OTHER INFORMATION

SWINE DISEASE GUIDE


1. General

A. 10-year goals for weaning-finishing:

<table>
<thead>
<tr>
<th></th>
<th>Mortality</th>
<th>Weight in &amp; out</th>
<th>Number of days</th>
<th>Feed:gain</th>
<th>Average daily weight gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1%</td>
<td>14 &amp; 260 lb</td>
<td>110 days</td>
<td>2.15</td>
<td>2.25 lb</td>
</tr>
</tbody>
</table>

B. The cost of disease as an increase in days to market:

<table>
<thead>
<tr>
<th>Disease</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TGE</td>
<td>+ 4-10</td>
</tr>
<tr>
<td>Mycoplasma pneumonia</td>
<td>+ 10-25</td>
</tr>
<tr>
<td>AR</td>
<td>+ 5-15</td>
</tr>
<tr>
<td>Swine dysentery</td>
<td>+ 15-25</td>
</tr>
</tbody>
</table>

Footnotes/explanation for the description of swine diseases:

1Available through veterinarian.
2Follow the manufacturer's instructions.
3Slaughter not permitted for at least 21 days after biological products have been injected. (_days): days in the parenthesis = withdrawal.

2. Boars

Disease

**Swine erysipelas:**

Cause: Bacteria *Erysipelothrix rhusiopathiae*.

Prevention: Erysipelas vaccine, Erysipelas bacterin; Oral Erysipelas vaccine.

Treatment: Penicillin injectable (5 days); Anti-swine Erysipelas serum; Lincomycin injectable (2 days); Oxytetracycline injectable (18-22 days).

**Leptospirosis:**


Prevention: Leptospirosis bacterins - use the type according to strain of Leptospirosis diagnosed or 5-way if the type unknown.

Blood test for tentative diagnosis. Culture *Leptospira* to confirm the diagnosis. Use antibiotic treatments.

Treatment: Oxytetracyline injectable (18-22 days); Streptomycin injectable (30 days).
To reduce chronic carrier state of Leptospirosis: Chlortetracycline, 200 g/ton continuously or 400 g/ton for at least 14 days; Oxytetracycline, 500 g/ton for 7-14 days (5 days).

**Pneumonia (respiratory infections):**

- **Prevention:** Isolate new animals; Avoid drafty conditions and cold floors.
- **Treatment:**
  - Individual treatment: Injectable penicillin₂ (5 days); Injectable streptomycin₂ (18-22 days).
  - Herd treatment: Chlortetracycline in drinking water (1-5 days); Oxytetracycline in drinking water (1-5 days); Tiamulin in drinking water (3-7 days); Cefiofur.

**Influenza (respiratory infections):**

- **Cause:** Influenza virus & other virus - Pasteurella, Bordetella, Haemophilus pleuropneumoniae; Haemophilus parasuis, Streptococcus suis; Other bacteria; Stress from environmental changes.
- **Prevention:** Oxytetracycline injectable (long-acting)₂ (28 days); Check ventilation; Clean fans; Measure ammonia levels in air.
- **Treatment:** See "Pneumonia."

**Arthritis and lameness:**

- **Cause:** Erysipelas rhusiopathiae; Mycoplasma hyosynoviae; Streptococcus suis.
- **Prevention:** Sort for good feet and legs - much lameness is from bad conformation; Feed biotin throughout growing-finishing period?
- **Treatment:** Depends on diagnosis - Tylosin injectable₂ (14 days); Lincomycin injectable₂ (2 days); Penicillin injectable₂ (5 days); Anti-swine erysipelas serum.

**Osteochondrosis:**

- **Prevention:** Select animals carefully for the breeding herd; 250 mg vitamin C in feed per head per day?
- **Treatment:** 250 mg vitamin C in feed per head per day?

**Brucellosis:**

- **Cause:** Bacteria Brucella suis.
- **Prevention:** Buy from validated herds; Blood tests before adding animals to herd.
- **Treatment:** None.

**Pseudorabies:**

- **Cause:** Herpesvirus.
- **Prevention:** Buy only recently tested animals or from Pseudorabies-qualified herds; Isolate 21 days and retest.
- **Treatment:** None.

**Parvovirus:**

- **Prevention:** Nearly every herd has parvovirus - many young boars are negative to parvovirus tests on arrival on the farm, but recently infected boars are likely to shed parvovirus and infect susceptible gilts.
  - Vaccinate young boars for parvovirus on arrival, repeat vaccine after 3 weeks and every 6 months thereafter.
  - An alternative control plan is blood testing gilts and boars at 6.5 months of age. Retain only those that have titers equal to or greater than 1,000, which indicates active infection had occurred and the long-term (life) immunity is present. Negative boars can be retested at 30-day interval until high titers are obtained.
- **Treatment:** None.

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3. **Sows - Pre-Breeding**

**Disease**
### Brucellosis:
- **Cause:** Bacteria *Brucella suis*.
- **Prevention:** Buy tested animals only from validated herds.
- **Treatment:** None.

### Leptospirosis:
- **Cause:** See "Boars."
- **Prevention:** Vaccination 2-3 weeks pre-breeding; Repeat at 6-month intervals.
- **Treatment:** Chlortetracycline, 200 g/ton continuously or 400 g/ton for at least 14 days; Oxytetracycline, 500 g/ton for 7-14 days approximately one month before farrowing (5 days). Oxytetracycline injectable (20-26 days); Oxytetracycline injectable (long-acting) (28 days).

### Erysipelas:
- **Cause:** See "Boars."
- **Prevention:** Vaccination 2-3 weeks prior to breeding.
- **Treatment:** See "Boars."

### Influenza & Pneumonia (Respiratory Infections):
- **Prevention:** Influenza during or shortly after breeding may produce reproductive problems - similar to PRRS.

### Arthritis and Lameness:
- **Prevention:** Sort the breeding stock for good foot and leg conformation. Hoof problems - biotin supplementation throughout growing-finishing period?; Will not work on adults?

### 4. Sows - Gestation and Farrowing

#### Disease

### Specific Infections Causing Early Embryonic Death:
- **Cause:** e.g., parvovirus.
- **Prevention:** Commercial or autogenous vaccines are available. Administer 5 weeks before breeding and repeat at 2 weeks before breeding. Repeat vaccination every 6 months thereafter. Parvovirus - see "Boars."

### Non-Specific Infections Causing Early Embryonic Death:
- **Cause:** Bacteria & virus.
- **Prevention:** Commingling sows and gilts. Expose them to each other 30 days prior to breeding so they will develop immunity to bacteria/virus that may be present. No preventive treatment is available for viral infections, except parvovirus and pseudorabies.

### MMA Syndrome (Mastitis, Metritis & Agalactia):
- **Cause:** *E. coli, Klebsiella, Streptococci sp.*, and other bacteria; Management factors, nutritional deficiencies and other unknown causes.
- **Prevention:** Feed antibiotics that sensitivity testing indicates would be of value in the herd. Autogenous bacteria prepared from bacteria involved in the herd problem. Use at 6 weeks and 2 weeks before farrowing. Vitamin E 10,000-20,000 units per ton. Sanitary procedures in farrowing crates; Avoid wood shavings and corn stalks or cobs that have not been heat sterilized for bedding.
- **Treatment:** Antibiotic injections (withdrawal - vary); Corticosteroids injections; Oxytocin injections.

### MMA Syndrome (Agalactia):
- **Cause:** Constipation, mastitis, metritis & hormonal deficiencies.
- **Prevention:** Check nipples for water flow - need .5 gal./minute; Others.
Treatment Mineral oil by mouth, enemas; Epsom or Glauber salts in feed or water; Increase fiber in the diet; Oxytocin injections² - .25-.5 ml.

Mastitis & metritis - see "MMA (mastitis & metritis)."

**Atrophic rhinitis (AR):**

**Cause** Bacterium *Bordetella bronchiseptica* & secondary invading bacteria.

**Prevention** Keep old sows in preference to gilts to reduce spread in pigs.

**Vaccination:** Vaccinate sows 5 weeks before farrowing and pigs at 3-7 days and repeat at 21 days (some companies recommend sows be vaccinated at breeding and 2 weeks prefarrowing). Use *Bordetella/Pasteurella*-type D toxigenic (and Type A toxigenic) bacterin or internasal live *Bordetella* vaccine. Drip .5 ml of vaccine into each pig's nostril as soon after birth as possible.

**Treatment** Long-acting oxytetracycline injections - .5 ml on day 1 & 1 ml on day 8 & 15 (28 days).

**Porcine reproductive & respiratory syndrome (PRRS):**

**Cause** Lelystad virus.

**Prevention** Difficult to prevent - test 10 late nursery pigs by ELISA serology if herd is positive.

**Treatment** Treat secondary pneumonia. Eradication from the herd - depopulate, clean and disinfect nursery to break virus cycle may be useful? Obtain serology profile of entire herd.

**Influenza pneumonia:**

**Cause** Influenza virus; *Pasteurella* and other bacteria.

**Prevention** Avoid bringing in new animals; Exposure to viruses, including influenza during gestation, may affect baby pigs before birth. Influenza vaccine is available.

**Treatment** Tiamulin in drinking water (3-7 days); Individual treatment - Oxytetracycline injectable² (20-26 days); long-acting Oxytetracycline injectable² (28 days); Tylosin injectable (14 days); Lincomycin injectable (2 days).

