Nutrition

Feeding Swine for all Ages and Stages
SUGGESTIONS FOR THIS MEETING:

- Give the Member’s a Roll Call Question of your choice

This meeting is a general overview of swine nutrition basics and parts of the swine digestive system.

**Activity:** Stomach Acid and Butter Experiment (on page 3)

**Supplies Needed:**
Water, baking powder, vinegar and a glass and spoon.
ACTIVITY: Stomach Acid and Buffer Experiment

To help demonstrate the chemical reaction in the stomach that helps to digest food. We as humans have the same type of simple stomach. Our stomach also contains acids and buffers that help with digestion. What happens if OUR stomachs are too acidic?___________________

Well, the same thing can happen in simple stomached animals like the pig. A balanced diet for us, and a balanced feed ration for the pig will help to prevent stomach problems.

Place 75 ml of water into a large glass
Add 15 ml of baking powder

Stir and observe the reaction.
You should see many bubbles form and hear a fizzing noise. When the fizzing is over, most if not all of the powder should be gone.

Why did we do this? What we saw was a chemical reaction. A new substance was formed when an ingredient was added to water, in this case a gas. This gas you saw was Carbon Dioxide, which formed the bubbles.

Similar reactions occur in the stomach when we eat. We have buffers or enzymes as well as acids to help us digest our food, just like the pig does. These buffers and acids also help protect the lining of the stomach so we don’t get ulcers from too much acid.

We will do this again, and when the bubbles are active we will add a bit of vinegar, a common acid and watch what reaction we get the second time.
NUTRITION
The Great Eating Machine

Swine need the same type of feedstuffs to give their bodies proper nutrients as we do. At different stages of their life cycle they will require different amounts of these nutrients as we will learn as we go through this unit.

There are many factors that influence nutrient requirements of the pigs in the herd, and since 60-75% of the total cost of pork production is feed, therefore the right balance of nutrition, and all other factors in the swine’s life better be just right.

Gone are the days where pigs were fed table scraps and allowed to root around for their dinner. Swine nutrition today is a fine balancing act that requires careful control to maximize farm production. Due to some of the factors listed below, nutrition is also something that needs constant revision based on herd health and production.

Factors that influence Nutrient Requirements:
- Environment- like temperature, housing, weather outside (damp), competition for feed trough space.
- Breed of swine, sex of the animal, genetic background.
- Herd health status
- The presence of molds, toxins or inhibitors in the diet.
- Availability and digestibility of feed and feed nutrients provided to the animal.
- Level of additives or growth enhancers in the feed presented to the animals.
- Energy level in the diet to meet the stage of production of that animal.

What is a Nutrient?

Knowing the difference between a nutrient and an ingredient, or feedstuff is important in formulating a diet for our swine. A nutrient is a chemical substance that is supplied by the diet and which the pigs need to stay alive. Nutrients perform specific functions in the body and their absence or deficiency will result in reduction of productivity, health problems and possibly death.

An ingredient or feedstuff is the material that supplies the nutrients.

Where does the feed go??
After the feed has been taken into the mouth and chewed, it is swallowed, it travels down a large tube called the esophagus to the stomach where the digestive juices called acids and enzymes break the feed down into six basic nutrients for the pigs body to use. Swine
are considered to be simple stomached animals like humans. The feed then travels to the small intestines where there are good “bugs” that help to further digest the fibrous feed and allow the animal to get about 20% more of the energy from the feed it is fed to help meet the bodies requirements, The unusable portions of the diet are then excreted from the body.

**See the diagram below to follow the food route.**

The nutrients that ALL feed must contain if a pigs is to grow are:

**Proteins:** are often referred to as Amino Acids and can be plant or animal based proteins.

- **Example of plant based protein**
- **Example of animal based protein**

Protein is essential from growth and development, reproduction and maintenance of body tissue.

**Carbohydrates:** are an energy source, are fiber and plant based.

**Fats:** are also an energy source and source. Plant sources such as soybean oil are considered the best sources, although there are other types used.

**Minerals:** essential to growth and maintenance of bones and teeth.

**Vitamins:** help the body process other nutrients.
Water: helps to move nutrients around the body, cleans up unused feed and regulates body temperature. Water is the MOST important part of any animal’s diet. Did you know that the pig is made up of 58% water?

Below is a chart to help you quickly review what the components in a feed ration need to do for the pigs that you are feeding. **No matter what age they are**, the pigs still need all these basics in order to grow and maintain a good health status.

Again, the amount fed or the type of ingredient fed may differ with the age of the animal, but the need for these basic components to be present will always be there.

Feedstuffs are often referred to in energy units. These units are expressed in different ways and may be confusing at first glance of a feed tag or bag.

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**Energy is defined as the capacity to do work, but in nutrition it is a**
measure of heat production resulting from the animal body using or excreting the feed heat.

There are different terms to describe energy units such as calories, British Thermal Units (BTU) or in joules. In the United States the calorie (cal), kilocalorie (Kcal) or mega calorie (Mcal) are also commonly used in animal nutrition.

A cal is the amount of heat required to raise the temperature of 1g of water 1 degree C= (4.1855 joules). A Kcal = 1,000 cal and a Mcal (or therm)=1,000 Kcal.

Animal use of feed energy is portioned in the following way:

Gross Energy (GE)- is the amount of heat resulting from oxidation of feed done by instrumentation. GE is used as a reference point at the feed plant.

Digestible Energy (DE)- is a measure of the energy that is absorbed by the animal after consuming the feedstuffs. This level is calculated by subtracting fecal energy from the GE eaten.

Metabolizable Energy (ME)- is determined by the loss of energy in feces and urine, and the combustible gases from the GE consumed. This is a common base used for feeding standards.

Net Energy (NE)- is measured by subtracting energy losses in rumen fermentation and tissue metabolism from ME. This is the energy that is available to the animal for maintenance such as work or lactation. This value is used often when formulating rations for animals.

Total Digestible Nutrients (TDN)- is an old method of calculating feed energy. The method of calculating TDN is similar to DE.

Energy requirements are affected by many different factors such as age, species, activity of the animal, level of production and temperature.
NUTRITION

LET’S START FEEDING THE HERD - Piglets

Leader’s Information

Suggestions to Begin this Section:

• Go through the birthing information provided. You can ask the members if any of these practices have been used on their farms. (fostering, splitting etc.). See if you can bring in a pair of tooth nippers to show what they look like, and / or a piglet sized water nipple.

• If you choose to these sections in order, at this meeting ask members to bring in a feed tag next week for the animal that they are using as their 4-H project for this year. If they are doing a virtual animal, they should ask you about one of the tags in their section or go to a feed mill and ask for a sample tag.

