Troubleshooting the Swine Operation

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Troubleshooting the Swine Operation

a guide for evaluating your production management practices

Cooperative Extension Service Purdue University West Lafayette, Indiana
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Troubleshooting the Swine Operation

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“A chain is no stronger than its weakest link.” Neither is a swine enterprise any more profitable than the least efficient or poorest managed phase of that operation.

For instance, the profit potential a producer might otherwise realize from large litter sizes, high percent of pigs weaned or heavy weaning weights can easily be lost later through inefficient feed utilization, low rate of gain or poor carcass merit of the market hogs. In other words, good management in one phase of the swine operation doesn’t make up for poor management in another.

All too often, a swine producer merely knows that he has profit-robbing management problems, but he’s not sure where they are or why they exist. What he needs is a way to “check out the system,” identify the problems and correct them by adjusting his management practices.

TROUBLESHOOTING — WHAT IT IS AND HOW IT WORKS

Troubleshooting is simply a method of looking for the “weak link” in your swine operation. It’s a systematic analysis of each phase of your production program to help you identify the management or husbandry problems that might be affecting overall performance. Such an analysis is especially important if you are considering expansion, but is a good way to periodically check management ability even if you don’t plan to expand. It should also help the prospective producer assess his chances for success by matching up management requirements with available resources.

Here’s how troubleshooting works:

- Any swine production system (breeding stock, feeder pig, growing-finishing or farrow-to-finish) is composed of some or all of the following phases — pre-breeding, breeding, gestation, farrowing, nursery and growing-finishing.

How “successful” the producer is during each phase of his operation is reflected in certain measures of animal performance, such as conception rate, pigs farrowed, pigs weaned, rate of gain, etc.

For each of the 11 performance measures discussed in this publication, there is a generally-accepted standard (that level of performance needed to consistently realize a reasonable return to one’s management input).

- Therefore, the first step in troubleshooting is to determine the performance results you are getting on your farm and then compare them with the accepted standards, which are summarized in Table 1. This comparison (called a production profile) should reveal where the “weak links” are in your swine operation.

For example, a 65 percent conception rate indicates a problem in the pre-breeding and/or breeding phases of the operation; whereas a 90 percent conception rate coupled with an average litter size of only 7 pigs farrowed live shows that the problem is during gestation.

- The next step is to determine why such a problem exists. In most cases, poor animal performance can be traced to poor management — i.e., the absence of, or improper application of, proven management practices. Therefore, after completing your operation’s production profile, proceed to the checklist of management practices that affect the performance measures which you found to be below average (pages 9 to 13).

- By incorporating into your management program all the practices suggested in the appropriate checklist, you should be able to correct the problem.
Determining Your Swine Production Profile

Table 1 lists the 11 measures of animal performance that reflect operator management ability during the pre-breeding, breeding, gestation, farrowing, nursery and growing-finishing phases of swine production. For each measure, three levels of performance are given (excellent, average and poor) plus a space to record the results being achieved on your farm. With Table 1 is a brief discussion of each performance standard, what it measures and how it’s calculated.

Just how your particular operation compares with the averages of all 11 performance measures determines your swine production profile. It’s like an X-ray of your total system, showing where you are successful and where management adjustments should be made.

To assure an accurate profile, calculate your performance standards using figures for the past several years, not just from one year, one group of sows or one batch of pigs. And be honest in calculating each standard — count every animal!

CONCEPTION RATE (A)

Conception rate is a very important performance measure in breeding stock, feeder pig and farrow-to-finish operations. A female that fails to conceive means no pigs at farrowing from her and fewer from the herd as a whole. Yet it costs nearly as much to feed and maintain an “open” sow as it does a pregnant one — a cost that won’t be recovered.