**SMEDI (stillborn, mummified pigs, embryonic death, infertility):**

**Cause** Enteroviruses, influenza virus, parovirus and other viruses that may affect the unborn pig causing early embryonic death, mummification, stillborn or weak pigs at birth.

**Prevention** Commingling sows and gilts 30 days before breeding. Give fence line contact with new boars. Avoid exposure of pregnant animals to outside animals. Animals affected usually will carry normal litters at the next breeding if not exposed to a different virus. The condition may recur in 2-3 year cycles on some farms.

A vaccine for parovirus is available - majority of SMEDI is due to parovirus (see "boars").

**Treatment** None.

**Pseudorabies:**

**Cause** Herpesvirus - produces abortions.

**Prevention** Bring in blood tested negative animals from Pseudorabies-Qualified herds; Isolate 21 days and retest.

Vaccinate every 6 months and prior to breeding. Emergency - can vaccinate pregnant sows or gilts.

**Treatment** Use pseudorabies vaccine that have a differential test kit available.

**Brucellosis:** (See "Boars.")

**Transmissible gastroenteritis (TGE):**

**Cause** Virus.

**Prevention** Vaccination of the sow twice¹, 6 weeks and 2 weeks prior to farrowing with injectable vaccine, or if oral vaccine is used, give orally 5 weeks and 3 weeks followed by one dose by injection 1 week prior to farrowing. Booster vaccination (one injectable or one oral & one injectable) before all subsequent farrowings.

**Treatment** None, except "fluids" orally or by injection. Avoid outside exposures during farrowing periods.

**Clostridial enteritis (Type C & D; Type A has been reported):**

**Cause** Bacteria *Clostridium perfringens* Type C & D.
Prevention Vaccination of the sow twice\(^3\) - 10 weeks and 2 weeks prior to farrowing; Bacitracin methylene disalicylate 250 g/ton of sow diet prefarrowing through lactation.

Treatment A disease of the baby pig, which may be prevented by the sow vaccination.

**Erysipelas:**

**Cause** Bacteria *Erysipelothrix rhusiopathiae*.

**Prevention** Vaccination of the sow\(^3\) can be done anytime during gestation - prefer before breeding to get maximum protection of the sow during entire gestation.

**Treatment** Repeat vaccination 3-4 weeks prior to farrowing to help protect the baby pig and sow during stress of farrowing, but not 1 week pre- or 4 weeks post breeding. See "Boars."

**Leptospirosis:**

**Cause** Bacteria *Leptospira pomona, L. grippotyphosa, L. canicola, L. icterohemorrhagiae, L.hardjo & L. bratislava*.

**Prevention** See "Boars."

**Vaccination of the sow**\(^1,3\) can be done anytime during gestation - prefer before breeding to get maximum protection of the sow during entire gestation. Repeat 2 weeks before every breeding.

**Treatment** See "Boars."


**Arthritis and lameness:**

**Cause** Get proper diagnosis - *Erysipelas rhusiopathiae; Mycoplasma hyosynoviae; Streptococcus suis; Mineral deficiencies; Injuries - footpads, hoof wall cracks; Osteochondrosis*.

**Prevention** Good selection practice may be an aid. Corticosteroids injectable\(^2\). Biotin - start at weaning and feed to adult age?

**Treatment** Depends on diagnosis - Tylosin injectable\(^2\) (14 days); Lincomycin injectable\(^2\) (2 days); Penicillin injectable\(^2\) (5 days); Anti-swine erysipelas serum.

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5. **Baby Pigs**

**Disease**

**Hypoglycemia (Sugar deficiency):**

**Cause** Starvation; Chilling.

**Prevention** Avoid chilling. Allow pigs to nurse shortly after birth - don't keep the pigs away until the sow is through farrowing.

**Treatment** Dextrose or dark syrup by mouth in very dilute solution or dextrose injected intraperitoneally as 5% solution.

**Transmissible gastroenteritis (TGE):**

**Cause** TGE virus.

**Prevention** Avoid exposure - limit people, animals and trucks on the premises. Don't bring it from the market, neighbors, etc.

Sow vaccination - see "Sows." Isolate animals for 60 days after arrival on the farm.

**Treatment** Difficult. Normal electrolytes 1 in water may help to replace the fluid loss in pigs. If they are more than 1 week of age, may be able to save few more pigs by weaning and putting on good milk replacer with antibiotics, and by not weaning and place a pan of a good milk replacer in the creep area of farrowing crate. Disinfect pan daily.

**Clostridial enteritis (Type C & D; Type A has been reported):**

**Cause** Bacteria *Clostridium perfringens* Type C & D.

**Prevention** Sow vaccination\(^1\) to protect pigs through colostrum (see "Sows"). Vaccinating sows with toxoid preferred. Feeding anti-bacterials such as bacitracin methylene disalicylate to sows prefarrowing may help (see "Gestating Sows").

**Treatment** None.

**Pseudorabies:**
**Cause**

Herpesvirus - produces central nervous disturbances, diarrhea, vomiting, severe death losses.

**Prevention**

Vaccination - see "Sows Gestation-Farrowing."

**Treatment**

In acute outbreaks, vaccination of all pigs may save some pigs. Chronic coughing occurs in growing and finishing pigs in some infected herds - vaccinate pigs at 9-10 weeks of age after making diagnosis by blood testing.

**Non-specific diarrhea:**

**Cause**

E. coli and others.

**Prevention**

Commercial bacterins that contain E. coli pilus antigens given to sows by injection 5 and 3 weeks before farrowing.
Sanitation of the building, wash and disinfect. Wash the sow or gilt when brought to the farrowing house - they may be carriers of bacteria, viruses or parasite eggs. Allow an interval between farrowings.
Keep pigs warm, clean and dry. Raised farrowing crates are very useful. Avoid using manure pits.

**Treatment**

Early treatment (first 24 hours most important) with an antibiotic or sulfonamide drug selected by using a sensitivity test or experience. Where the problem exist, a good practice to treat during first 24 hours regardless.

**Nutritional anemia:**

**Cause**

Iron deficiency.

**Prevention**

Inject with injectable iron compounds at 1-3 days of age (neck muscle or under the skin of the neck or flank). Excess may be a cause of E. coli scours - give no more than 100 mg at 1-3 days & repeat 100 mg at 10 days of age. Orally - ?

**Treatment**

Once anemia occurs, use injectable iron compounds. Add additional iron and copper to creep feed, but avoid excess.

**Pneumonia:**

**Cause**

Pasteurella; Mycoplasma; Haemophilus pleuropneumoniae; Secondary to AR; Pseudorabies; Drafts & chilling.

**Prevention**

Improve management, avoid drafts and chilling. Check ventilation.

**Treatment**

Injections: Oxytetracycline (20-26 days); Long-acting Oxytetracycline (28 days); Penicillin (5 days); Bacterins for Pasteurella pneumonia; Tylosin (14 days); Lincomycine (2 days); Ceftiofur.
Tiamulin in drinking water (3-7 days).

**Atrophic rhinitis (AR):**

**Cause**

Bacterium Bordetella bronchiseptica & Pasteurella multocida.

**Prevention**

Vaccinate with Bordetella or Bordetella/Pasteurella-type D toxigenic (and Type A toxigenic) bacterin at 7 days of age and repeat at 21 day of age. Internasal live Bordetella vaccines during the first day of life.
Obtain rhinitis-free breeding stock. Wean pigs early in infected herds. Save older sows to raise replacement gilts. Avoid stressful conditions - enteritis, anemia, pneumonia and parasites will make the effects of AR more severe.
Keep cats and other carrier animals out of the farrowing house. Maintain good preventive disease practices as well as good nutritional practices.

**Treatment**

Chlortetracycline 100 g/ton; Penicillin 50 g/ton; Tylosin 100 g/ton. Use for a minimum of 5 weeks, preferably to 75 lb. Antibiotics can be injected for treatment of individuals showing respiratory problems.

**Lameness:**

**Cause**

Navel infection, tail docking, foot and leg abrasions, and other injuries.

**Prevention**

Use sanitary methods to reduce infections and control hemorrhages; Electric instruments are useful for docking tails as they cauterize the tail stump.

**Treatment**

Injectable antibiotics.

**Bacterial enteritis:**

**Cause**

E. coli - most common; Erratic diet - sow's milk and creep feed; Pig's immune system at low point at 3 weeks of age.
Prevention Avoid chilling and drafts. Keep pens dry. Consider using creep feeds with lower protein levels that have additional lysine and others. Carbadox in the feed may be of value.

Treatment Tetracycline in pig's drinking water (4 days); Gentamycin sulfate in drinking water for postweaning E. coli enteritis - treat for 3 days (10 days); Carbadox (70 days).

Arthritis:

Cause Streptococcus suis, Streptococci sp., Corynebacterium sp., Staphylococci sp.

Prevention Clip needle teeth in first few hours, and ear notch and dock tails in a clean and sanitary manner. Disinfection of navels is important, but other source of infections are the ears, knees, and tail in modern swine units.

Avoid rough floors - mechanical abrasion of the feet and knees occur in first few hours of life. The use of epoxy paint on the floor surface may be helpful, but avoid excessively smooth surface. Use indoor/outdoor carpet or mat where pigs nurse.

Treatment Oxytetracycline (20-26 days); Penicillin (5 days); Tylosin (14 days); Lincomycin (2 days).