Answers to the question, what factors affect “creep feed” intake: can be: (on page 14) freshness, palatability (tastes good), pellet size (not too large), environment (temperature, crowding etc), sow’s milk production, piglet health and vigor, amount of water available to the piglet’s and the sow, growth rate of the piglets.

Activity: Nutrition Discussion (on pages 9 & 10)
ACTIVITY – Nutrition Discussion:

When we talk about baby pig nutrition, or nutrition for any other age of pig for that matter, we can draw some comparisons to our own bodies at different ages. Write in the answers as we go along.

Birth and Infants (Piglets and Young Weaners)- What do they need to eat? Why are they not fed something else?

________________________________________________________

Older Infants (Weanlings after 4 weeks old)- How does their diet change? Why is their diet changed?

________________________________________________________

Young Children (Growers)- How and why does their diet change?

________________________________________________________

Teenagers (Finishers)- What more does this age group need to get to market?

________________________________________________________

Pregnant mothers (Sows)- What do they need to insure they grow healthy hearty babies (piglet's).

________________________________________________________

Nursing Mothers (Sows after Farrowing)- How do their nutrition needs increase?

________________________________________________________

Senior Citizens (Mature Sows)- What happens to their appetites?

________________________________________________________
Nutrition Discussion Answers:

Birth and Infants: need for mothers milk or formula. Stress that their stomachs are not able to handle courser foods.

Older Infants: can begin to eat cereal but still need milk, just like the young piglets with their “creep feed”. The feed still has to be tender.

Young Children: eventually are weaned from milk. Humans still drink milk but by this time the piglet can do without it, and can eat a coarser, “pre-starter” diet.

Teenagers: eat more than adults. Why is this? Because they are growing so fast. This will be like your grower pig, which will need a ration with lots of energy and protein for those growing bones and muscles.

Pregnant: often need extra iron. Need to have good nutrition, and a well balanced diet to be sure to have a healthy baby. The nutrition and energy needs will increase because they are eating for themselves and the baby (piglet’s). This is of special concern in very high yield sows.

Nursing mothers (farrowed sows): need more fluids, and a more concentrated energy ration as they are feeding themselves and their offspring.

Senior Citizens: often will eat less than younger adults. Why? They are slowing down, often these sows produce smaller litters of piglet’s as they age. They are less prone to stress, may have better body condition to begin with compared to a younger sow.

There may be other answers that you would like to entertain here also.
The Baby - PIGLETS

The piglet is considered to be from Birth to 7-10 days. Piglets are born at about 2 kg. in weight.

The first hour of a piglet's life is critical. Under normal conditions, all piglets should learn to suckle within one hour of their birth. There are two very good reasons for this.

1. Suckling helps a piglet fight disease. The mother’s first milk, which is called colostrum, is filled with antibodies that will help the piglet fight some of the diseases it might be exposed to in the barn. It will also supply the piglet with highly concentrated and highly digestible first milk. Colostrum is usually thicker and of a yellowish colour compared to the milk produced in later lactation. The nutrients in the colostrum decline very rapidly, so if a piglet does not receive colostrum within the first 24 hours of life, chances are it will not survive unless supplemented with either cow colostrum or commercially available colostrum substitutes.

2. Suckling gives piglets energy and they will not become chilled and weak. Most animals are born with what is called a layer of brown fat. This is a temporary source of body energy that only lasts for a short time. This is why the piglet needs the colostrum energy as soon as possible after birth. This greatly reduces the chance of a piglet being laid on by the sow. A cold or starved piglet is slower to move around.

To ensure all the piglets get their colostrum the producers should take the time to observe litters shortly after farrowing and assist any smaller or weaker piglets to suckle by giving them access to the sow’s udder. One way that producers sometimes do this, especially with large litters is to “split suckle”. Shortly after birth, half the piglet’s are removed from the sow and are kept in a warm, dry box. The two halves of the litter are rotated on and off the sow to give each individual piglet maximum opportunity to suckle and receive the necessary colostrum.

This is also a good time to check the sow to be sure that all the teats are in working order. You will be handling and observing the piglets, and if there are too many for the sow, this is also a good time (after they have had their first colostrum) to find a surrogate sow for some of the smaller piglets. This transfer should take place about 3-4 hours after farrowing. Be sure that the piglet to be fostered is masked by a stronger smell than that of its birth mother or you will run the risk of the surrogate sow rejecting the piglet. One method that is sometimes used is to put a strong smelling substance on the sow’s nose, and put the same substance on ALL the piglets in her care so that everyone smells the same. Piglets could be fostered to a sow that has had a smaller litter of the same age, or if there is a larger group to be fostered to a sow that is about to have her piglet’s weaned from her.
The sow’s milk is very low in iron. If a piglet does not get enough iron it will become anemic. An anemic piglet is a weak and unhealthy piglet. An iron injection is usually given within the first 3 days of a piglet’s life. The injection is given in the neck muscle.

Baby pigs are also born with eight razor sharp “needle teeth”. If these teeth are **not** removed at birth, the piglet will bite the sow, which could cause the nipple to become infected. If the sow is bitten, she may also refuse to let the piglets nurse at all! You could therefore end up with a litter of orphan piglet’s, which could be a very costly endeavor to the farm. The piglet’s can also bite other piglet’s and cause damage to them.

The sow’s milk provides enough nutrition (except iron) for maximum growth in the piglets for only the first 2-3 weeks of life. A sow’s milk production will peak in the third week of farrowing. As you can see by the chart below the sow’s milk production begins to decline, while the needs of the litter continue to increase.

Piglets require **water** immediately after birth and should be offered water from their first day. Providing drinking water to very young piglet’s does not reduce their motivation to suckle. Piglet’s will start to drink water between two to five days after birth. A nipple drinker or water bowl can be used, but care must be taken to place the water at the correct height so that the piglet’s can drink easily. When piglets are introduced to drinking from a watering system prior to weaning they experience fewer problems with water intake after being weaned. Piglets begin by only drinking milk. This is because it is easy to digest.
and it forms a complete food. As the piglet gets a bit older, it begins to eat foods other than milk. But even an older piglet does not yet have a mature enough digestive system to break down all feeds. These new feeds need to be given special attention, in order for the piglet to gain the maximum value from this special feed.

A piglet of up to three weeks of age cannot digest the carbohydrates found in cereal grains. So, at 7-10 days, most producers will introduce starter feeds called “creep feeds” that contain skim milk or whey, fish meal, fats, (such as corn, soy or canola oils), and cooked cereals (rolled oats, or flaked corn) and this feed would have a protein content of 20-25%.