Conception rate is defined as the percent of sows exposed to the boar in first service that actually farrow. It is calculated as follows:

<table>
<thead>
<tr>
<th>Performance measure</th>
<th>Unit</th>
<th>Performance level</th>
<th>Your farm*</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Conception rate</td>
<td>pct.</td>
<td>Over 85</td>
<td>70-85</td>
</tr>
<tr>
<td>B. Pigs/litter farrowed alive</td>
<td>no.</td>
<td>Over 9.5</td>
<td>7.5-9.5</td>
</tr>
<tr>
<td>C. Avg. birth weight</td>
<td>lbs.</td>
<td>3.0-4.5</td>
<td>2.5-3.0</td>
</tr>
<tr>
<td>D. Pigs/litter weaned</td>
<td>no.</td>
<td>Over 8.5</td>
<td>7.0-8.5</td>
</tr>
<tr>
<td>E. Pct. live pigs weaned</td>
<td>pct.</td>
<td>Over 90</td>
<td>80-90</td>
</tr>
<tr>
<td>F. Avg. weaning weight</td>
<td></td>
<td>Over 12</td>
<td>9-12</td>
</tr>
<tr>
<td>3 weeks</td>
<td>lbs.</td>
<td>Over 20</td>
<td>14-20</td>
</tr>
<tr>
<td>5 weeks</td>
<td>lbs.</td>
<td>Over 25</td>
<td>20-25</td>
</tr>
<tr>
<td>6 weeks</td>
<td>lbs.</td>
<td>Over 40</td>
<td>30-40</td>
</tr>
<tr>
<td>8 weeks</td>
<td>lbs.</td>
<td>Over 1.25</td>
<td>1.00-1.25</td>
</tr>
<tr>
<td>G. Avg. rate of gain</td>
<td>lbs./day</td>
<td>Over 3.4</td>
<td>3.4-3.8</td>
</tr>
<tr>
<td>H. Avg. days to 220 lbs.</td>
<td>no.</td>
<td>Under 174</td>
<td>174-217</td>
</tr>
<tr>
<td>I. Feed efficiency</td>
<td></td>
<td>Under 3.4</td>
<td>3.4-3.8</td>
</tr>
<tr>
<td>Pen of pigs (weaning – 220 lbs.)</td>
<td>lbs. feed/lb gain</td>
<td>Under 4.00</td>
<td>4.00-4.25</td>
</tr>
<tr>
<td>Total swine enterprise</td>
<td></td>
<td>Under 4.00</td>
<td>4.00-4.25</td>
</tr>
<tr>
<td>J. Pct. U.S. No. 1’s sold</td>
<td>pct.</td>
<td>Over 80</td>
<td>70-80</td>
</tr>
<tr>
<td>K. Avg. backfat at 220 lbs.</td>
<td>in.</td>
<td>Under 1.3</td>
<td>1.3-1.6</td>
</tr>
</tbody>
</table>

*For average or below average performance, proceed to the management practice checklist to determine the possible problem and remedy.
NUMBER OF PIGS FARROWED (B) AND THEIR BIRTH WEIGHT (C)

Number of pigs per litter farrowed alive and healthy is also extremely important, because, of course, it’s only the live baby pigs that eventually become the salable breeding or market hogs. Larger average litter size means not just more total pigs, but usually less overhead cost per pig. Concerning birth weight, research indicates that the heavier the pigs at birth, the greater their chances for survival.

Performance levels for number of pigs farrowed alive are:

- **Excellent** ............... over 9.5 pigs/litter
- **Average** .................. 7.5 to 9.5 pigs/litter
- **Poor** ..................... under 7.5 pigs/litter

Pig birth weight performance levels are as follows:

- **Excellent** ................ 3.0 to 4.5 lbs./pig*
- **Average** .................. 2.5 to 3.0 lbs./pig
- **Poor** ..................... under 2.5 lbs./pig

NUMBER (D) AND PERCENT (E) OF PIGS WEANED

Number of pigs weaned is as important as number of pigs farrowed and for the same reasons. The performance standards for pigs weaned per litter are:

- **Excellent** ............... over 8.5 pigs/litter
- **Average** .................. 7.0 to 8.5 pigs/litter
- **Poor** ..................... under 7.0 pigs/litter

Number of pigs weaned is determined, to a large extent, by number farrowed and, therefore, may have limited value for “troubleshooting” purposes. Perhaps, a more meaningful measure is percent of pigs weaned in the total pig crop. This figure reflects death loss between farrowing and weaning and, thus, would indicate any management problems during this period. Percent pigs weaned is calculated as follows:

\[
\text{Percent weaned} = \frac{\text{Total no. pigs weaned}}{\text{Total no. sows farrowed alive}} \times 100
\]

The three performance levels for percent of pig crop weaned are:

- **Excellent** ................ over 90% weaned
- **Average** .................. 80 to 90% weaned
- **Poor** ..................... under 80% weaned

AVERAGE WEANING WEIGHT OF PIGS (F)

Weaning weight is the actual weight of the pig when it is removed, or weaned, from the sow. This is a valuable measure because it shows relative thriftiness of both individual pigs and the pig crop as a whole. This, in turn, indicates the type of performance that can be expected in the early growing stage of the life cycle.