6. Weanling Pigs and Finishing Pigs

Disease

Colibacillosis (postweaning diarrhea), feeder pig enteritis & non-specific bacterial enteritis:

Cause Usually E. coli.

Prevention Avoid stresses including feed changes. Medicate feed and/or water for 5-7 days during the stressful period. Hand feed first few days postweaning several times/day. Check for excess iron in postweaning diets (excess iron favors overgrowth of E. coli).

Treatment See "necrotic enteritis."

Correct anemia if present. Normal electrolytes may be of value in the water. Additional fortification of diets with B vitamins (especially niacin) may be helpful?

Aromycin; Gentamycin; Neomycin; Trimethoprim/sulfamethoxazole.

Edema disease (Enterotoxemia):

Cause E. coli; Stress such as weaning, shipping and feed changes.

Prevention Avoid stresses. Use feeds with high fiber content (e.g., 20% ground whole oats).

Treatment Starvation for 24 hours. Tetracycline in drinking water (4 days).

Necrotic enteritis:

Cause Salmonella sp. (may be present as a systemic disease with little or no diarrhea); Contaminated feed sources; Carrier animals.

Prevention Bacitracin, 50-100 g/ton; Carbadox, 50 g/ton (70 days); Chlortetracycline, 50-100 g/ton; Oxytetracycline, 50 g/ton.

Isolate new animals for 3-4 weeks before mixing with other pigs; Be sure diet contains 16 g/ton.

Treatment Bacitracin, not less than 100 g/ton; Carbadox, 50 g/ton for pigs weighing < 75 lb (has not been cleared for use in combination with sulfonamides); Chlortetracycline, 100-200 g/ton; Neomycin sulfate, 70-140 g/ton (20 days); Oxytetracycline, 100 g/ton; Penicillin, 90 g maximum/ton in combination (5 days); Niacin, 30 g/ton.

Jowl abscess (cervical abscesses):

Cause Bacteria Streptococci sp. - most common; Many others also associated with abscess formation.

Prevention Vaccination at 10-15 weeks of age; Chlortetracycline - 50-100 g/ton to reduce incidence; Wean pigs by four weeks of age.

Treatment Surgically drain abscesses (limited value on a herd basis); Penicillin (5 days) - conduct sensitivity tests of bacteria present to determine correct antibiotic.

Parakeratosis:

Cause Zinc deficiency and/or high calcium & other mineral imbalances.

Prevention Addition of 50 ppm Zn to the diet.

Treatment Addition of 50 ppm to the diet; Check levels of other minerals.
Hemorrhagic syndrome (bleeding disease):
  
  **Cause**
  Anti-vitamin K factors; Mycotoxins; Moldy feeds; Unknown causes.
  
  **Prevention**
  Menadione sodium bisulfite - 2 g/ton.
  
  **Treatment**
  Increase the level of vitamin K; Vitamin K injections².

Erysipelas:
  
  **Cause**
  Bacteria *Erysipelothrix rhusiopathiae*.
  
  **Prevention**
  Erysipelas vaccine¹,³ (avirulent); Erysipelas bacterin¹; Oral Erysipelas vaccine.
  
  **Treatment**
  Penicillin injectable² (5 days); Anti-swine erysipelas serum²; Lincomycin injectable² (2 days).

Swine dysentery:
  
  **Cause**
  Hemorrhagic dysentery; Vibrionic dysentery (bloody scours); Serpulina (Treponema - large spirochete); Hyodysenteriae.
  
  **Prevention**
  Isolate new animals.  Treat with an effective drug for 30 days as if infected; Avoid contaminated trucks and equipment.
  
  **Arsenic acid, 90 g/ton (5 days); Bacitracin, 250 g/ton; Lincomycin HCl, 40 g/ton; Carbadox, 50 g/ton (70 days); Oxytetracycline, 50 g/ton; Tylosin, 100 g/ton for 3 weeks and then 40 g/ton to market weight; Virginiamycin, 25 g/ton up to 120 lb.
  
  **Treatment**
  Carbadox, 50 g/ton (up to 75 lb; 70 days); Tylicine (14 days); Arsenic acid, 180 g/ton (5 days); Roxarsone, 50-200 g/ton for 5-6 days (5 days); Lincomycin HCl, 100 g/ton for 3 weeks and then 40 g/ton (6 days); Neomycin sulfate, 70-140 g/ton (20 days); Oxytetracycline, 100 g/ton; Tylosin, 100 g/ton for 2-6 weeks after treating with Tylosin in drinking water (2 days) for 3-10 days; Virginiamycin, 100 g/ton for 2 weeks followed by 50 g/ton up to 120 lb - over 120 lb, 100 g/ton for 2 weeks; Tiamulin in water, 60 ppm in drinking water for 5 days (3 days); Gentamycin sulfate water treatment for 3 days (10 days).

Atrophic rhinitis:  (See "Baby Pigs.")
  
  **Prevention**
  Avoid stresses.  Enteritis, pneumonia, parasites all make rhinitis more severe.

Arthritis:
  
  **Cause**
  *Erysipelothrix rhusiopathiae; Mycoplasma hyosynoviae or hyorhinis*.
  
  **Treatment**
  Tylosin injectable² (14 days); Lincomycin injectable² (2 days); Penicillin injectable² (5 days); Anti-swine erysipelas serum.

Pneumonia:
  
  **Cause**
  Secondary to AR; Secondary to influenza; *Pasteurella sp.; Mycoplasma sp.; Haemophilus pleurupneumoniae; Streptococcus suis*; Pseudorabies (respiratory form).
  
  **Prevention**
  See AR for "baby Pig"; Early treatment; Avoid drafts; Problem herds can use *Pasteurella* bacterins; Avoid bringing in new animals - isolate all additions to the herd; Reduce migration of Ascarids that make pneumonia more severe; PRV vaccine.
  
  **Treatment**
  Individual: Oxytetracycline² (20-26 days); Long-acting Oxytetracycline² (28 days); Penicillin injectable² (5 days); Lincomycin injectable² (2 days).  
  
  Herd (depending on drugs, but to be used in drinking water): Chlortetracycline (1-2 days); Oxytetracycline (1-2 days); Lincomycin (6 days); Tiamulin, 180 ppm in drinking water for 5 days (7 days); [Ceftiofur, 200 g/ton for 3 weeks postweaning].
  
  Tiamulin in drinking water (3-7 days).

Tail biting:
  
  **Cause**
  Tail biting injuries; Crowding; Dietary deficiencies; Lack of feeder & water spaces; Lack of bedding (bare concrete floors); Weather changes; Manure pit gases; Unknown causes.
  
  **Prevention**
  Remove tails & alleviate some adverse conditions mentioned in the "cause."
  
  **Treatment**
  Individual: Early treatment is essential; Penicillin injections (5 days); Oxytetracycline injections (20-26 days); Lincomycin injections (2 days).
  
  Herd: Organic iodides; Magnesium oxide in feed; Provide something (tires, bowling balls, etc.) to avoid boredom; Move pigs to a larger pen or outdoors.

Anemia:
  
  **Cause**
  Nutritional (iron deficiency); Eperythrozoonosis (blood parasite); Moldy grains (blood loss from hemorrhages); Gastric ulcers (blood loss).
Prevention Monitor hemoglobin levels in weaned pigs. Evaluate iron treatment of nursing pigs. Ulcers - avoid finely ground feed (use the particle size of = 700 microns).

Treatment Acute hemorrhages as from ulcers and the effects of mold are seldom observed early enough to justify treatment; Other anemia are corrected by adding iron and copper to the diet; Injected iron is used in conjunction with other postweaning diarrhea treatments.

7. Common Parasites - Internal

Parasite

| Whipworms: | Trichuris sp. |
| Cause | General swine sanitation. |
| Prevention | Check for the presence of parasites. Dichlorvos in feed as needed. Fenbendazole, 3 mg/kg for 3-12 day feeding period. |
| Treatment |

| Lungworms: | Metastrongylus sp. |
| Cause | Avoid ingestion of earth worms. |
| Prevention | Raise pigs in confinement; Avoid ingestion of earth worms. |
| Treatment | Levamisole in feed or water at weaning - repeat as needed (3 days); Sows: Levamisole in feed or water before breeding (3 days); Fenbendazole, 3 mg/kg for 3-12 day feeding period. |
| Ivermectin: injection, 300 µg/kg of body weight (18 days); in feed, 1.8 g/ton (5 days). |

| Ascarids (large roundworm): | Ascaris suum. |
| Cause | Worm the sow prior to breeding and 2 weeks prior to farrowing. Wash sows before farrowing. Raise pigs in cleaned buildings or new hog pasture. Avoid old lots. |
| Prevention | Pigs: Hygromycin B, 12 g/ton (15 days); Thiabendazole, .005 to .1% (45.5-908 g/ton) in feed - feed containing .05 to .1% for 2 weeks followed by feed containing .005 to .02% for 8-14 weeks; Pyrantel tartrate, 96 g/ton (.0106%) for 21-28 days (1 day). |
| Treatment | Sows: Levamisole in feed or water 7-10 days prior to breeding & 2 weeks prior to farrowing (3 days); Dichlorvos and Piperazine - the same schedule as Levamisole. Pigs: Dichlorvos mixed in feed at 6-12 weeks of age; Levamisole in feed or water at weaning - repeat treatment as needed (3 days); Pyrantel tartrate, 800 g/ton (1 day); Fenbendazole, 3 mg/kg for 3 days. Ivermectin: injection, 300 µg/kg of body weight (18 days); in feed, 1.8 g/ton (5 days). |

| Nodular & thread worms: | Oesophagostomum sp.; Strongyloides ransomi. |
| Cause | Nodular worm - Oesophagostomum sp.; Thread worms - Strongyloides ransomi. |
| Prevention | Strict sanitation in the farrowing house. Maintain sows and gilts in clean, dry pastures during gestation. |
| Treatment | Hygromycin B, 12 g/ton (15 days); Pyrantel tartrate, 96 g/ton for 21-28 days (1 day). |

| Kidney worm: | Stephanurus dentatus. |
| Cause | Fenbendazole in feed | 700 microns. |
| Treatment | 3 mg/kg for 3-12 days; Ivermectin injections, 300 µg/kg of body weight (18 days). |

8. Common Parasites - External

Parasite
Mange:

Cause: *Sarcoptes scabiei.*

Prevention: Dip or spray all new animals arriving on the farm. Routinely schedule spraying at 10-day intervals of animals and premise until control is achieved. Ivermectin injections, 300 µg/kg of body weight (18 days).

