be used that may be more appropriate for the disease that occurs at that stage of production. It is important to recognise that continuous medication in the nursery for control of diseases such as Strep suis may only defer the clinical signs to the grower barn and may inhibit circulation and exposure of organisms to the pig. If exposure to mucosal diseases is to occur it is preferable that it occur while the piglet is still under the influence of maternal protection.

Vaccination

Pre-farrowing vaccines using either commercial or autogenous vaccines can effectively control diseases such as Swine influenza , Haemophilus parasuis and Strep suis that occur in

the nursery. The boosted maternal immunity passively protects the piglets during the nursery period where they are gradually acclimatized to the diseases present in the nursery and build their own active protection. This technique is more cost effective than most medication protocols and is often more effective. It can be more cost-effective than the active immunization of piglets. This technique is especially useful where pigs are mixed in the nursery from multiple sources of variable disease status. These pre-farrowing vaccines programs are very compatible with quality assurance programs.
Oral vaccines using field strains of F4 or F18 positive but non toxin producing E.coli have been reported to be successful in the USA. These E.coli are propagated and fed to pigs via the water on entry to the nursery in order to stimulate intestinal immunity prior to the onset of disease.

Biosecurity

Biosecurity should be reviewed with special attention to breeding stock additions. It is not sufficient to switch sources saying that the health matches based on the presence or absence of a certain type of disease organism. Pigs can only juggle so many diseases at the same time. The last thing you want to do is add a few more isolates of the same type of disease. Certainly it will be important to avoid tracking in disease organisms that can be tough to eliminate from the nursery site. F 18, F4 (K88) E.coli and Salmonella may be almost impossible to remove from a building once the site is exposed.

Genetics

It is clear that there are some genotypes of pigs that do not possess the F4 receptor site on their intestinal epithelial cells and, as such, are these lines of pigs are resistant to E.coli where the F4 attachment is a required virulence factor for the E.coli. Similarly other genotypes have a more responsive immune system and can turn on their immunity to fight disease and just as importantly turn it back off again once they are done fighting the disease at hand. Hybrid vigour is also important in developing disease resistance. On average, crossbred weaners will be less susceptible to respiratory disease than purebred Yorkshire weaners.

Other Management Solutions

Nursery Management Guidelines. The Nursery Management Guideline is an information package that is usually printed on one page. This page is then posted outside the nursery room attached to the wall and usually sealed in a plastic liner. The common information found in this package relates to the typical management practices for the nursery. Details include room identification, water flow rate, starting age and weight of pigs, ending age and weight of pigs, starting and ending room temperatures, the current phase feeding program including medications, instructions for feeder management, water treatments, stocking density, manure management, fly control, rodent control and fan and heater sequencing. The sheets are readily available for access by staff. Once these guidelines are written, there is a clear plan and there is no further argument with respect to the current plan. The guidelines also act as an excellent training tool for new staff and the new employees can review these management guidelines prior to entering the room. Within a short period of time the staff are able to assimilate the

information in these guidelines. The plan can always be challenged and improved with mutual agreement.

Organizational Memory. There is only one thing worse than making a mistake and that is making the same mistake again. The development of farm-specific standard operating procedures have allowed for better communication of production management practices to all staff members involved in the process. A periodic review of standard operating procedures raises a number of questions and either re-confirms that current operating procedures are well worth continuing or need to be re-evaluated. When operations become larger and more complicated there is more reliance on written documentation to serve as long term memory. Insanity can be defined as "repeating the same behaviour over and over and expecting a different outcome"

Environmental Testing Equipment. The use of simple environmental testing equipment such as humidity monitors, data loggers, water pH, manure pH, air speed and gas testers have allowed for more detailed understanding of the nursery barn environment. This has greatly helped with disease control as well as the health and attitude of farm staff. This equipment has allowed for more objective ways of measuring environmental quality and can be directly related to the room management guidelines.

Depopulation / Repopulation. When health management protocols are ineffective in controlling the costs of diseases in the nursery then depopulation and repopulation may be the best answer. Of course this will always be easiest when there are only 1 or 2 weeks of production housed at that site. These protocols are well documented based on empirical information and have been extremely successful in terms of returning nurseries to maximum profitability where the sow herd is not the source of the disease. If the sow herd or herds are the source of the disease then depopulation and repopulation will only be a temporary fix at best.

Vice Management. The use of toys in nursery pens can be helpful in avoiding the development of vices such as tail biting and flank nuzzling. Toys are most acceptable to pigs when made of soft, pliable material such as non-steel belted rubber. Keeping the toy suspended off the floor will keep it cleaner and make the toy more attractive for continued use. A slightly frayed end will be more attractive to the pigs. The toy provides an outlet for exploratory behaviour and should be part of your behavioural control program in the nursey. These do not have to be placed in every pen immediately post entry but should be available if vices appear.

CONCLUSIONS

Disease in the weaner barn can be a persistent challenge for producers. Acceptable control and prevention measures should be based on a balanced approach towards minimizing pathogen loads and maximizing immunity. Ultimately the key to disease control is clear goals and objectives, timely review of records, prompt identification of the problem, development

of the action plan and proper communication to the team allowing for implementation and adjustment of the plan.

REFERENCES

Dahl, J. 1998. The effect of feeding non-heat treated, non-pelleted feed compared to feeding pelleted, heat treated feed on the salmonella seroprevalence of finishing pigs. Proceedings of the 15th IPVS Congress. pp. 125.

Dahl, J., L. Joergensen, and A.Wingstrand. 2000. An intervention study of the effect of introducing Salmonella controlling feed strategies in Salmonella high prevalence herds. Proceedings of the 16th IPVS Congress. pp. 213.

Carr, J. 2003. Water Systems – Troubleshooting Common Mistakes. Proceedings of the Swine Disease Conference for Swine Practitioners. Iowa State University. pp. 101.

Carr, J. 2002. Control Of Escherichia Coli 0147 F4 F5 Diarrhea in Piglets by Removal of Drafts. IPVS Posters: Pig Health.

Dinter, P.S. and W. Mueller. 1984. Die Tenazitat von Bakterienim luft getragenen Zustand III. Mitteilung:Modelluntersuchungen zur Epidemiologis von P. multocida under den Einflus tropischen Klimas. Zbl.Bakt.Hyg.,I.Abt.Orig. B179: 139-150.

Mellencamp, M. 2002. Swine genetics and disease resistance. American Association of Swine Practitioners. pp. 187-188.

Sellwood, R., R.A. Gibbons, G.W. Jones, J.M. Rutter. 1975. Adhesion of enteropathogenic Escherichia coli to pig intestinal brush border: The existence of two pig phenotypes. J. Med. Microbiology, 8: 405-411.

Spyridon, K. and R. Morrison. 2003. A critical review of feeding probiotics to pigs. Allen D Leman Swine Conference. pp. 252-255.

Underdahl, N.R., The effect of Ascaris suum migration on the severity of swine influenza. JAVMA 133: 380-383.

Wilson, P., VIDO News. Vaccine fights pervasive swine menace. www.vido.org/news/nr10515.html.