The standards for weaning weight of pigs on various weaning schedules are:

<table>
<thead>
<tr>
<th>Weaning Schedule</th>
<th>Excellent</th>
<th>Average</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 weeks</td>
<td>12 lbs.</td>
<td>9-12 lbs.</td>
<td>Under 9 lbs.</td>
</tr>
<tr>
<td>5 weeks</td>
<td>20 lbs.</td>
<td>14-20 lbs.</td>
<td>Under 14 lbs.</td>
</tr>
<tr>
<td>8 weeks</td>
<td>40 lbs.</td>
<td>30-40 lbs.</td>
<td>Under 30 lbs.</td>
</tr>
</tbody>
</table>

RATE OF GAIN (G) AND DAYS TO 220 POUNDS (H)

These two performance measures are essentially the same. A high rate of gain for the pig crop can mean a substantial savings in feed, because fastgaining pigs are usually good converters of feed to pork. In addition, the shorter growing-finishing period permits more efficient use of facilities.

Both measures are taken from birth to market. Those who sell their hogs around 220 pounds will probably use the days-to-220-pounds figure, while those who market at lighter or heavier weights will likely record rate-of-gain. Average daily gain for the pig crop is calculated as:

\[
\text{Daily gain (lbs.)} = \frac{\text{Avg. market wt.} - \text{Avg. birth rate}}{\text{Avg. age in days}}
\]

Rate-of-gain performance levels are the following:

- **Excellent** ............... over 1.25 lbs./day
- **Average** ................. 1.00 to 1.25 lbs./day
- **Poor** ..................... under 1.00 lbs./day

Performance levels for days to 220 pounds are:

- **Excellent** ............... under 174 days
- **Average** ................. 174 to 217 days
- **Poor** ..................... over 217 days
FEED EFFICIENCY (I)

Feed efficiency is simply the amount of feed it takes to produce a pound of pork. It’s an extremely important performance measure because feed makes up such a large part of the total cost of producing hogs (65 to 75%). Therefore, even a slight improvement in this trait can have a big effect on profits.

Feed efficiency can be calculated two ways — for each pen of pigs or for the entire swine operation. Since pigs vary in their ability to convert feed to pork, records kept by pen will not only pinpoint the poor converters but also help uncover any management-related reasons for poor performance.

Feed efficiency per pen of pigs is calculated and measured as follows:

\[
\text{Lbs. feed/lb. gain (per pen)} = \frac{\text{Total feed consumed from weaning to market}}{\text{Total weight gained}}
\]

- Excellent .......... under 3.4 lbs. feed/lb. gain
- Average ............ 3.4 to 3.8 lbs. feed/lb. gain
- Poor ............... over 3.8 lbs. feed/lb. gain

Feed efficiency for the total swine enterprise is calculated and measured as follows:

\[
\text{Lbs. feed/lb. gain (total operation)} = \frac{\text{Total feed fed to swine on farm}}{\text{Total pork sold from farm}}
\]

- Excellent .......... under 4.00 lbs. feed/lb. gain
- Average ............ 4.00 to 4.25 lbs. feed/lb. gain
- Poor ............... over 4.25 lbs. feed/lb. gain

PERCENT NO. 1's (J) AND BACKFAT THICKNESS (K) OF MARKET HOGS

A good hog producer is aware of what the consumer wants — lean pork. He has geared his operation to raising meat-type market animals and strives to maintain his market. He knows that choosing a meaty, lean herd sire will probably do more to improve the carcass leanness than will altering various environmental aspects.

Two measures of his success in producing lean pork are (a) the percent of market hogs that grade U.S. No. 1, and (b) the amount of backfat they carry. Here are the levels of performance for percent No. 1's sold:

- Excellent .............. over 80% U.S. No. 1's
- Average .................. 70 to 80% U.S. No. 1's
- Poor ....................... under 70% U.S. No. 1's

Performance levels for average amount of backfat (220-pound market animal) are as follows:

- Excellent ..................... under 1.3 in.
- Average ...................... 1.3 to 1.6 in.
- Poor ........................ over 1.6 in.