Treatment: Dip or spray (200 lb minimum pressure) - Lindane (30 days), Prolate (1 day), Permethrin (5 days) & Tactic (1 day); Ivermectin injections, 300 µg/kg of body weight (18 days).

Lice:

Cause: *Haematopinus.*

Prevention: Dip or spray all new animals arriving on the farm. Routinely schedule spraying at 2-3 weeks intervals of animals and premise until control is achieved. Ivermectin injections, 300 µg/kg of body weight (18 days).

Treatment: Dip or spray (200 lb minimum pressure) - Prolate (1 day), Permethrin (5 days) & Tactic (1 day); Fenthion-pour-on - use as a single application pour on the back line (14 days); Prolate dust (1 day); Ivermectin injections (see "Mange").

BIOSECURITY

There are many techniques that one should consider for securing herd's health: [1995. Pork'95 15(2):53]

1. Have your veterinarian test & assesses the disease status in each production phase of your herd.
2. Select a seedstock supplier with similar health status.
3. Implement isolation protocol for all incoming pigs:
   A. House new pigs away from the herd for 30 days.
   B. "Traffic" must be limited.
   C. Follow with appropriate blood testing.
4. After isolation:
   A. Move new pigs into an acclimatization area.
   B. Keep pigs there for 21 days, during which pigs should be exposed to cull or market pigs.
   C. Or, provide access to manure & others to expose new pigs to the farm's organisms.
   D. Begin vaccination programs if appropriate.
5. Once pigs are in the facilities:
   A. Sanitation program is must, and also limit pigs, humans & vehicle flow.
   B. A perimeter fence & warning signs are very useful.
6. Shower-in/shower-out?
   A. An extreme practice, and its practicality & necessity are being questioned.
   B. But, at least, boots & coveralls should remain with each building or room, and if possible, assign employees to specific areas.
7. Transportation:
A. Clean out and disinfect trucks and trailers after each use.
B. May want to establish off-site load-out facilities.
C. Drivers should change boots & clothes before re-entering the farm.

8. Establish a bird and rodent control program, and place bird screens on curtain-sided buildings and fans.

9. Dispose dead animals immediately.

10. Have your veterinarian conduct annual slaughter checks & periodically sacrifice a few pigs for necropsies.

11. Consider adopting herd health technologies such as all-in/all-out, segregated or medicated early weaning, multiple-site or on-site/off-site production.
### COMPOSITION OF COMMON FEEDINGREDIENTS


<table>
<thead>
<tr>
<th>Feedstuff</th>
<th>Protein (%)</th>
<th>Lys (%)</th>
<th>Trp (%)</th>
<th>Thr (%)</th>
<th>Met+ (%)</th>
<th>Cys (%)</th>
<th>Ca (%)</th>
<th>P (%)</th>
<th>ME (Kcal/kg)</th>
<th>Crude fat (%)</th>
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**Blood meal:**

- Flash-dried: 85.3 7.30 1.04 3.92 2.11 0.30 0.21 2068 1.4 1.0
- Spray-dried: 90.7 8.30 1.30 3.93 1.90 0.05 0.28 2552 5.3 1.0

**Canola meal**: 38.0 2.27 0.44 1.71 1.15 0.68 1.17 2454 3.8 11.1

**Corn and cob meal**: 7.8 0.17 0.07 0.29 0.26 0.06 0.24 2946 3.2 8.2

**Corn distillers grain** with solubles, dehy: 27.0 0.70 0.17 0.92 0.78 0.14 0.66 3326 9.3 9.1

**Corn gluten feed**: 23.3 0.64 0.15 0.79 0.80 0.18 0.99 2688 2.7 6.8

**Corn, high lysine**: 10.1 0.40 0.11 0.40 0.29 0.02 0.20 3432 4.0 3.7

**Corn, high oil**: 8.3 0.29 0.07 0.30 0.40 0.02 0.23 3544 7.2 2.3

**Corn, hominy feed**: 10.6 0.36 0.13 0.40 0.29 0.06 0.52 3302 5.7 5.0

**Corn, yellow**: 8.5 0.25 0.09 0.36 0.40 0.03 0.24 3412 3.6 2.3

**DL-methionine**: - - - - - 99.0 - - - -

**Dried brewers yeast**: 43.8 3.23 0.51 2.06 1.18 0.14 1.36 2860 0.9 3.0

**Dried fish solubles**: 31.5 1.85 0.43 1.57 1.35 1.28 1.02 3562 1.1 0.2

**Dried skim milk**: 33.3 2.54 0.43 1.57 1.35 1.28 1.02 3562 1.1 0.2

**Dried whole whey**: 13.3 0.94 0.18 0.89 0.49 0.86 0.76 3082 0.8 0.2

**Fats/oils**

- Animal/poultry: - - - - - - - - 7975 100 -
- Tallow: - - - - - - - - 7894 100 -
- Lard: - - - - - - - - 7751 100 -
- Corn oil: - - - - - - - - 7350 100 -
- Soybean oil: - - - - - - - - 7280 100 -

**Fish meal, Menhaden**: 61.2 4.74 0.65 2.51 2.33 5.19 2.88 3293 9.6 0.9

**L-lysine-HCl**: 95.8 78.00 - - - - - -

**L-tryptophan**: - - 98.0 - - - - - -

**Meat and bone**

- meal, 50% CP: 50.9 2.89 0.28 1.60 1.14 9.4 4.58 2275 9.7 2.4
- Meat meal, 55% CP: 55.6 3.09 0.38 1.78 1.41 8.27 4.10 2409 8.7 2.3

- Continued -

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<tr>
<th>Feedstuff</th>
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*a100% dry matter basis; Feed grade products usually contain water and other non-fat materials, thus energy concentrations should be adjusted accordingly.*
GENERALLY ACCEPTED TERMS & FORMULAS FOR THE PORK INDUSTRY
(Compiled by National Pork Producers Council, Des Moines, IA)

1. Formulas - Production

- **Marketable pork produced per year (or per time period)** (usually in lb or cwt) = weight of ending inventory + sales + home consumption, minus beginning inventory, minus purchases.
- **Total pork produced per year (or per time period)** (usually in lb or cwt) = weight of ending inventory + sales + home consumption + weight of post weaning death loss, minus beginning inventory, minus purchases.
- **Total feed consumed per year or per time period** = beginning inventory + feed purchases + home produced feed, minus ending inventory, minus sales, minus feed to other livestock.
- **Pigs produced per year (or per time period)** = ending inventory + sales + home consumption, minus beginning inventory, minus purchases.
- **Total pigs born per female per year (or per time period)** = total pigs born per year (or per time period) ÷ average female inventory.
- **Total pigs born per mated female per year (or per time period)** = total pigs born per year (or per time period) ÷ average mated female inventory.
- **Pigs born live per female per year (or per time period)** = pigs born live per year (or per time period) ÷ average total female inventory.
- **Pigs born live per mated female per year (or per time period)** = pigs born live per year (or per time period) ÷ average mated female inventory.
- **Pigs weaned per female per year (or per time period)** = No. of pigs weaned per year (or per time period) ÷ average total female inventory.
- **Pigs weaned per mated female per year (or per time period)** = No. of pigs weaned per year (or per time period) ÷ average mated female inventory.
- **Litters per female per year (or per time period)** = total farrowings per year (or per time period) ÷ average total female inventory.
- **Litters per mated female per year (or per time period)** = total farrowings per year (or per time period) ÷ average mated female inventory.
- **Average No. of pigs born per litter** = total pigs born ÷ No. of litters farrowed.
- **Average No. of live pigs born per litter** = live pigs born ÷ No. of litters farrowed.
- **Pigs weaned per litter farrowed** = No. of pigs weaned ÷ No. of litter farrowed.
- **Pigs weaned per female nursed** = No. of pigs weaned ÷ No. of females nursed.
- **Average pig birth weight** = litter birth weight ÷ total No. of pigs weighed.
- **Average pigs produced per litter** = pigs produced per year ÷ No. of farrowings per year (or per period).
- **Total female-to-boar ratio** = average total female inventory ÷ average total boar inventory.
- **Mated female-to-service boar ratio** = average mated female inventory ÷ average service boar inventory.
- **Pregnancy rate (%)** = No. of females checked positive for pregnancy within 40 days post mating ÷ No. of mated females within a contemporary group x 100.
- **Farrowing rate (%)** = No. of mated females that farrow within a contemporary group ÷ total No. of mated females for this contemporary group x 100.
- **Mated females removed per time period (%), i.e., herd turnover rate** = No. cull females sold/year ÷ No. mated female deaths/year ÷ average mated female inventory x 100.
- **Replacement rate (%)** = No. of added mated female ÷ average mated female inventory x 100.
- **Weaning percentage, % (i.e., % live pigs weaned)** = No. of pigs weaned ÷ No. of live pigs born x 100.
- **Herd weaning age (or average weaning age)** = average No. of days from farrowing to weaning.
- **Whole herd feed efficiency for total pork produced** = total pounds of feed consumed per year (or per time period) ÷ total pork produced per year (or per time period).
- **Whole herd feed efficiency for marketable pork produced** = total pounds feed consumed per year (or per time period) ÷ marketable pork produced per year (or per time period).
- **Sow productivity index (SPI)** = (6.5 x No. of born live pigs in litter) + adjusted 21-day litter weight. (See NSIF Guideline for adjustment factors.)
- **Days to 230 pounds** = actual age + [((230 - actual weight) x (actual age - 38)) ÷ actual weight].
- **Backfat at 230 pounds** = actual backfat + [230-actual weight) x (actual backfat) ÷ (actual weight - 25].
- **SPI ratio** = individual sow’s SPI ÷ SPI average of contemporary sow group x 100.
**Swine Production Handbook**  
*Section 18: Other Information*  

