BABY PIG MANAGEMENT (AFTER WEANING)

INTRODUCTION

1. Post-Weaning Lag or Growth Check: (Whittemore, 1987)

2. Post-Weaning Stress
   - Weaning is a traumatic time for suckling piglets, and there are three types of stress: 1) Environmental, 2) Social, and 3) Nutritional.

WAYS TO REDUCE “POST-WEANING LAG” & IMPROVE PIG PERFORMANCE

- Should try to reduce/alleviate various stressors associated with weaning, i.e., 1) removal from the sow, 2) environmental stress, c) social stress, and 4) nutritional stress!

1. Stimulate Feed Intake After Weaning
   A. The primary reason for post-weaning lag seems to be “lack of energy intake soon after weaning!” Thus, should make efforts to let pigs eat some feed within 12 hours or so!
   B. Ways to stimulate feed intake:
      1) Hand-feed on the floor several times a day (first 2 or 3 days after weaning) because pigs are reluctant to make a trip to the feeder after weaning. (A piece of plywood can be placed on the floor for this purpose. It can also reduce drafts!)
      2) Check pigs often - Stirring them up can stimulate pigs, as they may eat more! Should try at least 5 to 6 times/day for about week. (Remember that pigs are used to being called to nurse every 30 min-hour by the sow!)
      3) For early-weaned pigs (3 wk or younger), adding water to milk replacer or pre-starter diets (or mixture of the two) may enhance intake. Should try two to three times a day for about week, and feed only what they can clean up at each feeding!

2. At Weaning Time
   A. “Split-weaning” to help smaller pigs!?
B. Feeds - May want to feed the same creep feed for about five days after weaning to reduce nutritional stress!

1) A sudden change in feed from a liquid (milk) to solid diet at weaning, thus pigs will not eat during the first day or so. [See “Eating Behavior & Feed Intake.” NHF/Apr. pp 46-49 (1990)]

2) Then, pigs may consume a large amount – mostly undigested, → diarrhea!

3) The digestive system may not be ready for digesting a large quantity of solid feed (especially, corn-soy-based diets). [See “Digestive Enzyme Activity: (1986. NHF/Spr. pp 23-31)]

- Important to: a) Encourage pigs to eat more & b) offer highly palatable/digestible diets!

C. After removing the sow:

- Being removed from the sow by itself is considerable stress for pigs, and it is aggravated by moving pigs to a new pen & co-mingling with strange pigs!

1) Possible alternatives?

a) Leave pigs in the farrowing pen overnight or even 3-4 d to ≈ week, i.e., a graduate transition to “no sow” & “new pen/new pen mates!”

  - Effective? - (1) No difference in the performance of pigs, and (2) Causes problems in the production schedule (interfere with the next group).

b) Keep litter mates intact - No mixing with strange pigs!

  - Effective? - (1) Pigs perform better, but 2) Need more nursery pens, and facilities are not fully utilized, and 3) Mixing later may cause more problem than mixing at weaning time.

2) Effect of the group size?

a) As the No. of pigs/pen increases, more difficulty in recognizing one another & forming a stable social order.

b) Unstable social order can induce tail biting and other aggressive behaviors, thus can reduce performance.

c) The bottom line? Fewer the better, but try to keep “≤ 20 pigs/pen” for the optimum performance?

| Number of nursery pigs and performance: (NHF, 1986) |
|-----------------|---------------|---------------|---------------|
| **Item**        | 8/pen         | 16/pen        | 24/pen        |
| Sq. ft./pig     | 3             | 3             | 3             |
| Gain, lb/d      | .95           | .93           | .88           |
| Feed:gain       | 2.14          | 2.24          | 2.28          |

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3. **Environmental Accommodations?**

A. **Sanitation**

1) Baby pig’s immune system is not fully developed until 5 or 6 weeks of age, thus a clean, dry nursery is essential in preventing or reducing contact with pathogenic organisms!

2) Important to use “all-in, all-out” system if possible! (See an example in a box.)