Troubleshooter's Management Practice Checklist

Following are the management practices or activities which, we feel, most directly affect the 11 performance measures that determine your swine production profile. These practices are grouped according to the specific performance measure(s) they influence.

When a performance standard is found to be above average, chances are you have answered "yes" to most of the management questions listed under that performance measure. On the other hand, when the standard is below average, you probably had to answer "no" to many of the questions (or at least the most important ones). Attention to those management practices which you have overlooked or neglected should improve your overall swine production profile — and your profits!
<table>
<thead>
<tr>
<th>MANAGEMENT PRACTICES AFFECTING CONCEPTION RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Were boars purchased 60 days prior to use?</td>
</tr>
<tr>
<td>2. Were boars free of any lameness or stiffness?</td>
</tr>
<tr>
<td>3. Were boars free of external parasites — i.e., lice, mange, etc.?</td>
</tr>
<tr>
<td>4. Were the newly-purchased boars isolated for 30-45 days?</td>
</tr>
<tr>
<td>5. Were boars given fence-line contact with females 30 days prior to use?</td>
</tr>
<tr>
<td>6. Were boars maintained in a comfortable lot and quarters that were dry, draft-free and junk-free?</td>
</tr>
<tr>
<td>7. Were young boars old enough to use — i.e., at least 9 months of age?</td>
</tr>
<tr>
<td>8. Were boars test-mated prior to use to check semen, libido and ability to breed?</td>
</tr>
<tr>
<td>9. Were boars in breeding condition — i.e., not too fat?</td>
</tr>
<tr>
<td>10. Were boars treated for internal parasites?</td>
</tr>
<tr>
<td>11. Were boars free of flu or high body temperatures prior to and/or during breeding? (Normal body temperature 102°F ± 1°F.)</td>
</tr>
<tr>
<td>12. Was breeding done on a dry, not a slick, surface?</td>
</tr>
<tr>
<td>13. Was “boar power” adequate? (Young boar — 10-12 gilts per herd, pen breeding; older boar — 15-20 gilts per herd, pen breeding.)</td>
</tr>
<tr>
<td>14. If a large number of females are to be bred, were boars rotated?</td>
</tr>
<tr>
<td>15. Was using a young, untried boar to pen-breed a group of sows just weaned avoided?</td>
</tr>
<tr>
<td>16. Were gilts at least 8½ months old at breeding?</td>
</tr>
<tr>
<td>17. Did all sows and gilts exhibit normal 21-day heat cycles before breeding?</td>
</tr>
<tr>
<td>18. Were sows and gilts vaccinated for leptospirosis prior to breeding?</td>
</tr>
<tr>
<td>19. Was fresh manure exchanged between existing breeding stock and new breeding stock at least 2 weeks before breeding?</td>
</tr>
<tr>
<td>20. Were sows and gilts free of any exposure to high environmental temperatures during breeding and gestation?</td>
</tr>
<tr>
<td>21. Were sows and gilts in breeding condition — i.e., not too fat or too thin?</td>
</tr>
<tr>
<td>22. Were sows and gilts in a weight-gaining status at breeding time?</td>
</tr>
<tr>
<td>23. Was a balanced ration fed to the breeding animals?</td>
</tr>
<tr>
<td>24. Was the ration fed free of molds?</td>
</tr>
<tr>
<td>25. If hand mating system is used, were sows and/or gilts mated at least twice (24 hours apart) at breeding time?</td>
</tr>
<tr>
<td>26. If a commercial swine operation, is crossbreeding practiced?</td>
</tr>
</tbody>
</table>
MANAGEMENT PRACTICES AFFECTING PIGS FARROWED AND BIRTH WEIGHT