- **Average daily gain** = total ending weight - total beginning weight - total beginning weight of dead ÷ No. of pigs at the end x total No. of days.
- **Total pig days** = No. of days from date of beginning to ending weight x No. of pigs involved each day.
- **Litters farrowed per crate per year (or per time period)** = total No. of farrowing per year (or time period) ÷ average No. of farrowing crates.
- **Pigs weaned per crate per year (or per time period)** = No. of pigs weaned per year (or time period) ÷ average No. of farrowing crates.
- **Death loss (time)** (%) = No. that die (time) ÷ No. at risk (time) x 100.
- **Mated female death loss** (%) = No. of mated females that die per year ÷ average mated female inventory x 100.
- **Stillborn (%)** = No. of stillborn pigs ÷ total pigs born x 100.
- **Mummified pigs (%)** = No. of mummified pigs ÷ total pigs born x 100.
- **Pre-weaning death loss (%)** = pre-weaning death loss ÷ live pigs born x 100.
- **Post-weaning death loss (%)** = post-weaning death loss ÷ pigs weaned x 100.
- **Average market weight** = total weight all market hogs ÷ No. market hogs.

2. **Formulas - Economics**

- **Current ratio (liquidity ratio)** = current assets ÷ current liabilities.
- **Ownership equity ratio (%)** = net worth ÷ total assets x 100.
- **Debt-to-asset ratio (%)** = total liabilities ÷ total assets x 100.
- **Rate of return on assets** = net farm income + interest paid minus an allowance for operator and family unpaid labor ÷ average assets.
- **Rate of return on net worth** = net farm income minus an allowance for operator and family unpaid labor ÷ average net worth.
- **Returns per $100 feed fed** = total hog enterprise returns ÷ total feed costs x 100.
- **Returns per $100 expenses** = total hog enterprise returns ÷ total expenses (feed and non-feed) x 100.
- **Returns to unpaid labor and management** = total hog enterprise returns minus total costs except unpaid labor and management charge.
- **Management return** = total hog enterprise returns minus total costs.
- **Sows per FTE** = average total female inventory ÷ No. of FTE's.
- **Litters farrowed per FTE** = No. of farrowing per year ÷ No. of FTE's.
- **Total enterprise returns** = ending inventory + sales + home consumption, minus purchases minus beginning inventory.
- **Total non-feed costs** = power + equipment + buildings + labor (paid and unpaid) + livestock expenses + taxes + insurance + overhead + interest on all capital.
- **Total pork produced per FTE** = total pork produced per year ÷ No. of FTE's.
- ** Marketable pork produced per FTE** = marketable pork produced per year ÷ No. of FTE's.
- **Feed cost per cwt or marketable pork produced** = value of feed fed ÷ marketable pork produced x 100.
- **Feed cost per cwt of total pork produced** = value of feed fed ÷ total pork produced x 100.
- **Total returns per cwt of marketable pork produced** = total hog enterprise returns fed ÷ marketable pork produced x 100.
- **Total returns per cwt of total pork produced** = total hog enterprise returns ÷ total pork produced x 100.
- **Cost per cwt commercial feed** = total cost commercial feeds fed ÷ pounds of commercial feeds fed x 100.
- **Cost per cwt feed fed** = total feed cost ÷ total pounds feed fed x 100.

3 **Formulas - Marketing**

- **Price per cwt hogs actually received** = total dollars received (before NPPC and market deductions) ÷ pay weight x 100.
- **Base market price** = price quote per cwt on date sold at normal market outlet for US 1-2, 220-250 lb live weight hogs.
- **Live-weight cash sales premium of discount** = price actually received (for cash live-weight sales) minus base market price. (This can serve as a measure of the weight or other discounts received and the price differential associated with selling at a market other than the market from which the base price quotation comes.)
- **Grade and yield premium or discount** = price actually received (for cash grade and yield sales) minus base market price. (This measures the actual rather than the quoted premium or discount on grade and yield sales.)
- **Contracting premium or discount** = price actually received (for forward contract sales) minus base market price. (This measures the gain or loss from contracting hog sales. It indicates that cost of buying price insurance or protection through forward contracting.)
- **Gain or loss on futures trades** = net margin (gain or loss) minus interest on margin money ÷ cwt of hogs hedged. (This measures the gain or loss on those sales that involve futures market transactions. It indicates the cost of buying price insurance or protection through the futures markets.)
- **Average live weight** = total pounds (pay weight) ÷ No. of head.
- **Dressing percentage** = hot carcass weight with standard trim ÷ live weight x 100.
- **Commercial feed purchasing efficiency** = net cost/ton actual purchases (including storage costs and interest) minus price quotes if purchased on as-used basis. (This measures the benefits or costs of any forward contracting or quantity purchases of commercial feed.)
- **Corn purchasing efficiency** = price per bushel actual purchases (or market price at harvest + storage costs and interest on raised corn) minus price quotes in purchased on as-used basis. (This measures the benefits or costs of any forward contracting or quantity purchases of corn.)
- **Feeder pigs contracting efficiency** = actual price paid (contracted price) minus cash prices on delivery date. (This measures the benefits or cost of any contractual arrangements for purchasing feeder pigs.)
- **Marketing or purchasing efficiency** = base market price on days bought or sold ÷ average base price per time period.
- **Marketing cost per cwt marketed** = transportation costs + yardage costs + commissions ÷ pay weight x 100.

4 Glossary of Terms - General

- **Abortion** - The delivery of fetuses or fetal membranes between date of service and up to and including 109th day of pregnancy.
- **Accounts payable** - See liability.
- **Accrual basis** - An accounting system where income is reported in the year produced and expenses are claimed in the year the goods and services are used in production.
- **Age of weaning** - The No. of days between farrowing and weaning (farrowing = day 0), i.e., farrowing-to-weaning interval.
- **Anestrus females** - A female that is not detected in estrus.
- **Asset** - A resource or item of value that you own.
- **Average assets** - The average value of the beginning and ending assets.
- **Average net worth** - The average of the beginning and ending net worth.
- **Average carcass backfat thickness** - The average of three backfat measurements taken along the midline at the first rib, last rib, and last lumbar vertebra.
- **Average daily gain** - Amount of weight gained per day during a defined period of time.
- **Average mated female inventory** - The average of mated female inventory in the herd as recorded on 12 or more equally spaced occasions during the year.
- **Average No. of farrowing crates** - The average No. of farrowing crates available for use as recorded on 12 equally spaced occasions during the year. (Multiple recordings of No. of crates available during the year is not necessary if the No. of crates does not change.)
- **Average service boar inventory** - The average No. of service boars in the herd as recorded on 12 or more equally spaced occasions during the year.
- **Average total boar inventory** - The average No. of service boars and replacement boars in the herd as recorded on 12 or more equally spaced occasions during the year.
- **Average total female inventory** - The average total female inventory in the herd as recorded on 12 or more equally spaced occasions during the year.
- **Boar, replacement** - Any intact male pig intended for use in the breeding herd, but has not yet been used for breeding.
- **Boar, service** - Any male boar that is being, or has been, used for breeding purposes.
- **Breeding herd** - The inventory of the mated females and replacement gilts, service boars, and replacement boars.
- **Capital asset** - An asset with a life of more than one year.
• **Cash accounting** - An accounting method that accounts for cash sales and cash expenses and depreciation in the year they are incurred; also referred to as the cash receipts and disbursements method.

• **Cash flow statement** - A financial statement summarizing all cash receipts and disbursements over the period of time covered by the statement.

• **Contemporary group** - A group of swine managed under the same environmental conditions, generally no more than one month range in age or time.

• **Contingent liabilities** - Obligations that may become due only under specific circumstances.

• **Cost basis** - A method of valuing assets at their cost of production or acquisition.

• **Coordinated financial statements** - A set of financial statements designed to present the total financial picture which requires specific accounting relationships between the statements.

• **Culled breeding animal** - Any live breeding animal physically removed from the breeding herd production unit, whether to be sold immediately or to be moved to finishing pens.