B. **Temperature**

1) Young pigs are sensitive to cold temperatures because they are not consuming adequate nutrients (mostly energy) & in a “negative energy balance!” Thus, young pigs (especially, smaller pigs) need higher room temperatures!

2) Effective temperature, which can be defined as “The temperature that the pig actually feels:”

   a) Considers various factors such as the size of pigs, size of group, exercise potential, air velocity, flooring material and moisture/humidity.

   b) Requirements? (See a box!)

3) Can measure effective temperatures by observing pigs’ response to changes in the temperature:

   a) Too warm: (1) seek a shaded-area (outdoors), (2) seek a cool resting area, wallow or other wet area, (3) refrain from various activities, (4) reduce feed intake, and (5) increase respiration rate (pant).

   b) Too cold: (1) seek shelters, (2) shiver, (3) increase the activity, (4) huddle, and (5) increase feed intake.

4) Supplemental heat? Under the confinement system, the use of “heat lamp” is fairly common.

Do pigs need a constant temperature 24 hr/day? Reduced nocturnal temperatures - See a diagram for the study design & a box for the data (Brumm & Shelton, 1988).

- The bottom line?

   (1) Pigs may not need a high-temperature during the night.

   (2) ∴ may be able to save some utility costs (e.g., propane and electricity).
C. Drafts

1) Effect? 30’ & 90’/min = equivalent to 7°F ↓ & 18°F ↓ in temp., respectively!

2) To reduce drafts:

a) Use solid partitions - Can be a permanent or temporary.
b) Provide solid areas on the floor - Permanent or place a rubber mat or plywood temporarily on the totally slotted floor.
c) Use a hover or cover (temporary).
d) Use bedding in the outdoor or semi-confinement system - A combination with "hover" works much better!

D. “Kennel-type rearing pens” can be beneficial in providing a “draft-free” environment (e.g., see McFarlane, 1989):

1) Use “solid” partitions & place feeders on the front gate - Feeders can serve as a “solid” partition.
2) A totally slotted floor with a removable solid panel/mat in front of the feeder for about week or so - Prevent both drafts & wasting feed (. . . also can keep the sleeping area dry!).
3) Nipple waterers in the back - Encourages pigs to use this “wet” area as a “bathroom.”
4) Place an insulated cover (or a hover) on the top of partitions (= the same size as a “removable” solid panel/mat placed on the floor). Also, may want to place a “supplemental heater” on this area.

HOUSING FOR THE BABY PIG

1. Permanent or Portable Kennel (Brent, 1986)

A. A “bedded or slotted” dunging area in the back of the pen.
B. A sleeping area is totally enclosed (often insulated materials are used for a box), and each pen has a pophole with a plastic (or other materials) flap.
C. Waterers are located in the dunging area, and feeders in the sleeping area.
D. A “flap” on the top of the box can be used for checking/handling pigs, feeding, etc.
2. **Floor Types**

A. Totally or partially slotted with pit(s) or flushed or scraped gutter(s) for manure handling.
B. Totally slotted & decked:
   1) With pit(s) or flushed or scraped gutter(s).
   2) “Decked” nursery can be two-tier or three-tier in some instances:
      a) Pens can be the same size, or smaller pens on the top (to be used as “pre-nursery”).
      b) Smaller pens can be placed on the top of “existing” nursery pens.
      c) Advantages:
         1. Can stock greater density/building.
         2. Can operate costs/pig because of the number of pigs/unit.
         3. Better use of heat, i.e., can use warmer upper decks for smaller pigs.
         4. Fewer pigs/group in smaller pens - Less stress because of the size uniformity?
      d) Disadvantages:
         1. Difficulty in observing pigs & handling pigs in the upper deck.
         2. Design and management of environmental control systems are more critical - Must consider “ventilation & heat” for all levels.
         3. Difficulty in the maintenance of feeders, waterers, etc. - Must have better designs for easy access.
         4. Pigs in lower pens can be dirtier than normal.

   Generally, there is no difference in performance between the bottom & upper decks!

3. **Floor Surfaces**

   - In terms of performance, many types of floors work well, thus make a decision based on costs, cleaning property and possible foot injury.