Although these “creep feeds” are expensive, it has been proven that the young piglets can convert this ration to body tissue more efficiently now than at any other time in their lives.
What factors could affect the intake of creep feed consumption?

After the piglet is over 7 kg, and about 4 weeks of age this “creep feed” can be changed to a higher grain ration called a “pre-starter” diet. By this time their stomachs are more mature and can handle digesting the courser grains found in this type of feed.

Weaning ages and practices vary and therefore so will the feeding schedules. There have been many studies on both the Early Weaning (14-17 days of age), and weaning more typically from 21-28 days of age. It is said that early weaning from the sow prevents transfer of disease and improves productivity. On the other hand, it is also said that creep fed piglet’s are heavier at weaning if weaning age is 28 days or greater. Feeding is a fine balancing act for the farmer.
Let’s Feed the Herd - Weaners
Leader’s Information

Suggestions for this Section:

- If you are doing this section in the order it appears in this unit, last week Members were asked to bring in a feed tag from the feed for their project animal for this week. Review this tag, and go through any questions or problems the members may be having. The answers that the members give may range from all manner of grains to vitamins, minerals, water etc, and depending on the farm and the kind of products they use at home on their farm, they could all be correct. Refer to the feed tags in this section if you are unsure of any elements.

- At this, or any other part of the Nutrition project you may want to speak with a feed company and see if a representative could come out and talk to the members about the types of feed that their company has and uses.

Activity: I’ve Made a Feed Game (pages 16 - 19)
Supplies Needed: Card templates on cards, pre-prepared as directed in the activity.
The game below can also be used at any time through the Nutrition section. A senior member can make up the cards. If the group is small enough you may want to make a set for each member so they have them and remember all the requirements of feeding swine.

**ACTIVITY: I’ve Made a Feed Game**

**Purpose:** To teach the different types of nutrients pigs need in their feed.

**Suggestions** for Building the Deck of Pig Cards:
- Copy and Cut the pig templates and attach to white recipe cards, card stock or actual playing cards. You could also print them onto sticky labels and attach them to actual playing cards. Each deck should have 6 of the ingredient cards and one super pig and one dead pig. The two empty cards can be used as scorecards.

**Object:** To be the first player to score 50 points.

**Instructions:**
1. Use one “complete feed” set of cards for each member that is playing the game (i.e. if there are four players, make sure that there are 4 proteins, 4 carbohydrates, 4 fats, etc. in the deck). If there are more than 6 players use 2 decks. They can be combined into one large game or members can split into two groups.
2. Prepare a score sheet.
3. Select a dealer.
4. The dealer shuffles the cards and deals the whole deck out (two people will have an extra card).
5. Players will then pick up their cards and start sorting them, looking for cards that will give them a complete feed. They will want to trade away any cards that they hold duplicates of.
6. After everyone has sorted his/her cards, the dealer says, “The mill is on”
7. Players start trading with each other by holding out the number of cards they wish to trade and yelling TWO-TWO-TWO- or THREE-THREE-THREE, etc. (Cards should be held face down.) Players must accept back the same number of cards they have traded away. If a player wishes to trade two cards he/she must accept two cards back.
8. Trading continues until someone in the group has A) all eight cards to make a complete feed, OR B) seven cards and the “Super Pig” wild card. When members get either of these hands, he or she calls, “I’ve Made A Feed”.
9. At this point, all trading stops.

Play continues with another hand until someone reaches 50 points or you run out of time to play.
PROTEIN

CARBOHYDRATE

FAT

WATER
SUPER PIG

DEAD PIG
NUTRITION

Let’s Feed the Herd - Weaners

Weaner pigs are considered to be approximately age 2 weeks (early weaning) to 4 weeks old. They should weigh no less than 5 kg, and are considered weaners until they weigh up to 25 kg. Weaners will be eating a **starter** feed that is 18-20% protein (note that this rate of protein is slightly less than their piglet rations). This starter diet can be purchased as a prepared feed with vitamin and mineral premix added, or feed can be produced on the farm by adding home-grown grains to either a commercial supplement or premix.

At the time of weaning the pig is exposed to a series of **stressors** that, if left unchecked, can lead to poor performance and increased mortality.

**Stressors**

1. Piglets being removed from the sow. Even though they may have been introduced to “creep feed”, water spigots and a pre-starter ration if weaned later, they still had the sow there to provide milk, which would be the largest portion of the diet. They should not be weaned until they are at least 5 kg. The piglet should weigh 7 kg by 4 weeks of age. Wean piglets according to their weight not their size. Some farmers choose to do a gradual weaning where they remove the piglets or the sow for a certain portion of every day, so that both can get acclimatized to being separated. Again this is a farm practice and may also depend on the general age of weaning practices that are followed on the farm.

2. When moved to a weaner barn there is often a temperature difference from the farrowing barn (usually cooler). Be sure to control the environment and gradually reduce the temperature in the new barn a degree a week until the desired temperature is reached for newly weaned piglets. Best temperature for them will be between 27-29 C.

3. Piglets will now be exposed to a larger group of animals, not just their own litter. Be sure that there is adequate floor space. This space depends on a few factors like body size, floor construction and environmental temperature. For weanling piglets the space should be 0.26-0.33 sq.m. per weaner pig. If the weather is hot the floor space allowance should be increased by 10-15%. Group animals in pens by size not age, this will cut down on bullying and smaller animals loosing out at the feeding stations.

4. Feeder space should be adequate to allow all the piglets to eat together. The piglets will be used to eating all at the same time from being in the farrowing room. There should be at least 15 cm of trough space per piglet in the beginning stages of weaning. Trough space can be reduced over time to avoid food wastage to approximately 7.5-10 cm of feeder space per pig. Feeder design should allow easy access to the feed while minimizing waste, spill and contamination.
5. Piglets are now exposed to getting disease easier than before. Your barn may be on a vaccination program that would start when the piglets are weaned and moved to a new barn. There is no substitute for strict SANITATION!! Be sure that the barn and area that these young animals are being housed in is cleaned between each new batch of piglets. This is common sense to avoid any cross contamination between litters and batches of animals in the barn.

**Feeding Methods:**
There are two methods of feeding that are commonly used for the growing and finishing pig.

**Restricted feeding**- pigs are fed a measured amount of feed several times a day in a trough or on the floor.

**Full feeding**- pigs will have feed in front of them all the time.

The most efficient and cost conscious producer will probably feed a complete diet on the full feeding system. This method will usually produce faster gains than the restricted feeding method, especially for pigs weighing 25-50 kg.