• **Current assets** - Represents cash and near-cash items. They are assets that could be converted to cash without disrupting the ongoing business, and assets that will be used up or converted to cash during the year or during the firm's normal operating cycle.

• **Current liabilities** - Liabilities that exist on the date of the balance sheet that must be paid within 12 months.

• **Date of service** - The first mating date (or for group breeding, the first potential mating date) within a service period. For group breeding programs, the potential mating date equals the date a boar was first placed in the group.

• **Depreciation** - An accounting procedure by which the purchase price of an asset with a useful life of more than one year is pro-rated over time.

• **Discounted hogs** - Market hogs that are sorted out and discounted by the buyer, i.e., injury, weight, physical defects, etc.

• **Estimated breeding value** - An estimate of the animal's genetic worth.

• **Estrus** - A period of sexual receptivity to the male. It does not necessarily imply service or mating.

• **Fair market value** - A method of listing assets at their estimated current market value on the balance sheet.

• **Farrowing** - Production of a litter of one or more live or dead pigs on or after that 110th day of pregnancy, i.e., parturition.

• **Farrowing frequency** - A calendarized system for initiating group farrowings expressed in days or weeks.

• **Farrowing interval** - The No. of days between two consecutive farrowings for an individual sow.

• **Feeder pigs** - Young swine weighing 30 to 100 pounds.

• **Full time equivalent of labor (FTE)** - Based upon 40 hour work week or 2000 hours per year.

• **Gestation** - Period of time between conception and farrowing.

• **Gilt pool** - A group of replacement gilts available for breeding purposes. Should be counted as part of the total female inventory as soon as they have been selected for breeding purpose and their unselected contemporaries have been sent to slaughter. (Gilts must be counted in the gilt pool by the time they have reached seven months of age.)

• **Income statement** - A financial statement reporting the income and expenses during a given accounting period (sometimes referred to as a profit and loss statement.)

• **Intermediate term assets** - Represents assets that provide services over an immediate period of time (longer than one year but less than 10 years) or those assets that are considered to have a low liquidity.

• **Intermediate term liabilities** - Liabilities that have a maturity or original "due date" of more than one year and correspond to an intermediate term asset.

• **Liability** - The dollar value of anything owed.

• **Liquidity** - The ability of the firm to generate sufficient cash to meet financial obligations as they come due, with little cost or disruption to the operations of the firm.

• **Litter** - Pigs born to a sow during one farrowing.

• **Litter birth weight** - Total birth weight of all live pigs weighed in a litter.

• **Live pigs born** - Total pigs born, minus the stillborn and mummified pigs.

• **Loin muscle area** - The cross sectional area of the loin muscle cut between the 10th and 11th rib.

• **Long term assets** - Consists primarily of land and real estate improvements.

• **Long term liability** - Liabilities with an original maturity of more than 10 years and generally associated with the purchase of real estate.

• **Market hogs** - Finished hogs sold for slaughter.

• **Mated females** - All females in breeding herd that have at least one opportunity to be mated.
- **Mating** - The act of insemination.
- **Modified cost basis** - A method of valuing assets at their cost remaining after depreciation.
- **Mummified pigs** - The pigs that are born degenerate (discolored and shriveled or decomposed) that died sometime during gestation.
- **Net farm income** - Net cash farm income plus or minus the net change in inventory values including depreciation adjusted by accounts payable and receivable, and including adjustments for payments and deferrals.
- **Net worth** - The equity of a business or person, or both.
- **No. of sows weaned** - The No. of females that farrowed a live litter and had their pigs removed from them, regardless of how long they nursed. Should approximately equal the No. of litters farrowed over a year’s time.
- **No. of sows nursed** - The No. of females that completed a normal lactation period.
- **Nursing pig** - Any pig not weaned.
- **Ordinary income** - Income from the normal operation of a farm which excludes income from the sale of capital assets or capital gains.
- **Parity** - The No. of times a female has farrowed, i.e., a 4th parity female has farrowed four times.
- **Post weaning death losses** - Pigs that die between weaning and market. May be further subdivided into nursery, growing/finishing, etc. using the appropriate method of calculating death loss percentage.
- **Prepaid expenses** - Expenditures that have been paid before the goods or services have been used or consumed.
- **Pre-weaning death losses** - Pigs born live that die before weaning.
- **Profitability** - A criterion for measuring the relationship between income and expenses for different investments, operations, or firms.
- **Rate of return** - The internal rate of return on an investment, or that discount rate which equates the net cash flows generated by an asset with its cost.
- **Repeat breeder** - A female that returns to estrus before the anticipated farrowing date.
- **Replacement gilt** - A female that has been transferred to the gilts pool and has not yet had the opportunity to be mated.
- **Return to service** - Occurrence of another estrus after a previous service period (at least 10 days previously) within a single parity.
- **Return to service, regular** - Return to estrus 18-24 days after previous service period.
- **Return to service, early** - Return to estrus less than 18 days after previous service period. [Return to estrus within 7-10 days “after weaning” is usually considered to be the ”Early Return to Estrus.” (Often, the breeding period is “one week to 10 days” in the modern swine production system.])
- **Return to service, delayed** - Return to estrus more than 24 days after previous service period.
- **Service period** - A period of time during which one or more mating or breeding can take place.
- **Service per boar per time period** - Includes the total No. of times the boar ejaculates in that time period.
- **Solvency** - A measurement of what would be left if all your assets were converted to cash and all your liabilities were retired.
- **Sow** - Any breeding female that has farrowed at least one litter or has reached 12 months of age.
- **Stillborn pigs** - Fully developed pigs found dead behind the sow, or in the afterbirth, after farrowing. Lungs of stillborn pigs do not float in water.
- **Target** - An attainable level of production established for a performance category.
- **Tenth rib backfat** - Backfat taken over the loin muscle at the 10th rib. Divide the longest axis of the loin muscle into quarters. Measure the fat depth opposite a point three-fourths the distance along the long axis toward the belly. The measurement is from the edge of the muscle to the outer edge of, and perpendicular to, the skin.
- **Total female inventory** - Sum of replacement gilts and mated females.
- **Total pigs born** - All pigs born in a litter, which includes those born live, stillborn, and mummified.
- **Weaning** - The act of separating the pigs and the sow.
- **Weaning-to-service interval** - The time interval from date of weaning to next date of service.

5. **Glossary Terms - Confinement Management of Swine**

   A. Areas:
Breeding area - Area where breeding swine are held during the mating period.
Gestation area - Area where bred sows are held starting 0 to 21 d after breeding and for the duration of pregnancy.
Breeding-gestation area - Area where breeding swine are held during breeding and gestation periods.
Farrowing area - Area where sows are held during farrowing and lactation periods.
Nursery - Area to which lactating sows and their litters may be moved to be held after farrowing, also area to which pigs are moved at weaning.
Weaning area - Area to which pigs are moved at weaning.
Growing area - Area where pigs are held from 40-70 pounds until they weigh around 125 pounds.
Finishing area - Area where pigs are held from 125 pounds until they reach market weight.
Growing-finishing area - Area where pigs are held during growing and finishing periods.
Mating area - Area specially designed for mating (i.e., breeding area).
Sow-wash area - Area in which sows are washed before farrowing.
Resting area - Area within a pen intended to be used by pigs for resting or sleeping.
Dunging area - Area within a pen intended to be used by pigs for defecation and urination.
Creep area - Area accessible only to nursing pigs in which feed is provided.
Weighing area - Area where pig scale is located.

B. Behavior:

Social environment - That aspect of the pig's environment which includes other pigs.
Space allowance - Average amount of floor space allowed per pig, exclusive of feeder space.
Population density - No. of pigs per unit of floor-space area.
Group size - No. of pigs sharing a common area.
Crowding - Situation when the population density is so high that pig performance is reduced.
Cannibalism - Behavior pattern in which one pig bites or chews some part of another.
Tail biting - Specific form of cannibalism in pigs.
Ear-chewing - Specific form of cannibalism in pigs.
Savaging sow - Sow that eats her own piglets.

C. Building types:

Enclosed building - Building for housing swine that is closed except for air inlets and outlets.
Open building - Building for housing swine that is open on one or more sides the year around.
Open building with outside apron - An open building with an outside pen to which swine have free access.
Modifiable open building (Modified open-front building) - Building for swine with one or more sides that may be closed or open as determined by the weather.

D. Confinement:

Confinement - Holding swine in a restricted area on an underfooting other than soil.
Pasture - An area of soil providing vegetation from which swine held on it derive some nutrients.
Dirt lot - An area of soil providing little or no vegetation and from which swine held on it derive negligible nutrition.
Total confinement (or Life-cycle confinement or Complete confinement) - Confinement of swine during the entire life cycle.
Partial confinement - Confinement of swine during only part of the life cycle.

E. Disease management:

Active immunity - Resistance that develops in a host animal following exposure to an antigen.
Acute illness - Illness characterized by a sudden onset and short course.
Antibiotic - A substance produced by microorganisms which has the capability to kill or retard growth of other microorganisms.
Antibody - A protein molecule capable of combining specifically with an antigen.

Antimicrobial - Any substance, including antibiotics and chemotherapeutic agents, which has the capability to retard or kill microorganisms.

Autogenous vaccine - A vaccine prepared from microorganisms, usually bacteria, isolated from a specific herd or farm.

Bacterin - A killed bacteria vaccine, consisting of a suspension of whole bacteria.