A. Slotted floors - At least 2/3 should be slotted, and floors having a solid area result in the best performance. (If pigs are > 6-wk old, may not need a section of solid floor though.)
B. Partly slotted floors:
   1) In the confinement, not easy to train nursery pigs (or any pigs!) to sleep on solid floors and dung on slats!
   2) Some tips to avoid the problem:
      a) Use a long, narrow pen - 2-4 times longer than width.
      b) Use solid-partitions over solid floor and open-partitions over slotted area.
c) Place feeders on solid floors and waterers over slats.
d) Provide 1-2" step up from slotted floors to solid floors. (Separate sleeping and
dunging areas, and to keep manure off the solid floor.)
e) Use a supplemental heat in the solid floor area for smaller pigs.
f) Use removable hovers over sleeping area to retain heat, and to reduce draft.
g) Wet down the slotted area just before moving pigs in.
h) Feed on the solid floor for the first few days.

4. Space Requirements

A. Floor space:

1) “Floor space” can affect the performance of young pigs! (See a box.)
2) Floor space recommendations:

   a) Partial or total slats:

<table>
<thead>
<tr>
<th>Pig wt.</th>
<th>ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 - 30 lb</td>
<td>2 - 2.5</td>
</tr>
<tr>
<td>30 - 60 lb</td>
<td>4</td>
</tr>
<tr>
<td>In cages (&lt; 40 lb)</td>
<td>2</td>
</tr>
</tbody>
</table>

   b) Solid floors need slightly more space/pig.

B. Feeder space:

1) Feeder space & pig performance: (Brumm & Carlson, 1985)

   a) Insufficient feeder space can result in variations in growth rate!
   b) However, excess feeder space can be costly, and pigs use only few holes (. . .
defecation, urination & mold growth in the unused holes!).

2) Feeder space recommendations:

<table>
<thead>
<tr>
<th>Pig wt.</th>
<th>Feeder space</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 - 30 lb</td>
<td>2 pigs/space</td>
</tr>
<tr>
<td>30 - 60 lb</td>
<td>3 pigs/space</td>
</tr>
<tr>
<td>Over 60 lb</td>
<td>4 pigs/space</td>
</tr>
</tbody>
</table>

C. Water space:
1) One waterer for each 10 pigs with a minimum of 2 waterers per pen.
2) Place nipples at about 10" for 10 lb pigs, 12" for 12 lb pigs, etc.
3) Nipple drinkers are better because of their cleanliness and lower wastage.
4) Flow rate should be at least 1.25 cup per minute.

* Some info on water space: [1992. Feedstuffs 64(17):16]
  a) Should be no more than 15 pigs/nipple.
  b) The optimum flow rate of nipple drinker is more than 1 cup/min, but less than 4 cups/min.
  c) With the lower flow rate, may have no adverse effect on weight gain because pigs compensate for its low flow rate by spending more time at the nipple, but, may notice behavioral changes (↑ aggressions).

BABY PIG NUTRITION

1. Starter Diets

A. Not a long ago, only one starter diet was used for baby pigs, but nowadays, it is common to use a three-phase feeding system. [e.g., See a box (Luce & Maxwell, OSU)]

B. Phase feeding:
   1) Phase I diets are often formulated without soybean meal and they are pelleted.
   2) May ↑ performance during the starter phase.
   3) Some question on the effect of improved performance on overall growth performance & cost effectiveness!

C. Sometimes, mixing own starter diets may not be cost-effective, especially diets for very young pigs.

* Thus, may want to buy a complete diet or a base mix containing many special ingredients if you do not have many sows and(or) producing pigs only few times/year!

2. Type of Ingredients/Diets

- Mostly depending on the weight and(or) age of starter pigs.