Producers may choose the restricted method if they find they have a high feed wastage problem, or are feeding high moisture corn diets. Restricted feeding, properly done, can also result in a carcass with a higher percentage of lean meat.

**Common Problems of Feed Wastage:**
Continued feed wastage can cost producers thousands of dollars. The amount of feed wasted varies from about 6% to 30%. Some of the causes are:

- If the feed is too finely ground, pigs will push aside the smallest bits, which then become stale and unappealing to eat.
- Poorly designed feeders can result in wastage. If the feed falls through slats onto the floor, it will not be eaten.
- Feeders with poorly adjusted controls that allow too much feed in the trough will lead to wastage. As a pig eats, the feed becomes damp with saliva and soon is unpalatable.
- Broken feeders result in wastage of feed.
- If the feeder is too small, pigs will grab a mouthful of food and step backwards, spilling feed in the process.

Always be sure that there is fresh water available. As the pigs begin to consume more of this grain rich diet, they need fresh water available to them at all times.
THE MAGIC CAKE

Wouldn’t be great if we could live on cake? After all our body will process the food into usable parts, right? There are a few reasons why cake alone will never be enough for our bodies to live on.

1. A body needs many different nutrients, and in different amounts as we grow and age.
2. Different foods are made up of different amounts of the basic nutrients that our bodies need. For example Oranges are high in vitamin C, liver contains a high source of iron and protein. Breads are high in carbohydrates. Our bodies need all of these ingredients, just like the pigs do.

There is NO “magic cake” formula that will meet all the body’s nutritional needs. In pigs a typical, well-balanced diet might include corn, wheat, barley, soybean meal. Added to this is usually a vitamin and mineral mix. Extra vitamins and minerals are added to the feed because there aren’t enough of them available in the grains that we feed to our pigs.

Pig feeds are labeled according to how much protein they contain. It is important to note that they do not only contain protein, but that they contain other basic nutrients as well.

Below is a list of some high energy and high protein feeds:

<table>
<thead>
<tr>
<th>Protein Values</th>
<th>Digestible Energy (kcal/kg)</th>
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<tbody>
<tr>
<td>Skim or buttermilk- 34% protein</td>
<td>High moisture corn- 3,000</td>
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<tr>
<td>Canola meal- 36% protein</td>
<td>Dry corn- 3,500</td>
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<tr>
<td>Soybean meal- 48% protein</td>
<td>Wheat- 3,400</td>
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<tr>
<td>Meat meal- 54% protein</td>
<td>Barley- 3,000</td>
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<tr>
<td>Fish meal- 60-70% protein</td>
<td>Oats- 2,700</td>
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<tr>
<td>Blood meal- 77% protein</td>
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Pigs need a balance of both protein and energy over their lifetime. The proportion of ingredients is determined on the age and stage of the animal as well as the cost of the feed ingredients used. On the next page you will find a table showing you approximately the amount of weight gain that can be expected from pigs of a specific age.

If we review your 4-H Swine project for this year:
- How is your show pig stacking up to these weights on the table on the next page?
- Let’s check your feed tags.
- Are there any questions or problems so far about your project animal?
- Be thinking of shows that we may be able to attend to show our project animals.
The table below shows a list of vitamins and minerals that are a must to keep your pig healthy. Beside the vitamin or mineral is what will happen to your pig if these vital elements are lacking in the diet.

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<tr>
<th>Symptoms of Vitamin and Mineral Deficiencies</th>
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<td><strong>VITAMINS</strong></td>
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<td>Riboflavin</td>
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<td>Niacin</td>
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<td>Vitamin B12</td>
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<td><strong>MINERALS</strong></td>
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<td>Calcium (Ca)</td>
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<td>Phosphorus (P)</td>
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<td>Sodium (Na)</td>
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<td>Chlorine (Cl)</td>
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<td>Iron (Fe)</td>
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<td>Zinc (Zn)</td>
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<td>X</td>
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<td>X</td>
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<td>X</td>
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<tr>
<td>X</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Iodine (I)</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Manganese (Mn)</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Selenium (Se)</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
NUTRITION
Feeding the Grower and Finisher
Leader’s Information

Suggestions for this Section:

• Discuss the Grower and Finisher barns. Depending on the number of members that live on pig farms they may be used to different methods of handling this age and stage of animal on their farms. When we are discussing the weights and ages on average.

• Discuss with the members the feeding strategy used in their barns at home. Explain phase feeding and why that is done. Also the split sex feeding.

• Discuss with the members consumer demands, and the type of product the consumer wants.

The table Hog Target Weight Calculator can be obtained from OMAFRA, but is included in the member’s manual as a copy in case you do not have access to getting one. Explain how it is used.

ACTIVITY - Putting Together a Ration (Member’s sheet on page 26). Gather a variety of feedstuffs either from a feed store or grocery store. Items such as oats, soybeans, soybean meal, cornmeal, rocks (just to fool them), vitamins, wheat, barley etc. Any of the items we have discussed in the last few weeks. Be sure to include some items that should NOT be in the diet just to make them think about it. Ask them to put together a ration. They can look back in their book and choose what protein level they are trying to make from the chart in week 3.

After they have made their choices you can present them with a copy of feed tags gathered for different ages and stages to see if the members can tell which feed tag is for what stage of growth of animal and what may or may not be missing from their rations.

The first tag in the sequence is an Early Weaning Ration. The second tag in the sequence is a Grower Ration. The third tag is a Dry Sow Ration. The fourth tag is a Lactating Sow Ration.
ACTIVITY: Putting Together a Ration

In front of you are a variety of goods. If you were going to put together a ration to help your pig get to market at the correct weight and in a timely manner which of these items might you choose to include in your ration?

Why would you choose those items?

What does that ingredient provide the animal?