Bactericidal - Antimicrobial compound which kills bacteria.

Bacteriostatic - Antimicrobial compound which inhibits the growth or multiplication of bacteria. Does not kill bacteria.

Cellular immunity - Acquired immunity in which cells, rather than antibody, predominate. This protection is stimulated by contact or close proximity with an antigen and is not the same as antibody.

Chemotherapeutic agent - Natural or man-made chemical agents which inhibit or kill microorganisms.

Chronic illness - Illness characterized by a gradual onset and long course.

Disease - An morbid condition that impairs the full productive potential of an individual or group.

Humoral immunity - Acquired resistance where circulating antibody predominates.

Illness - A morbid condition having a characteristic sequence of symptoms.

Immunity - Resistance involving the sum of the host defenses that react either specifically or non-specifically to an antigen.

Infection - Invasion of the body by microbial agents or parasites other than insects.

Infestation - Invasion of the body by insects.

Modified (attenuated) vaccine - A living suspension of microorganisms altered to stimulate an immune response but not cause disease.

Natural immunity - Innate resistance of the host to a pathogen. Generally considered to be transferred through genetic processes.

Passive immunity - Resistance mediated by antibody or cells formed by one animal and given to, or taken by, another animal, such as antibody in serum (anti-serum) or colostrum.

Pathogen - Biologic agent, i.e., bacteria, virus, protozoa, nematode, that may produce disease or illness.

Predisposing factor - An environmental change, dietary change, traumatic injury, stress, infection, or other factor that makes disease or illness more likely.

Primary immune response - Generated upon initial exposure to an antigen that sensitizes the immune system.

Resistance - The general ability of an individual to remain unaffected by anything that causes disease.

Secondary immune response - Produced by the immune system following a second, or more exposures, to an antigen.

Secondary infection - Infection that follows an initial infection which lowered resistance and made another infection more likely. Usually produces overt illness.

Subunit vaccine - Vaccine consisting of a piece of the micro-organism that the vaccine is directed against, which produces an immune response.

Syndrome - A condition which has a series of non-specific symptoms and be of undetermined cause.

Toxoids - A modified toxin capable of stimulating an immune response but which has lost its toxicity.

Vaccination - The act of administering a vaccine or antigens.

Vaccine - Suspension of attenuated or killed microbes or toxins administered to induce active immunity.

F. Environment, air:

Air environment - Those environmental components present in air.

Dust (or Particulate matter) - Small, relatively dry particles in air or on surfaces.

Odor - Quality of something that stimulates, or sensation resulting from stimulation of, the olfactory system.

Odorous - Having an odor.

Noxious gas or vapor - Gas or vapor potentially harmful or having an obnoxious odor.

Manure gas - Mixture of gases formed during decomposition of excreta.

Aerosol - Suspension of viable or nonviable particles in air.

Air ionization - Negative ionization of air as a means of atmospheric dust control.

Vapor pressure - Partial pressure of water vapor in air.
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- **Saturation vapor pressure** - Maximum amount of water vapor air can hold at a given temperature.
- **Absolute humidity** - Water content of air expressed as mass of water vapor per unit mass of air.
- **Relative humidity** - Water content of air expressed as the ratio between actual vapor pressure and saturation vapor pressure.
- **Draft** - Current of air in an enclosed space.
- **Convection** - Sensible mode of heat transfer in which heat moves together with the mass (e.g., air) containing it.
- **Radiation** - Sensible mode of heat transfer in which heat moves through space in the form of electromagnetic waves from emitter to absorber.
- **Conduction** - Sensible mode of heat transfer in which heat is passed through a body as one molecule comes into contact with the next, imparting energy to it, and so on. Involves no mass movement.
- **Evaporation** - Latent mode of heat transfer in which heat is absorbed during water's change in state from liquid to vapor.
- **Heat loss** - Transfer of heat from the pig's body to its environment.
- **Heat production (or Metabolic rate)** - Heat released during metabolism.
- **Thermoneutral environment** - Environment having an effective temperature that elicits no change in heat-production rate from the minimal rate.
- **Heat balance** - Condition in pig's body or house in which incoming heat plus that released inside the body or house is exactly offset by that leaving the body or house.
- **Lower critical temperature** - Effective temperature below which the pigs must increase heat-production rate to achieve heat balance.
- **Upper critical temperature (or Point of hyperthermal rise)** - The effective temperature at which all of the pig's appropriate thermoregulatory mechanisms are acting maximally in response to heat stress and above which the pig loses control of body temperature.
- **Moisture balance** - Condition in pig's building in which water vapor brought into, plus that arising in, the building is offset by that leaving.

G. Environment, light:

- **Light environment** - Those environmental components that stimulate the visual system or control photoperiodic phenomena.
- **Light** - Electromagnetic radiation that is visible.
- **Photoperiod** - Time period when light is present.
- **Scotoperiod** - Time period when darkness prevails.
- **Photoperiodism** - Cyclic phenomenon that is controlled by photoperiod.
- **Biological rhythm** - Cyclic phenomenon in animal function, structure, or behavior that continues even in the absence of environmental cues.
- **Wavelength** - Characteristic of electromagnetic radiation that determines that color of visible radiation.
- **Lumen** - Basic unit of luminous flux.
- **Foot-candle** - Unit of luminous flux density equivalent to one lumen shining on one square foot.
- **Lux** - Unit of luminous flux density equivalent to one lumen shining on one square meter.

H. Environment, thermal:

- **Thermal environment** - Those environmental components that affect heat content of the pig's body.
- **Air temperature (or Environmental temperature)** - Temperature of the air.
- **Mean radiant (or wall) temperature** - Temperature of environmental surfaces facing the pig.
- **Air velocity** - Speed of the air.
- **Effective environmental temperature** - An index reflecting the net total cooling or heating power of the environment.
- **Dry-bulb temperature** - Air temperature as measured by a thermometer with a dry sensing element or bulb.
- **Wet-bulb temperature** - Air temperature as measured by a thermometer with its sensing element or bulb covered by a wick wetted with water.
- **Psychrometrics** - Body of knowledge dealing with thermodynamic properties of moist air.
I. Equipment and facilities:

- **Adjustable pen** - Pen with at least one side adjustable so pen size can be varied.
- **Bedding board** - Board placed at junction of bedded and unbedded area serving to contain bedding material.
- **Breeding crate** - Device used to facilitate copulation.
- **Farrowing pen** - Area in which sow is confined during farrowing and lactation periods, but in which sow can turn around.
- **Farrowing stall (or Farrowing crate)** - Device in which sow is confined during farrowing and lactation periods, and which prevents sow from turning around.
- **Tether farrowing stall (or Tie farrowing stall)** - Device in which the movement of a sow is restricted by attaching her neck or girth strap or harness to an anchor by a chain or strap within a farrowing pen.
- **Guard rail** - Projection from sides of farrowing or nursery pen preventing sow from lying against side and crushing a baby pig in the process.
- **Hover** - Coverlet suspended over an area in a pen or stall aimed at conserving heat for pigs. May include a heat source.
- **Sprinkler** - System for applying water on swine.
- **Fogger (or Mister)** - System for aerosolizing water above swine.
- **Free farrowing stall (or Free farrowing pen)** - Stall that allows the sow to enter or leave at will, but confines the pigs within the stall.
- **Gestation stall** - Individual stall in which pregnant sow is held during gestation.
- **Raised deck nursery** - Pen for pigs following weaning with its floor above the bedded conventional floor.
- **Hot nursery** - A high temperature nursery unit for rearing early weaned pigs.

J. Floors:

- **Slotted floor** - Floor having any kind of openings through which excreta may fall.
- **Slotted floor of "material"** - Indicates the floor is slotted and also the material from which the floor is made.
- **Solid floor** - Floor having no openings through which excreta may fall.
- **Totally slotted floor** - Floor having openings for excreta over entire area inhibited by swine.
- **Partially slotted (or slatted) floor** - Floor having openings for excreta over only part of the area inhibited by swine.
- **Heated floor** - Floor having some means for being heated from within.
- **Textured floor** - Floor in which an attempt has been made to provide textured walking surface for swine.
- **Smooth floor** - Floor in which an attempt has been made to provide smooth walking surface for swine.
- **Slot** - Any opening in a floor through which excreta may fall.
- **Slat** - A single member of some material that forms part of one kind of slotted floor. Slats are placed parallel with one another, the spaces between forming slots.
- **Slat width** - Width of a slat at floor surface.
- **Slot width** - Width of slot between slats at floor surface.
- **Slat material** - Material from which a slat is made.
- **T-, U-, L-, Low-profile, or high-profile slat** - Cross-sectional configuration of slats.
- **Flattened, expanded metal** - Commercial metal product with diamond-shaped slots of a certain size. Flattened to make surface less abrasive. Used as slotted-flooring material.
- **Quarry screen (Woven wire)** - Interwoven wire mesh of certain wire and mesh sized used as slotted-flooring materials.
- **Rubber mat** - Heavy rubber sheet commercially prepared for use as overlaying material, especially in farrowing area.
- **Carpet** - Woven product suitable for use as overlaying flooring material, especially in farrowing area.
- **Sand box** - Layer of sand on the floor. Usually used for footing in the breeding area.