  A. 3-week-old or younger (≤ 15 lb) - Need a complex diet!
  B. 4- to 6-week-old (up to = 25 lb) - A semi-complex diet (i.e., a diet containing some milk products) or a corn-soy-based diet (. . . may ↑ the performance slightly, but justified economically?!).
  C. 6-week-old or > 25 lb - Some milk products are recommended, but a simple diet (corn-soy diet) can be used.
3. **Suggested Baby Pig Diets**


<table>
<thead>
<tr>
<th>Item</th>
<th>Starter 1/ transition&lt;15 lb</th>
<th>Starter 2 15-25 lb</th>
<th>Starter 3 25-50 lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingredients, %</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Corn</td>
<td>31.45</td>
<td>52.50</td>
<td>51.10</td>
</tr>
<tr>
<td>SBM (44% CP)</td>
<td>8.50</td>
<td>22.90</td>
<td>23.65</td>
</tr>
<tr>
<td>Soy protein</td>
<td>3.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dried whey</td>
<td>27.50</td>
<td>15.00</td>
<td>15.00</td>
</tr>
<tr>
<td>Plasma proteins</td>
<td>6.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Oat groats</td>
<td>12.50</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fish meal</td>
<td>5.00</td>
<td>-</td>
<td>4.00</td>
</tr>
<tr>
<td>Blood meal</td>
<td>-</td>
<td>2.50</td>
<td>-</td>
</tr>
<tr>
<td>Fat (stabilized)</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>L-lysine HCl</td>
<td>0.15</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>DL-methionine</td>
<td>0.10</td>
<td>0.05</td>
<td>-</td>
</tr>
<tr>
<td>Limestone</td>
<td>0.45</td>
<td>0.60</td>
<td>0.40</td>
</tr>
<tr>
<td>Dical phosphate</td>
<td>0.80</td>
<td>1.65</td>
<td>1.05</td>
</tr>
<tr>
<td>Salt</td>
<td>0.10</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>Trace mineral</td>
<td>0.15</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>Vitamin mix</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Copper sulfate</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Calculated analysis, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lysine</td>
<td>1.55</td>
<td>1.25</td>
<td>1.25</td>
</tr>
<tr>
<td>Protein</td>
<td>22.1</td>
<td>18.9</td>
<td>19.3</td>
</tr>
<tr>
<td>Calcium</td>
<td>0.90</td>
<td>0.80</td>
<td>0.80</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>0.80</td>
<td>0.70</td>
<td>0.70</td>
</tr>
</tbody>
</table>

\*SBM = soybean meal; soy protein = soy protein concentrate; dried whey = edible dried whey; plasma proteins = spray-dried plasma proteins; fish meal = select menhaden fish meal; blood meal = spray-dried blood meal.

\*Provide a total of 4 lb/pig (at least 3 lb after weaning) to pigs > 13 lb at weaning, but < 28 days of age.

4. **Feed Ingredients and Additives**

A. Protein sources in general:

1) Milk products (dried skim milk, whey):

   a) Very good ingredients for weanling pigs because: (1) no need for an adaptation period, (2) highly palatable, (3) contain a highly available source of energy, lactose, and (4) “efficient” utilization of milk proteins.

   b) Form a “curd” in the stomach by coagulation of milk proteins by “rennin” (or chymosin) produced in the gastric mucosa: (A concentration/activity of rennin with age!)

   (1) A curd can stay in the stomach longer, which can stimulate acid secretion, thus enhancing the activation of proteases (. . . pepsins, which are produced as pepsinogens or proenzymes).

   (2) Causes stomach to release nutrients very slowly, . . better utilization!

2) Soy proteins do not form a curd and acid secretion is very slow, . . less enzyme activation, and some components may be harmful to pigs because of, for instance, allergic reactions!
3) Soy protein concentrate (being used by the Food Industry) - Potentially harmful carbohydrates (raffinose, stachyose, etc., in which galactose is joined by “α-1,4-galactosidic linkage”) are removed, thus may improve palatability and availability. But, they are expensive, and pigs’ response is very inconsistent!

B. Some protein sources/supplements for baby pigs:

1) Fish meal - Cost and quality of fish products vary greatly, and limit to a maximum of 5% (depending on the quality) because of palatability issue.
2) Dried whey:
   a) Most commonly used in starter diets.
   b) Because of variations in the quality (see a box), try to use only “edible” grade, which are higher in lysine and lower in ash & salt compared with feed grade, especially for newly weaned pigs.
   c) Tan/brown in color means “overheating” & it has less available lysine.