1. Have you checked all items under "conception rate"?

2. If a commercial operation, is a systematic crossbreeding program practiced?

3. Were sows and gilts limit-fed (4-5 lbs. per sow per day) during gestation?

4. Did you avoid breeding sows and/or gilts that were too extreme in muscling?

5. Were sows and/or gilts in the right condition during gestation—not too fat and not too thin?

6. Was the actual farrowing time of each sow of normal duration (2-5 hours).

7. Was a thermometer available for checking temperature?

MANAGEMENT PRACTICES AFFECTING PIGS WEANED AND WEANED WEIGHT

1. Was a definite breeding and farrowing schedule followed?

2. Were sows and gilts free of external parasites?

3. Were sows and gilts treated for internal parasites prior to farrowing?

4. Was the farrowing house isolated for disease prevention?

5. Were slotted floors constructed accurately and uniformly (so pigs don't get caught in slots)?

6. Was there a break of at least a week in the use of the farrowing unit for it to be washed down?

7. Was the farrowing unit washed down too often? (Wash only between farrowings, otherwise keep dry.)

8. Was proper ventilation provided?

9. Was the farrowing unit draft free — i.e., no air intakes allowing drafts directly on pigs?

10. Were doors to the farrowing unit kept shut at all times to prevent drafts?

11. Was the farrowing unit sufficiently warm (70-80°F room temperature)?

12. Were extra heat lamps used at farrowing time to keep the pigs' sleeping area around 90-95°F?

13. Was there a footbath at entrances to the farrowing unit?

14. Were dogs, cats and birds kept away from the premises?

15. Was all equipment in good repair?

16. Were sows washed and sprayed with a disinfectant prior to farrowing?
17. Was feed to the sows reduced at farrowing time (2-3 lbs. per day for 3 to 5 days prior to farrowing; no feed on the day of farrowing)?

18. Were all sows farrowed over a short period of time — i.e., about 25 days?

19. Did all sows and gilt have at least 12 functional udder sections?

20. Did pigs have a dry sleeping area because the farrowing house floor was kept dry?

21. Were the pigs’ tails docked the first day with disinfected equipment?

22. Were the eight needle teeth clipped the first day?

23. Were the pigs’ navels treated with iodine the first day?

24. Were the iron injections given within 3 days of age?

25. Were pigs castrated prior to 2 weeks of age?

26. Were pigs’ knees in good condition — i.e., no knee abrasions?

27. Were utensils used for cutting and injecting cleaned thoroughly and disinfected before and after such use?

28. Was litter size evened up — i.e., largest pigs from big litters transferred to smaller litters within 48 hours?

29. Was initial selection of potential replacement gilts made soon after farrowing? (Check number and placement of teats; mark selected pigs.)

30. Were replacement gilts selected on the basis of litter size and the dam’s milking and mothering ability?

31. Was there a supply of clean, fresh water for both sow and pigs?

**MANAGEMENT PRACTICES AFFECTING DAILY GAIN AND FEED EFFICIENCY**

1. Were pigs of uniform size in a pen? (Pig weight should not deviate 10% from the mean.)

2. Was there a satisfactory number of pigs per pen? (Ideal is 20 to 35 or less.)

3. Was there adequate space per pig in the pens? (Slotted floors — 8 sq. ft./200-lb. pig; solid floors — 9-10 sq. ft./200-lb. pig.)

4. Was there sufficient feeder space — i.e., 3-4 pigs per self-feeder hole?

5. Were feeders in good repair and adjusted to prevent feed wastage?

6. Were there sufficient watering spaces — i.e., a maximum of 25 pigs per watering cup or drinking space?

7. Were waterers in good repair with no leakage or wastage?

8. Did pigs appear to be comfortable?

9. Was the environment clean, dry and draft-free?
10. Was shade provided during hot summer months?  
11. Were feeder pigs purchased from only one source (to prevent disease problems)?  
12. Did the performance records of purchased boars indicate that their offspring would have the genetic potential for fast gain and good feed efficiency?  
13. Was a balanced grower-finisher ration fed?  
14. Were tails docked?  
15. Were pigs wormed?  
16. Were pigs treated for external parasites?  
17. Were pigs free of lameness, abscesses or swollen hocks?  
18. Were pigs generally free of health problems, such as coughing, sneezing, scours and unthriftness?  
19. Has there ever been a health check on hogs at a slaughtering establishment?  
20. Was there a medication system available when needed?  
21. Were sick pigs isolated in a separate pen or building?  
22. Were pigs that died given a post-mortem examination by a veterinarian?  
23. Were pigs separated physically with respect to lot runoff from cattle, sheep or poultry?  
24. Were feedmen or other servicemen able to make deliveries without entering the hog lot?  
25. Were sows limited to 4 to 5 pounds of feed per day during gestation (affects herd feed efficiency)?  
26. Were feed losses from wind while delivering minimized?  
27. Was there good control of rodents?  
28. Were losses from wet, spoiled, moldy and old feed kept to a minimum?  