What will happen if your pig does not have this item in its feed?
Swine Project - Nutrition - 4-H Ontario

**2074 PIG TECH 4000 (ETIS)**

**Guaranteed Analysis**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Min.</th>
<th>Max.</th>
<th>Copper (Cu)</th>
<th>Zn (Zn)</th>
<th>Vitamin A</th>
<th>Vitamin E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Protein</td>
<td>22.0%</td>
<td>15.0%</td>
<td>125 mg/kg</td>
<td>100 mg/kg</td>
<td>4,500 IU/kg</td>
<td>1,000 IU/kg</td>
</tr>
<tr>
<td>Crude Fat</td>
<td>5.0%</td>
<td>5.0%</td>
<td>100 mg/kg</td>
<td>100 mg/kg</td>
<td>4,500 IU/kg</td>
<td>1,000 IU/kg</td>
</tr>
<tr>
<td>Crude Fiber</td>
<td>4.0%</td>
<td>3.0%</td>
<td>125 mg/kg</td>
<td>100 mg/kg</td>
<td>4,500 IU/kg</td>
<td>1,000 IU/kg</td>
</tr>
<tr>
<td>Potassium (P)</td>
<td>0.85%</td>
<td>0.70%</td>
<td>125 mg/kg</td>
<td>100 mg/kg</td>
<td>4,500 IU/kg</td>
<td>1,000 IU/kg</td>
</tr>
</tbody>
</table>

**Ingredients**
A list of the ingredients used in this feed may be obtained from the manufacturer or registrant.

**Directions**
- Introduce Pig Tech 4000 and feed to the specified piglets weighing from 5.0 to 7.5 kg body weight. Consult the Purina Precision Starter Program to customize your feeding strategy to 25 kg.

**Important**
Follow these management practices:
1. Provide a source of fresh clean water at all times.
2. Supply small amounts of fresh ration daily to avoid wastage.
3. Any ration change should be made gradually. In order to reduce weaning shock, the pig's ration should not be changed within 7 days of weaning.
4. When using a self-feeder, make sure it is adjusted to minimize feed wastage. Feeders should be well managed so as to provide adequate feeder space and prevent moisture condensation, mold and insect development.
5. Consult your veterinarian for recommended health programs in your area.

**Caution**
- Directions for use must be carefully followed.
- Feed is perishable. Store in a dry, well-ventilated area protected from rodents and insects. Do not feed moldy or insect-infested feed to animals as it may cause illness, abortion or death.

Disclaimer of Liability:
Individual results from use of this product may vary based upon differences in customer programs of management, health, sanitation, breeding, genetics and feeding. Therefore, Agribusiness/Purina Canada Inc. and its Dealers do not warrant or guarantee individual results.

**2289 LEAN MAKER 4 (CHECKER)**

**Guaranteed Analysis**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Min.</th>
<th>Max.</th>
<th>Copper (Cu)</th>
<th>Zn (Zn)</th>
<th>Vitamin A</th>
<th>Vitamin E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Protein</td>
<td>22.0%</td>
<td>15.0%</td>
<td>125 mg/kg</td>
<td>100 mg/kg</td>
<td>4,500 IU/kg</td>
<td>1,000 IU/kg</td>
</tr>
<tr>
<td>Crude Fat</td>
<td>5.0%</td>
<td>5.0%</td>
<td>100 mg/kg</td>
<td>100 mg/kg</td>
<td>4,500 IU/kg</td>
<td>1,000 IU/kg</td>
</tr>
<tr>
<td>Crude Fiber</td>
<td>4.0%</td>
<td>3.0%</td>
<td>125 mg/kg</td>
<td>100 mg/kg</td>
<td>4,500 IU/kg</td>
<td>1,000 IU/kg</td>
</tr>
<tr>
<td>Potassium (P)</td>
<td>0.85%</td>
<td>0.70%</td>
<td>125 mg/kg</td>
<td>100 mg/kg</td>
<td>4,500 IU/kg</td>
<td>1,000 IU/kg</td>
</tr>
</tbody>
</table>

**Ingredients**
A list of the ingredients used in this feed may be obtained from the manufacturer or registrant.

**Directions**
Feed Lean Maker 4 as the sole ration to pigs from 45 kg body weight to pigs with a high lean growth potential. See your Purina Sales Consultant to customize a feeding program to best fit your needs.

**Important**
Follow these management practices:
1. Provide a source of fresh clean water and adequate drinking space per animal at all times.
2. Provide a draft-free pen with clean, dry sleeping area.
3. When using a self-feeder, make sure it is adjusted to minimize feed wastage. Feeders should be well managed so as to provide adequate feeder space and prevent moisture condensation, mold and insect development.
4. Consult your veterinarian for recommended health programs in your area.

**Caution**
- Directions for use must be carefully followed.
- Feed is perishable. Store in a dry, well-ventilated area protected from rodents and insects. Do not feed moldy or insect-infested feed to animals as it may cause illness, abortion or death.

Disclaimer of Liability:
Individual results from use of this product may vary based upon differences in customer programs of management, health, sanitation, breeding, genetics and feeding. Therefore, Agribusiness/Purina Canada Inc. and its Dealers do not warrant or guarantee individual results.
### GUARANTEED ANALYSIS

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Protein</td>
<td>14.00 %</td>
<td></td>
</tr>
<tr>
<td>Crude Fat</td>
<td>2.00 %</td>
<td></td>
</tr>
<tr>
<td>Crude Fibre</td>
<td></td>
<td>11.00 %</td>
</tr>
<tr>
<td>Calcium</td>
<td></td>
<td>0.90 %</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>0.65 %</td>
<td></td>
</tr>
<tr>
<td>Sodium</td>
<td>0.30 %</td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td>20 mg/kg</td>
</tr>
<tr>
<td>Zinc</td>
<td></td>
<td>100 mg/kg</td>
</tr>
<tr>
<td>Vitamin A</td>
<td></td>
<td>6500 IU/kg</td>
</tr>
<tr>
<td>Vitamin D3</td>
<td></td>
<td>1400 IU/kg</td>
</tr>
<tr>
<td>Vitamin E</td>
<td></td>
<td>49 IU/kg</td>
</tr>
</tbody>
</table>

### INGREDIENTS

A list of the ingredients used in this feed may be obtained from the manufacturer or registrant.

### DIRECTIONS FOR USE

**Feeding Times:**
- morning
- evening
- evening

**Feeding Schedule:**
- Morning: Feed 0.5 to 1.0 kg/head/day or 2.0 kg/day on the day of farrowing.
- Evening: Feed 0.5 to 1.0 kg/head/day or 2.0 kg/head/day on the day of farrowing.

**Lactation:**
- During the first week of lactation, increase feed intake gradually by 0.5 to 1.0 kg/head/day until sow is eating 5 to 6 kg/head/day. After 7 days, feed at appetite (ad libitum). Increase or decrease feed offered to sows based on what they cleaned up from the previous feeding.
- Provide a source of fresh, clean water at all times.

**Note:**
Any ration change should be made gradually.

### CAUTION

1. Directions for use must be carefully followed.
2. Feed is perishable. Store in a dry, well-ventilated area protected from rodents and insects. Do not feed moldy or insect-infested feed to animals as it may cause illness, abortion or death.

