Introduction to Herd Health Pork Industry Handbook
Michigan State University
Michigan State University Extension
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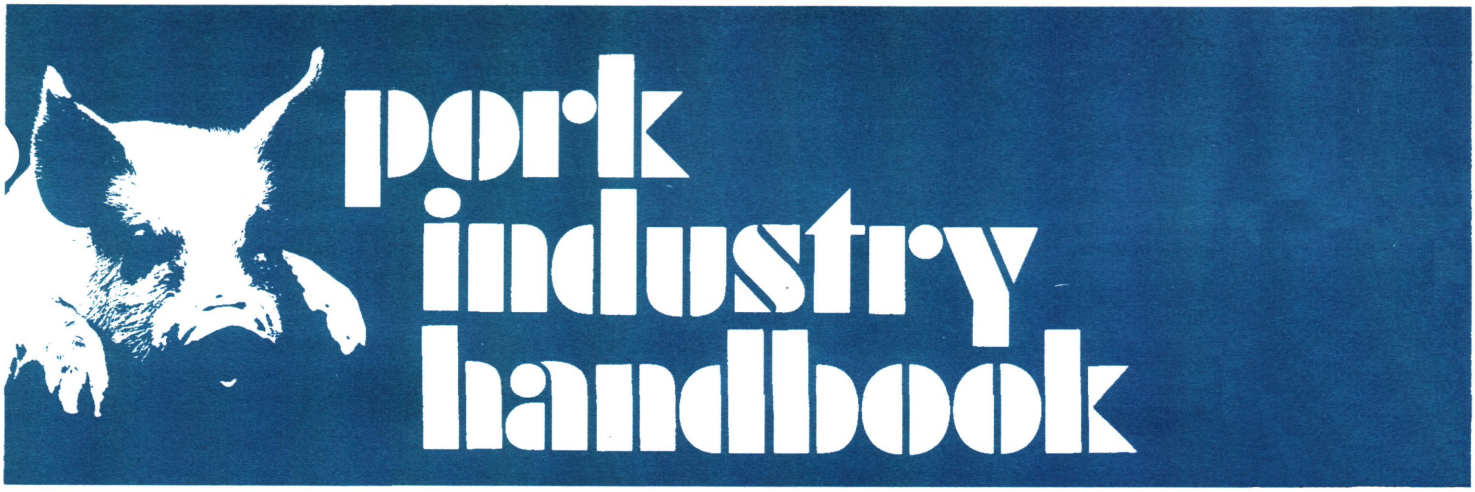

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Designing and communicating health strategies for herds of animals requires a very different approach than those used for individual animals. This fact sheet serves as an introduction to the herd health section of the Handbook and provides an overview of health maintenance and disease prevention strategies used to manage herds of animals. It provides fundamental terms commonly used to communicate health issues, reviews basic factors that confound disease diagnostics, and reviews techniques that can be used to estimate health and disease costs within populations of pigs.

Health and Disease

Health is the condition of an animal with regard to the performance of its vital functions. The vital functions of the pig are reproduction and growth. They are vital because they are major contributors to the economic sustainability of the pork production enterprise. Health is not simply freedom from infectious agents, rather, it is also a function of innate animal resistance, nutrition, environment, and genetics.

Disease is the impairment of the normal state of function of the living animal. It interrupts or modifies the performance of the pig's vital functions and reduces animal well-being. Disease is a major risk to farm sustainability, thus protection of herd health is a top priority.

Microbes and Disease

Viruses, bacteria, mycoplasma, and some forms of parasites are considered microbes. When a microbe contributes to the occurrence of disease, it is referred to as a pathogen.

Most microbes, however, do not adversely affect the animal. There is a normal flora of microbes literally covering every external and internal surface of the pig's body. These normal microbes occur on the skin, in the ears, mouth, stomach, intestine, bladder, and vagina of the pig. The feces are composed primarily of microbes, approximately 100 billion microbes per gram. The pig is exposed to far more helpful microbes than harmful pathogens when reared under reasonable levels of sanitation either extensively outdoors or in confinement buildings. Many of these helpful or good microbes produce nutrients and aid digestion of food.

Whether microbes cause disease is dependent upon several determinants including the specific causal agent or agents (often microbes), host factors, and environmental factors. These determinants are variable and directly or indirectly influence the frequency and/or occurrence of disease. Because of this variability, every effort should be made to keep out microbes that are known pathogens to pigs.

Health Status Versus Health Level

The formulation of a herd health plan is contingent upon what microbes are present within a herd and, if present, what impact they have on herd performance. The terms health status and health level are used to describe the relationship between pathogenic microbes and a herd. Incorrectly, the terms are often used synonymously. Health status relates to the presence or absence of pathogens within the herd. In contrast, health level quantifies the expression of clinical disease once disease-causing agents have entered a production unit. The distinction between these two terms is particularly important in communicating health goals.