**MANAGEMENT PRACTICES AFFECTING CARCASS MERIT**

1. Were boars chosen on the basis of performance test results for growth rate, feed efficiency and carcass leanness?  
2. Were estimates of carcass merit obtained for your herd — e.g., carcass contests, grade and yield selling, direct reports from packers, use of backfat probe, sonoray, etc.  
3. Was a swine identification program used on the farm for good record keeping?  
4. Were estimates obtained on amount of backfat in the market hogs?  
5. Was replacement breeding stock checked for jowl abscesses?
Where Do I Go From Here?

The answer to that question depends largely on your plans for the hog enterprise and results of your swine production profile (Table 1). For the operator who does not wish to expand, the profile, together with management practice checklist, reveals where and how he can improve his present set-up to maximize profits. For the one considering expansion, the production profile helps predict his chances for success if he were to "take the plunge."

Here is how we suggest you approach the question of expansion in light of your profile results:

- **Proceed with expansion plans if your animal performance scores are consistently above average.** This indicates that, from a management or husbandry standpoint, you are ready to handle a bigger operation.

- **Think twice about expansion or do so only with great caution if your performance standards are only average.** Normally, our suggestion would be to first improve performance in your existing program then expand, rather than try to cope with an operation that has grown beyond your ability to manage it properly.

- **Don't expand if any performance measures are found to be below average.** Instead, concentrate on identifying those management practices from the checklist above that have been overlooked or neglected, and apply them to upgrade your present program. If there is still no improvement, seek out an expert to review your total enterprise. Hopefully, he can help spot the trouble and/or accurately assess your swine husbandry abilities.

**ADDITIONAL HELP**

Your county Extension agent, if not able to assist directly, can put you in contact with an area Extension agent, Purdue specialist or local veterinarian concerning specific swine husbandry and health problems. He can also provide publications on various aspects of swine management.

Single copies of the following Purdue Extension swine publications are available free of charge to Indiana residents from their local county Extension offices or from the CES Mailing Room, AGAD Building, Purdue University, West Lafayette, Indiana 47907:

**Management and Selection**

"Confined Sow Management Systems" (ID-80)

"Planning Data for Hog Farms" (EC-408)

"Pork Production Systems with Business Analyses: The One-Litter System (Farrow-to-Finish)" (ID-104)

"Pork Production Systems with Business Analyses: The Two-Litter System (Farrow-to-Finish)" (ID-106)

"Requirements and Methods for Safe Withdrawal of Feed Additives for Swine" (ID-79)

"Selection and Management of Herd Boars" (AS-409)

"Selection and Management of the Sow Herd" (AS-417)

"Selection Guidelines for the Swine Breeding Herd" (AS-419)

"Waste Handling and Disposal Guidelines for Indiana Swine Producers" (ID-83)

**Nutrition**

"Balanced Rations for Swine" (AS-350)

"Balancing Swine Rations" (AS-326)

"Feeding Blighted Corn to Hogs" (AS-394)

"Feeding Moldy Corn to Swine" (AS-384)

"Feeding Systems and Rations for Gestating Sows" (AS-408)

**Housing and Equipment**

"Baker-Purdue Animal Sciences Center Swine Facilities" (AS-390)

"Insulation and Heat Loss" (AED-13)

"Planning a Central Farrowing House" (AE-75)

"Swine Housing and Equipment Handbook" (MWPS-13), from Farm Building Plan Service, Agricultural Engineering Building, Purdue University, West Lafayette, Indiana 47907 (cost $2.00).

"Ventilation of Swine Buildings" (AE-63)

**Diseases and Insects**

"African Swine Fever" (VY-46)

"Atrophic Rhinitis in Swine" (VY-39)

"Bloody Dysentery of Swine" (VY-45)

"Hog Lice and Mange" (E-15)

"Prevention of Baby Pig Anemia" (AS-372)

"Swine Erysipelas" (VY-12)

"Swine Disease and Management Interrelationships" (VY-40)

"Transmissible Gastroenteritis (TGE)" (VY-37)

"Virus Pig Pneumonia" (VY-38)