### NET WT ON INVOICE
NUTRITION

Feeding the Grower and Finisher

At the grower / finisher stage most farms now will move these animals to another barn, possibly even another farm depending on housing capabilities or possibly their contract.

The **grower** will be between 10 and 18 weeks of age and weigh between 25 and 50 kg. The feed they consume will contain approximately 16-17% protein.

The **finisher** pig will be between 18 and 26 weeks of age and weigh between 50 and 115 kg. The feed they consume will contain approximately 14-16% protein.

At this stage the goal of the producer is to get the most meat for his/her input dollar. That little piggy better be ready to leave home.

All feeder barns should have set objectives for their finishing goals. These objectives may vary greatly depending on a variety of circumstances, including pig genotype, health status, environmental control, pig density in each pen and diet composition.

For optimal return the grower pig has to gain 87 kg from the time it is weaned until the time it is sold.

Farmers can choose to use one ration to meet the needs of the grower pigs, but this diet will provide finishing pigs with nutrition that is above their requirements.

Farmers have tended to move toward “phase” feeding, this means that the farmer uses more than one ration to pigs between the time they arrive in the feeder barn and when they reach market weight. There is also split sex feeding where barrows and gilts are fed different rations. This is done because, once pigs are over 25 kg, we know that barrows eat more feed and grow faster than gilts, they also use their feed less efficiently. On average gilts tend to eat approximately 10% less than the barrow, but will and do gain lean body mass at only a slightly slower rate. By phase and type feeding the farmer has better control on the cost of feeding the grower pig as he can more closely match the nutrient requirement of the pig while limiting excess waste and reducing cost.
GOAL LEVEL

<table>
<thead>
<tr>
<th></th>
<th>GOOD</th>
<th>Better</th>
<th>BEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at 105 kg</td>
<td>160</td>
<td>150</td>
<td>140</td>
</tr>
<tr>
<td>Days in Feeder Barn</td>
<td>110</td>
<td>100</td>
<td>90</td>
</tr>
</tbody>
</table>

The fewer number of days it takes to get the hog to market, the more cost effective for the farm, the lower the mortality rate and better the carcass index.

FEEDER BARN 20-105 KG PIGS

<table>
<thead>
<tr>
<th></th>
<th>GOOD</th>
<th>BETTER</th>
<th>BEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Growth Rate (g)</td>
<td>775</td>
<td>850</td>
<td>950</td>
</tr>
<tr>
<td>Feed Conversion</td>
<td>3.20</td>
<td>2.85</td>
<td>2.60</td>
</tr>
<tr>
<td>(Kg of feed to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>produce kg of body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>weight)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortality %</td>
<td>2.0</td>
<td>0.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Carcass Index</td>
<td>107</td>
<td>110</td>
<td>112</td>
</tr>
</tbody>
</table>

Consumers demand high quality lean pork products. It is in the farmer's best interest to maximize the muscle and lean body mass while minimizing fat deposit. One important advantage is that the pig if far more efficient in producing lean tissue than fat. Pigs require about 4 times the amount of feed to produce 1 kg of body fat compared to 1 kg of body lean. This is due largely to the difference in water content: fat and lean tissue mass contains 5% and 70% respectively.

The pork producer can manipulate lean tissue growth by selecting genetically lean animals for breeding, maintaining a high herd health status, carefully formulating market hog diets and controlling feed intake for optimal lean growth and cost efficiency.

Waterers for Older Pigs:
Older pigs are strong, destructive animals and will often play with water to relieve boredom. This means that the waterer must be rugged, and solidly attached to the floor or wall.

The correct angle and setting of the water is important. The waterer should be adjusted so that the water goes over the pig’s tongue and down the throat. Waterers should be about 45 cm apart. Where straw is used for bedding, bowl waterers, at the correct height, will contain the water and decrease spillage. Every grower or finisher pen with 10-20 pigs should have a minimum of 2 waterers.
Using the Target Weight Calculator
The diagram relates carcass weight, dressing percentage (DP), and live weight. It can
be used as a visual calculator to determine a shipping weight given a target carcass weight
and an estimate of DP (or vice versa).

The target weight calculator can be used to
determine the target shipping weights for your
hogs based on your current grid, or for
determining the potential shipping weight based
on the target weight range of a new grid
presented to you. It can also be used to see what
carcass weight is likely to result from shipping
hogs at a given live weight, or to see what effect
a change in DP might have on carcass weight.

How to use it
1. Find the target carcass weight (from your grid)
on the left axis.
2. Estimate your DP (from records, or use 80%).
3. Use a straightedge to read across from the
target carcass weight through the DP to find the
target live weight.
4. Reverse the procedure to determine carcass
weight based on a given live weight.

Example:
Consider the current Ontario Grading Grid. The
Index is the maximum of 114 over the weight
range of 80-94.9 kg—we’ll use 80-95 kg.
Assuming a DP of 80%,
we can read from 95 kg
carcass weight, left
side) through the 80%
point to arrive at a target
live weight of about
118.8 kg on the right
side. Similarly, a carcass
weight of 80 gives 100
kg. This is illustrated in
the Figure, right. So,
for the Ontario grid, the
target live weight range
is 100-118.8 kg.

(Continued on other side...)
(Continued from other side...)

Notes
The live weight target range of 118.8 kg found in this example is quite wide compared to some grids where the maximum index occupies a single weight class range of 10 kg, or even 5 kg, compared to the current Ontario Grading Grid's 15 kg. In these cases it is very important to know, and to ship at, the optimum live weight in order to hit the target carcass weight.

Use the table at the bottom of the diagram to repeat the exercise using your own grid. Be aware of the factors that can influence carcass weight and DP (some are listed below). Note how a change in DP changes the target live weight for a given target carcass weight.

**Target Carcass Weight...**
- is determined by your grading grid
- depends on dressing percentage and live weight
- know your grid and your targets
- weigh your pigs

**Dressing Percentage...**
is influenced by:
- transit time
- slaughter time (know your schedule)
- feed withdrawal/gut fill
- diet composition

Prepared by Jaydee Smith
Ontario Ministry of Agriculture, Food and Rural Affairs
(519) 674-1542 jaydee.smith@omafra.gov.on.ca

July 2001
NUTRITION

Feeding Stages of the Sow
Leader’s Information

Suggestions for this Section:
- Members can take turns reading through the first section.
  Be sure that they understand the terms “flushing” and “estrus cycle.” Refer to the feed tags in the previous section for the two sow rations and check the protein levels.
- If members have a farrowing barn at home you may ask them how the feeding is done in their barn.
- You can walk the members through the body shapes available or use the judging handbook and put a few different animals that are similar in body type and have them judge and give reasons for their choices.