3) Dried plasma proteins, which are highly palatable & may have some role in the immune status of young pigs - Can be an alternative to milk products?

C. Alternative grains (other than corn and milo):

1) Oats - Use ≤ 20% because of “high fiber/low-energy content.”
2) Barley - Use ≤ 20-25% because of a palatability problem & also low in energy.
3) Wheat - Use ≤ 30-35% because of a palatability problem. Also, avoid fine grinding!

D. Fats/oils:

1) Palatable, excellent sources of energy, and reduce “dustiness” in feeds & buildings.
2) Fats are cheaper vs oils, but have to be melted before incorporating into the diet.
3) Oils are easier to mix vs fats, but still need extra time, and they are rather expensive.
4) In a high-milk diet, may or may not see beneficial effects of fats/oils.
5) Medium-chained fatty acids (MCT; contain 8-14 carbons, and for e.g., coconut oil contain = 60% MCT):
   a) Research interest in recent years.
   b) Highly digestible vs long-chained fatty acids because MCT may be absorbed /without “micelle formation.”
   c) May improve the performance slightly, but very expensive & may not be justified economically?

E. Antibacterial agents:

1) Three types:
   a) “Antibiotics” - Compounds synthesized by living organisms that can inhibit the growth of other microorganisms, and there are two types (mostly derived from bacteria and molds):

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### Composition of dried whey:

<table>
<thead>
<tr>
<th>Item</th>
<th>Low</th>
<th>High</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>4.5</td>
<td>9.7</td>
<td>6.4</td>
</tr>
<tr>
<td>Protein</td>
<td>5.3</td>
<td>13.2</td>
<td>11.8</td>
</tr>
<tr>
<td>Lysine</td>
<td>.32</td>
<td>1.12</td>
<td>.85</td>
</tr>
<tr>
<td>Calcium</td>
<td>.43</td>
<td>1.35</td>
<td>.71</td>
</tr>
<tr>
<td>Salt</td>
<td>2.2</td>
<td>3.9</td>
<td>2.8</td>
</tr>
</tbody>
</table>
(1) Broad spectrum - e.g., Aureomycin (chlortetracycline) & Terramycin (oxytetracycline).
(2) Narrow spectrum - e.g., Tylosin, Penicillin, etc.

b) “Chemotherapeutics (or chemobiotics)” - Compounds that have bacteriostatic or bactericidal properties. Unlike antibiotics, they are produced chemically, and examples include sulfa compounds, carbadox, & copper sulfate.

c) “Combinations” - A combination of antibiotic(s) and chemobiotic(s) such as CSP 250, ASP 250 & Tylan Sulfa-G.

2) Can one population of bacteria that may be causing subclinical or non-specific diseases, thus can improve pig performance.

a) e.g., Antibiotics - “Improvement (%)” in growth performance over control:

<table>
<thead>
<tr>
<th>Years</th>
<th>Weight gain</th>
<th>Feed/gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950-1977</td>
<td>16.1</td>
<td>6.9</td>
</tr>
<tr>
<td>1978-1985</td>
<td>15.0</td>
<td>6.5</td>
</tr>
</tbody>
</table>

b) An additive effect of antibiotic and chemobiotic, i.e., using together can result in better performance than used singly.

e.g., Additive effects of antibiotics & copper sulfate: (1990. NHF/Apr.)

<table>
<thead>
<tr>
<th>Apramycin, ppm</th>
<th>Cu, ppm</th>
<th>0</th>
<th>125</th>
<th>0</th>
<th>125</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>125</td>
<td>1.10</td>
<td>1.21</td>
</tr>
<tr>
<td>ADFI, lb</td>
<td>0.60</td>
<td>0.68</td>
<td>0.73</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>Feed:gain</td>
<td>1.85</td>
<td>1.80</td>
<td>1.79</td>
<td>1.69</td>
<td></td>
</tr>
</tbody>
</table>

3) Drug resistance

a) For every 10-mil bacteria, usually one is resistant to a particular antibiotic.
b) With a continuous use of the same antibiotic, the majority of bacteria will be inhibited or killed, but the “resistant” bacteria will multiply rapidly.