Health status goals pertain to management's ability to exclude disease, particularly infectious agents. Biosecurity precautions protect the health status of the herd. By tracking health status, managers and veterinarians are able to quantify risk of disease within the herd and risk of disease to farms that receive animals from the herd.

Health level goals pertain to management's ability to limit disease expression by enhancing pig resistance and by reducing disease challenge level. This may be accomplished through isowean, pig flow, multi-site production, vaccination, and hygiene.

To determine the health status of a herd, either blood samples for serologic assay or samples of body fluids for pathogen identification are frequently collected. These tests (such as serologic profiling), however, do not fully describe the health status of a pig and at times can be confusing. Serology simply suggests whether or not the pig has been exposed to a particular pathogen. Several situations are possible regarding an infection with a pathogen:

1. The pig could be in the incubatory stages of disease (infection exists but clinical expression of the disease has not occurred yet).
2. A disease or illness is occurring.
3. The pig has recovered from the disease either on its own or due to treatment but is still infected with the pathogen (referred to as a carrier state). The carrier pig may or may not be shedding the pathogen. Thus, a carrier pig may or may not be infecting other pigs.
4. The pig may be "immune" to the effects of the disease but still be infected with the pathogen (this immune state may be induced by vaccination or simply recovery from the infection).
5. The pig may recover plus eliminate the pathogen.

Because of this disparity, laboratory tests should not be the sole determinant of health status. Further, health decisions should not be based on single animal evaluation, but rather on evaluation of the entire herd, or at least a representative sample of the herd. Indicators such as clinical signs, postmortem examinations, and performance data should be evaluated in addition to serology. Thorough evaluation of all parameters assists in making decisions that can prevent outbreaks of disease.

Epidemic Versus Endemic Disease

Outbreaks of disease that attack many animals at one time, are widely diffused, rapidly spread, and result in high morbidity are referred to as epidemic. Epidemics are characterized by extensive prevalence of disease within a population. In contrast, endemic disease is one that is present at all times, and generally results in low morbidity. Endemic disease usually can be controlled through good management practices. However, if there is a breakdown in management, endemic disease may revert to an epidemic disease resulting in continuous or periodic demonstration of clinical signs.

Many of the most costly diseases in pigs are endemic. Therefore, a properly designed system of management is crucial to prevent these normally endemic diseases from resulting in epidemic outbreaks. These strategies include multi-site production, all-in/all-out management, and batch management. By employing pig flow techniques such as these, along with good sanitation and hygiene of facilities, health level is optimized through management. In cases where endemic disease cannot be cost effectively managed with good management and control strategies, disease elimination through depopulation/repopulation or isowean may be necessary.

Epidemics may also arise from the introduction of new pathogens. For this reason, external biosecurity is crucial. The objective with this approach is to prevent new disease by carefully introducing new breeding stock and by creating barriers which prevent disease introduction.

Estimating Costs of Herd Disease

Health maintenance is a cost to production. Likewise, disease is a cost to production. Health maintenance costs are inevitably driven by disease costs. In general, health maintenance costs are much less than the cost of disease because the efforts to prevent one disease also prevent others without additional costs.

Estimates of disease cost can be expressed as relative risk (%) and attributable risk ($). By using these measures, management can estimate the efficiency of the system in preventing disease over time (population relative risk). Further, they allow management to standardize cost over time and between groups, particularly when disease occurs inconsistently (population attributable risk).

Simple risks	**Source**
a. Veterinary costs/pig exposed	Production data
b. Veterinary costs/pig unexposed	Production data
c. Veterinary costs/pig overall	Mean of data
d. Prevalence of exposure	Production data
Compared risks	**Calculation**
e. Relative risk	a ÷ b
f. Attributable risk/pig	a - b
g. Population attributable risk/pig	f x d
h. Population attributable fraction	g ÷ c

Establishing Herd Health Goals

Herd health goals should be written so as to remind both management and staff of what is expected. The goals should be reviewed periodically and updated as necessary. This constant review serves as a motivator and reminder that health maintenance is important and critical to the survival of the production unit. Components of the health plan should address:

1. Herd goals for health status;
2. Herd goals for health level;
3. A plan to keep out new diseases;
4. A plan to control disease currently present in the herd, including a description of pig flow, vaccination protocols, and other health maintenance measures;
5. A plan for routine diagnostic monitoring.

Plans should account for the type of production unit, whether the unit is new or existing, location and layout, current disease status, and herd size. For example, a seedstock unit is expected to have greater expectations for health status than that of a commercial production unit.

Summary

The subsequent fact sheets in this section contain specific information about proven herd health techniques to achieve and maintain herd health. Included is information on biosecurity; disease control through pig flow, vaccination, and hygiene; and disease elimination through all-in/all-out production, multi-site production, and isowean. Other fact sheets discuss specific disease entities.

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