K. Heaters and Heating:
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- Air heater - Device that heats air drawn through the device.
- Unit heater - Air heater suspended from ceiling. Air drawn by fan over heat exchanger heated either by burning petroleum fuel, by electricity, by steam, or by hot water.
- Hot-air furnace - Air heat comprising a furnace (combustion chamber and heat exchanger), a fan to move air across the heat exchanger, and a bonnet to which a dust system for air distribution may be attached.
- Radiant heater - Device that emits thermal radiation that is directed at and received by absorbing materials.
- Heat lamp - An electric lamp providing radiant heat.
- Catalytic heater - Radiant heater in which heat is generated by the nonflammable combustion of LP gas.
- Hot-water boiler - Water-heating device comprised of heat source, water chamber, expansion tank, safety valves, and circulation pump.
- Hot-water floor heater - System comprised of hot-water boiler and pipes embedded in floor material. Used to heat the floor.
- Electric-cable floor heater - System comprising electric-resistance cable embedded in floor material. Used to heat the floor.
- Heat exchanger - A ventilation device that will alter the temperature of the incoming fresh air using heat derived from outgoing air.
- Electric heating mat - Mat in which electric-resistance wires are embedded and on which swine may lie, especially in farrowing and nursery areas.
- Supplemental heat - Heat which must be added from source other than the pigs themselves to the pigs' environment to compensate for ventilation and building heat losses.
- Zone-heat - Supplemental heat directed at a specific zone. For example, at the sleeping area.

L. Nutrition:

- Diet - The feed fed.
- Ration - The feed fed to an animal during a 24 hour period.
- Prestarter diet (or Creep feed) - Diet provided for pigs from about 3 to 10 days of age.
- Starter diet - Diet provided for weaned pigs until they weigh about 40 pounds.
- Grower diet - Diet provided for pigs between 40 and 125 pounds body weight.
- Finisher diet - Diet provided for pigs from about 125 pounds until they are marketed.
- Gestation diet - Diet provided for pregnant females.
- Farrowing diet - Diet formulated to include fibrous ingredients to reduce dietary energy level, usually fed a few days before to few days after farrowing.
- Lactation diet - Diet provided for lactating females.
- Least-cost diet - Diet formulated to meet the pig's nutrient requirements using components purchased at least cost.
- Ad libitum feeding - Pigs have access to diet at all times.
- Limited (or restricted) feeding - Intentional limitation of dietary intake to some level below that of voluntary intake in an ad libitum feeding situation.
- Interval feeding - Feed is available to pigs intermittently at present intervals.
- Hand feeding - Feed is physically delivered to pigs at each meal.
- Free-choice feeding - Pigs can choose a diet for themselves from several feedstuffs and nutrient mixtures that are available ad libitum.
- Concentrate - Dietary component that is high in energy or protein and low in fiber content. Highly digestible.
- Protein supplement - Dietary component containing high concentration (at least 25%) of protein.
- Complete supplement - Dietary component containing high concentrations of protein, vitamin, and minerals, and with which an energy source (such as corn or milo or wheat) is mixed to produce a complete diet.
- Feed additives - Ingredients (such as antibiotic or a hormone-like substance) added to a diet to perform a specific role.
- Premix - Blend of a small amount of dietary ingredients with a suitable carrier (e.g., a small amount of a feed additive in corn meal).
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- **Base mix** - Contains all ingredients used to fortify a grain-protein supplemental mix.
- **Fortified (major component) diet** - Diet formulated to meet all of the pig's known nutrient requirements (e.g., fortified corn-soybean meal diet).

M. Systems, buildings:

- **Production-line building systems (or In-line building system)** - Building system in which swine in all stages of the life cycle are accommodated in respective areas of one building.
- **Multiple building system** - Building system in which more than one building is used in order to accommodate different stages of the life cycle, respectively.

N. Systems, farrowing:

- **All-gilt system** - System in which all farrowing females are gilts.
- **Sow-and-gilt system** - System in which both sows and gilts farrow.
- **Single-litter farrowing system** - One farrowing season per year.
- **Two-litter farrowing system** - Two farrowing seasons per year.
- **Four-litter farrowing system** - Four farrowing seasons per year.
- **Six-litter farrowing system** - Six farrowing seasons per year.
- **Multiple farrowing system** - More than two farrowing seasons per year.
- **Continuous farrowing system** - No calendarized farrowing season.

O. Systems, feeding:

- **Pneumatic feed-handling system** - Device for distributing feed through tubes by air pressure.
- **Auger feed-handling system** - Device for distributing feed through a tube by auger.
- **Drag-wafer/tube feed-handling system** - Device for distributing feed through a tube by wafers pulled by a cable.
- **Chain/flighting feed-handling system** - Device for distributing feed through a trough by flighting pulled by chain or cable.
- **Self-feeder** - Device holding feed and from which swine can obtain feed ad libitum.
- **Floor feeding** - Feeding methods in which feed is placed on floor for consumption by swine.
- **Limit feeding** - Feeding methods in which swine are fed less than they would consume if given free access to feed.
- **Liquid feeding** - Feeding method in which feed and water are mixed in definite proportions to form a liquid suspension of feed before being offered to swine.
- **Paste feeding** - Feeding method in which feed and water are mixed in definite proportions to form a paste before being offered to swine.
- **Ingredient bin** - Storage facility for dietary ingredients before diet preparation.
- **Proportioning mill (or Meter mill)** - Device in which dietary ingredients are blended in set proportions and ground in a mill.
- **Feed mixer** - Device for mixing dietary ingredients, usually by auger or spiral.
- **Feeding stall** - Individual stall in which hog stands when fed and an attempt is made to control individual diet intake.
- **Trough** - Device holding feed from which pig eats.

P. Other systems:

- **All-in, all-out system** - Management system in which area is filled and emptied of hogs all at once.
- **Artificial-piglet-rearing system** - Feeding system in which piglets are removed from sow soon after birth, usually after that consumption of colostrum.

Q. Ventilation:
Negative pressure ventilation (or Exhaust ventilation) - System in which air is forcibly vented from the building and in which make-up air from outside is drawn by negative pressure into the building to replace that vented.

Positive-pressure ventilation (or pressure ventilation) - System in which outside air is forced into the building, which in turn forces inside air out by positive pressure.

Static pressure - Potential pressure exerted in all directions by a fluid (e.g., air) at rest (tendency to either burst or collapse a building).

Underfloor ventilation (or Pit ventilation) - Ventilation system designed to vent the air between slotted floor and excreta in underfloor pit. Part or all of the building's ventilation may be accomplished by the system.

Natural ventilation - Ventilation achieved by natural air movement without mechanical support.

Air distribution - Pattern of air movement in a swine house.

Dead-air space (Stagnant air space) - Space in which there is insufficient air movement.

Intake velocity - Velocity of air as it enters the building through an inlet.

Evaporative cooling - Process in which air is adiabatically cooled as water is evaporated. Often accomplished by drawing air through a wetted pad.

Zone ventilation - Controlled ventilation of a particular part of a space (e.g., zone cooling around a sow or snout cooling of a sow).

Air inlet - Part of building through which air enters.

Air outlet - Part of building through which air leaves.

Baffle - Device which directs the distribution of incoming air.

Shutter (or Louver) - Device for covering air outlet which, when shut, prevents air from entering the air outlet.

Soffit - Region between rafters and under eaves through which air may be taken in.

Convention tube - Inflatable tube through which air is distributed in the building.

Plenum - Chamber in which air is stored or conditioned before distributed in the building's animal space.

Butterfly door - Door pivoted horizontally slightly off center. Usually swings inside at the top and close by weight of the door.

Side curtain - Fabric used to cover openings in swine house. Capable of being adjusted to control ventilation.

R. Waste management:


S. Waterers (Drinkers):

Demand waterer - Waterer which must operated by the pig to deliver water.

Nipple waterer - Demand waterer from which pig receives water by taking the device into the mouth and operating it in some manner.

Paddle waterer - Cup-type demand waterer in which water level is controlled by a paddle-activated valve.

Float waterer - Cup-type waterer in which water level is controlled by a float device.

Pressure waterer - Waterer designed to operate under pressure developed by a pump.

Gravity waterer - Waterer designed to operate under pressure developed by a head of water.

Vacuum waterer - Waterer in which water level in cup is controlled by vacuum in reservoir.

Straw waterer - Demand waterer in which pigs is presented a more-or-less vertical metal tube connected to a water-delivery system. Pig sucks water through tube ("straw").

Medicator (Proportioner) - Device which dispenses a medication at a known rate into a water line.

Circulating watering system - Watering system in which unconsumed water is circulated continuously.

T. Miscellaneous:

Crossbreeding - Mating animals from genetically diverse groups within a species.
- **Purebred** - An animal eligible for registry with a recognized breed association.
- **Hybrid** - Progeny of genetically diverse parents of purebred breeding or crossbred parents.
- **Heterosis (or Hybrid vigor)** - Effect reflected by performance of offspring greater than the average of that of the parents.
- **Performance testing** - Evaluating performance of an individual.
- **Progeny testing** - Evaluating the genotype of an individual by studying the performance of its offspring.
- **Heritability estimate** - Estimate of the proportion of the total variation in performance between individuals that is due to heredity.
- **Ultrasonics** - Technique for estimating certain aspects of body composition and for pregnancy detection.
- **Feet-and-leg soundness** - Absence of functional defects of the feet and legs.
- **Stress** - Any force causing or tending to cause a change in a pig's function, structure or behavior.
- **Strain** - A pig's reaction against stress.
- **F1 stock** - Progeny of the first cross between purebred or inbred lines.