Answer to the question (on page 35) - what is a female pig that has never been bred called: GILT
Answer to the question (on page 35) - what is a female pig that has had piglets but is not now nursing called: DRY SOW.

ACTIVITY: Pig Matching Game (on page 34)

ACTIVITY - Breed Research
Their research before next meeting is to find information on a breed of swine that you will give them on a piece of paper. This will ensure that everyone has a different animal and not necessarily something that they are familiar with. Tell the members that they will give a brief description of the breed, where they are from and maybe a photo if they can find one. Also if they are noted for a particular trait E.g. good EBV, good mothering, large litter size etc.

Supplies Needed: Pre-prepared names of swine breeds on slips of paper, fishbowl or jar.
ACTIVITY: Pig Matching Game

Put the terms and the matching definitions on slips of paper in a bowl or hat. Have all the members pick out one slip of paper, and find their appropriate partner. OR you could post the definitions on the wall. Have members choose a term from a hat or bowl and state what phrase corresponds.

DEFINITIONS:

1. The meat we get from pigs
2. A male pig
3. A female pig that has had at least one litter
4. A newborn pig
5. A pig whose parents are of different breeds
6. A pig weighing up to about 25 kg that has been weaned from its mother
7. A female pig that has not had piglet’s
8. A neutered (castrated) male pig
9. To give birth to a litter
10. A disease caused by a bacterium or virus that can be passed to another animal is said to be an _______ disease.
11. A pig weighing between 25 kg and 50 kg is called a _______.
12. A pig weighing between 50 kg and 115 kg is called a _______.
13. A disease which is not caused by a bacteria or virus and is not passed on to other animals is said to be a _______ disease.
14. A pig weighing about 115 kg and ready to go to slaughter is called a ______ hog.

TERMS:

1. pork
2. boar
3. sow
4. piglet
5. crossbred
6. weaner
7. gilt
8. barrow
9. farrow
10. infectious
11. grower
12. finisher
13. non-infectious
14. market
NUTRITION

Feeding Stages of the Sow

A female pig that has never been bred is called a ________. A female pig who has had piglets and who is not now nursing is called a ___________________.

Producers should aim to have gilts grown to 115-125 kg by six and a half months and bred on the second heat and have 17-20 mm of back fat. It has been well documented that short-term, high level feeding (flushing) during the estrus cycle (the period of heat in female animals) will increase the ovulation rate compared to gilts fed restricted amounts of feed. The protein level in a dry sow or gilt diet is 14-15%, and feed should be available constantly up to the time of mating.

Also at this time in a sow’s life the sow vaccination and worming program under veterinary and contract direction should be followed. These programs will help to boost sow colostrum antibody levels so she has passive transfer through her milk to protect her newborn piglets from most bacterial diseases.

However following mating the sow’s feeding is another matter. By flushing the gilt or dry sow you are increasing their ovulation rate, producing more eggs, therefore more piglets. After mating feed intake should be restricted to less than 0.5 kg for 7 hours. Approximately 30% of all viable embryos die during the first 25 days of gestation. Studies have shown that high levels of feeding after mating have been associated with this increase in embryo mortality.

Look at the example below:

Influence of Feeding Level Following Mating on Embryo Survival in Gilts

<table>
<thead>
<tr>
<th></th>
<th>Low Energy 22.9 MJ/day</th>
<th>High Energy 40.5 MJ/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ovulation Rate</td>
<td>12.3</td>
<td>13.8</td>
</tr>
<tr>
<td>Number of Embryos</td>
<td>9.7</td>
<td>10.1</td>
</tr>
<tr>
<td>Embryo Survival (%)</td>
<td>78.3</td>
<td>73.2</td>
</tr>
</tbody>
</table>

Earlier we discussed that the most expensive part of raising pigs was feeding. By looking at the table above does it make sense that the farmer would use a High Energy ration when the results are lower than that of a Low Energy ration??

The length of gestation for a swine is (time from conception to birth) is approximately 114 days (sometimes remembered as 3 months, 3 weeks and 3 days).
The Gestating Sow

While the sow is gestating (pregnant) feed intake should be limited to 1.8-2.7 kg of feed per day (20-33 MJ/day) of 14-15% protein feed if housed under reasonable conditions and are free of heavy parasite infestation and controlled by individual feeding stalls or floor feeding. Increasing the feed intake of the sows above this level would be of little benefit. Too much, too little or not the right mixture of feeds will create problems for the pregnant pig and her unborn piglets.

Methods of Restricting Feed of Sows in Gestation:
Various management styles have been successful. Here are a few methods:
- Hand feeding using gestation stalls.
- Computer controlled feeding stations
- Self-closing individual stalls
- Skip a day feeding
- Self-feeding a high fiber ration

Severe underfeeding during pregnancy may result in low piglet birth weights. Piglets with a birth weight of less than 1 kg have a greater chance of mortality.

Severe overfeeding during pregnancy causes the sow to be too fat, or what is referred to as “over conditioned”, when giving birth or farrowing. This may cause difficulties at birth, which increases the number of pigs born dead (stillborn).

Most of the development of the unborn litter occurs 40 days before farrowing. The sow will need the most nutrition during this period. If a sow is too thin, feed can be increased at this time. If she is at the desired weight, the feed level should be maintained. If she is “over conditioned” the feed level may be dropped slightly, but not by more than 1/2 kg as this will affect piglet growth and development.

The first step in assessing the proper diet of your gestating animals and your feeding program is to get an average score for the dry sows in the entire herd. If the average body condition score is less than 3 the daily feed allowance should be increased. The same rule applies if the average is greater than 3 the diet needs to be decreased.
Score your Sows’ Shapes

Let’s get a bit of practice in deciding when sows are too fat, too thin or just right!

A covering of fat over the “H” bone (hip bone) will show the amount of fat that the sow has in reserve. This is how you can determine the “condition of the sow”

Here’s how our body condition scoring stacks up and some feed changes that may need to be made in their diet:

1. Emaciated- Bone structure is apparent- ribs, backbone and hips are visible to the eye. Feed should be increased by 0.60 kg daily.
2. Thin- Hips and backbone are noticeable and can be easily felt. The backbone is also noticeable and easily seen and felt. Feed should be increased by 0.30 kg daily.
3. Ideal- Sow is tube shaped. Hips and backbone can be felt with firm palm pressure. You got the feeding just right, no need for changes.
4. Fat- Body tends to bulge. Hips and backbone cannot be felt, or felt with some difficulty. Decrease feed intake by 0.30 kg daily.
5. Over fat- The sow tends to look bulbous. Hips and backbone are heavily covered and cannot be felt. Decrease feed intake by 0.60 kg daily.