Equally applicable to other species!

c) Two types of resistance: (1) “Mutational” - Being passed on to daughter cells only, and (2) “Transferable” - Has a resistant or R factor, which can be transferred to other bacteria of the same or different types.
d) Questions/problems?

(1) Are antibiotics still effective in animals? - Yes, according to many data, including a data set already mentioned (… see the % improvement in growth performance due to antibiotics between 1950-1977 & 1978-1985)!
(2) Can R factors from normal bacteria be transferred to pathogenic bacteria such as salmonella? - Can be, but very rarely, and disease-causing capability is considerably when they are transferred!

(3) Can the resistant pathogen be passed on to humans?

(a) If so, antibiotics are no longer effective in treating humans!
(b) According to some study, “resistant bacteria” are unable to establish themselves in the GI tract of human volunteers.

But, theoretically, still possible, thus continues to be a subject of concern, and the drugs of the greatest concern are “penicillin & tetracycline!”

F. Organic acids:

1) European producers have been trying to acidify starter diets for some time, and fumaric acid, citric acid & others may be effective in improving performance.

2) How do they work?

a) Acidic diets can stomach pH (more acidic), which can activation of pepsin, rate of passage, and keep pathogenic bacteria in check.

b) May prevent overeating because acids are slightly unpalatable, : avoid overloading the digestive system, which can lead to less diarrhea.

3) Does it pay?

a) Costs - Inclusion of 1½ to 3% fumaric or citric acid (60¢ to $1/lb) costs additional $30 to 60/ton.

b) If pigs are healthy and growing well, may not see obvious responses! To offset $60/ton, need a sizable performance improvement, thus”may not be beneficial unless problems exist!”

G. Probiotics:

1) A mixture(s) of bacteria, yeasts and(or) other microorganisms (MO), and may competitively inhibit undesirable MO, thus helping desirable MO.

2) However, its effect on pig performance has been very inconsistent!

H. Flavors:

1) Being used by the feed industry to enhance feed intake and(or) cover up odors (e.g., odor of fish meal).

2) Adding flavors for pigs or producers? - Pigs have a different No. of taste buds!

I. Enzymes:

1) Included in the diet to assist digestive process . . . Remember that the young pig’s digestive system is not fully competent, thus the idea in excellent!

2) The response has been very inconsistent:

a) One of the reasons? “Heat processing!” - Baby pig diets are often pelleted or crumbled, thus the effectiveness may depend a method of incorporation!?
b) Exception? The use of β-glucanase, which can breakdown β-glucan (e.g., 5-8% in barley), has been resulted a very consistent response!

5. A Check List for Selecting Nursery Feeders

A. Allows pigs their normal eating stance.
B. No buildup of feed in the trough yet not to restrict feed intake.
C. Easy to adjust openings.
D. Agitator - Easy to learn, and easy to use.
E. Allows pigs to swallow feed with their mouths in or above the trough.
F. Feed should be accessible to pigs at or near the floor level.
G. Pigs should not be able to climb into or become trapped by the feeder.
H. Free of protruding bolts, nuts & sharp edges, especially in places where insufficient clearance for pig's head and neck.

HEALTH MANAGEMENT OF BABY PIGS

1. Post-weaning Scours - A Major Problem!

A. Big three:

1) TGE (Transmissible Gastroenteritis):
   a) Caused by virus that belong to a group called coronaviruses, and destroys digestive cells (villi) in pig's intestines, thus no digestion/absorption, which can lead to “diarrhea!”
   b) The most deadly, and the most feared by producers.

2) Rotaviral diarrhea:
   a) Caused by groups of rotavirus (groups A, B and C), and destroys the lining of the small intestine.
   b) Rotaviruses are resistant to low pH, lipid solvents & many disinfectants, and they can survive for a long time!

3) Colibacillosis (E. coli):
   a) Caused by certain strains of E. coli that are classified as enteropathogenic, which can propagate rapidly, and produce toxins (enterotoxin).
   b) Toxins can cause massive fluid and electrolytes losses from the body, and the result being a large amount of pale yellow, watery feces.
   c) Its effects might be a secondary to the damage caused by TGE or rotavirus?

B. Mixed Infections?

1) Out of 158 cases of colibacillosis, 104 were E. coli alone & 54 cases involved rotavirus or TGE, whereas 33% of TGE cases were mixed with rotavirus or E. coli (Missouri data).
2) In mild cases, all three have similar symptoms - Watery diarrhea ≤ 1 wk after weaning, which can last 2-3days & result in dehydration & lack of appetite. Pigs may recover, but they remain “stunted” and 1 days to market.
3) Because of body reserves/some immunity, scours in the nursery is generally mild, but with a combination of the three or a poor environment, likely to see severe diarrhea!
4) Identifying a problem(s) is difficult because of too much overlap, and it requires a complete diagnosis, i.e., post-mortem bacteriology, virology and histopathology.

C. Treatment/prevention:

1) Treatment: a) No effective drugs to treat TGE or rotaviral diarrhea, b) the efficacy of drugs for colibacillosis varies depending on strains, c) electrolytes solution in water may or may not be effective, and d) the effectiveness of vaccines are variable for rotaviral diarrhea and TGE, and it depends on a proper identification of strain(s) for colibacillosis.

2) Combination? Treat pigs with anti-bacterials, and immunizing sows and pigs for colibacillosis (use multiple antigens). May reduce the severity of TGE and rotaviral diarrhea?

D. “Prevention” by good management practices:

1) Probably the best treatment - The use of “All-in/all-out,” colostrum to pigs, ensure an adequate milk intake, a good sanitation program, a warm, draft-free environment, etc.
2) For TGE (e.g.):
   a) Once infected, prevent from spreading by isolating the infected-herd & exercising care in handling pigs from one group to the next (use a different set of or cleaned/disinfected instruments, equipment & others, changing cloths & boots, etc.
   b) Control birds and vermin.
   c) Proper handling of dead pigs ( . . . keep away from dogs, vermin, etc.).
   d) Not to allow dogs and cats from entering one building to the next.

2. Parasites

A. Estimated financial losses:

1) Internal parasites - $250 million/year because of ↓ feed intake, ↓ growth rate, and ↓ carcass value due to organ damage.

2) External parasites - $10 to $50 million/year (as high as $230 mil/yr according to a recent estimate by some) because a sever irritation can ↓ feed intake, thus ↓ growth rate. Also, can transmit some diseases [e.g., swine pox & eperythrozoanosis (anemia)].

B. Prevention/treatment:

1) Internal parasites:
   a) Accurate diagnosis/identification of species present for determination of specific drug(s) to be used for treatment.
b) Deworm sows one week before breeding and one week before farrowing, and wash sows before placing sows in a clean farrowing house.

c) Deworm pigs at 6 to 8 weeks of age and again 30 days later.

d) Isolate all incoming pigs and treat them.

“Deworming is NOT a substitute for poor sanitation or environmental conditions!

2) External parasites - A routine spraying or dipping with appropriate products:

a) Sows - 45 days pre-farrowing and again at 30 to 35 days before.

b) Pigs - About 8 weeks of age, and follow up in 2 weeks.

C. Ivomec can be used to eliminate both the external and internal parasites:

- An example of the program using Ivomec

  a) Inject sows two weeks before farrowing (300 µg/kg or 1 ml/75 lb).

  b) Keep injected sows from untreated pigs.

    - By doing a) & b), pigs should be free of parasites, and can stay “free” by keeping away from infected/untreated pigs.

  c) Treat every pigs on the farm within a day or two, and repeat 14 days later.

  d) Treat replacement stocks/feeder pigs on arrival and isolate for 7 days or so.

  “Ivomec is not effective against “whip worms” and “kidney worms!”