THE NURSING MOM:
Giving birth (farrowing) is the hardest work that the sow will ever do. She will strain for between one and five hours and she will lose about 20 kg. Piglets are born in litters of 8-14 piglets.

They will weigh about 0.9-1.4 kg at birth. They will walk and nurse within minutes after birth.
Constipation can be a problem for the sow. A couple of days before farrowing you can add some bran to her ration, this will help the problem. You can also use mineral oil or other commercial laxative to her feed. Remember to check your contact list for the products that you are allowed to use on your farm.

After farrowing, the sow may not eat for about 12 hours. She should be provided with plenty of water at all times. She can drink up to 18-23 liters per day.

When she is ready to eat again, feed her 0.5-1 kg of 16-18% nursing ration with 14 MJ De per kg. Slowly increase her feed intake until she is eating as much as she will clean up twice a day. Check feeders and adjust to avoid feed wasting. Uneaten food should be removed daily to avoid mold or other contamination.

Record keeping for next week:
- These scoring standards are consistent for judging of most livestock. This week you will check your swine project animal for body condition score and note this in your record book. How did you check the condition score? Did someone help you decide what the score should be? Be thinking of what shows are available for us to attend. Any decisions?
NUTRITION
Feeding the Boar
Leader’s Information

Suggestions for this Section:
• Give the Members a Roll Call question of your choice.
• Members should now have their record books well underway. This meeting would be a good time to review what they have done. Discussion about where their achievement show/shows are going to be and final arrangements could be made for transportation, problems, etc. If members have a virtual pig they can hand in their record books for review. Members with a virtual pig are still expected to attend the achievement show/shows to assist other members with their project. This is a good show of support for the entire group. Keep meeting regularly to work with their pigs, getting them ready and comfortable to show if that is what they are going to do. You may need to also make them aware of an auction barn or sale that the member pig could go to if they are unable to keep the animal.
• This meeting may be a good meeting to see if you can get an AI person to come in and talk about boars and boar selection. At the back of the project you will find listings for the boar units that may have someone available to talk to your members. If there is no AI person, a swine veterinarian may also be of assistance.

Activity - Breed Research Review
If you are presenting this section in the order in which it appears in this unit, each member is to present what they discovered about the breed of swine you gave them at the last meeting. Go around in turn. If they a picture of the breed you could hang them on the wall for everyone to look at after all the members are finished.

Activity: Crossword Puzzle (Member’s portion on page 40).

Crossword Answers:

ACROSS
2. standing
4. crossbred
5. piglet
7. estrus
12. ovulation
15. infectious
17. farrow
20. pork
21. weaner
22. OSIP
24. Landrace

DOWN
1. Hampshire
3. heat
6. selection
8. boar
9. gestation
10. EBV
11. Duroc
13. terminal
14. Yorkshire
16. sow
18. market
19. barrow
20. gilt
ACTIVITY - Crossword

ACROSS
2. Best time for breeding
4. A pig with parents of two different breeds
5. Newborn pig
7. Heat
12. Release of female sex cells during estrus
15. Disease caused by a bacterium or virus
17. Give birth to piglets
20. Meat we love to eat
21. 25 kg pig
22. Formerly ROP (initials)
24. White pig

DOWN
1. Breed with a meaty carcass
3. Also called estrus
6. Choosing the best
8. Male pig
9. 114 days
10. -2.2 mm backfat
11. Red pig
13. Type of crossbreeding program
14. White pig
16. Mature female pig
18. A _______ pig weighs about 100 kg
19. Neutered male pig
23. Young female pig
NUTRITION
Feeding the Boar

It used to be that every breeding herd needed some male pigs, which are called boars in their herd. Today less than 10% of swine herds at the time of this writing keep a boar on the premises for breeding purposes. Swine farms today may keep a Barrow (castrated male pig) to help with heat detection in the sow barn only.

Boars used for breeding these days are most commonly kept at companies that collect semen for Artificial Insemination (AI). These units maintain a group of 100 or more top quality purebred and crossbred boars from which semen is collected and can be purchased by the swine farmer.

Feeding the boar is often a forgotten member of the breeding herd and there is little research done on boars as to their nutritional requirements. This seems to be because most boars are market hogs and are shipped at a specific weight or age.

Young Boars are usually selected to be herd sires according to an index which includes such characteristics as growth rate, appetite, feed efficiency, lean tissue growth rate and carcass quality. As a consequence, young boars need to be fed a high energy ration, with the feed available to them at all times in order to accumulate meaningful performance data for use in a sire selection program. The protein requirements of growing boars is greater than that of barrows or gilts since the boars gain faster, are more efficient and have less back fat. Average daily gain and feed efficiency are maximized for growing boars at levels of 20% protein during the growing period (20-55 kg), and 18% crude protein during the finishing period (55-100 kg).

Nutrition can have a major impact on age of puberty and the rate of sexual development if feed levels are not sufficient for the age and weight of the boar. For example it has been found that a 30% reduction in feed intake has been shown to cause a 42-day delay in puberty in purebred and crossbred boars. Unless the animal is severely malnourished this restriction does not appear to have any obvious long-term effects on growth and body size of the animal.

Working boar daily energy requirements are looked at from the following components: body maintenance, body gain, semen production, mating activity and the requirement for extra heat production when kept below their lower critical temperature. Nutritional findings put the nutrient range from 29-41.5 MJ DE/day with an additional 3% for each 1 degree C in temperature below 20 degrees C.

Feeding the working boar is a fine balance. If overweight, they become sluggish and have a low libido and run the risk of leg and foot problems.
If underweight, they may not have an acceptable sperm count and the capacity for those sperm cells to fertilize will drop dramatically.

The table below shows **Energy Requirements for the Working Boar**

<table>
<thead>
<tr>
<th>Live weight kg</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight gain (g/day)</td>
<td>500</td>
<td>400</td>
<td>300</td>
<td>200</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Maintenance Energy (MJ/day)</td>
<td>17.8</td>
<td>22.1</td>
<td>26.1</td>
<td>29.9</td>
<td>33.6</td>
<td>37.1</td>
</tr>
<tr>
<td>Energy for growth (MJ/day)</td>
<td>16.4</td>
<td>13.1</td>
<td>9.8</td>
<td>6.6</td>
<td>3.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Total energy (MJ/day)</td>
<td>34.2</td>
<td>35.2</td>
<td>35.9</td>
<td>36.5</td>
<td>36.9</td>
<td>38.7</td>
</tr>
<tr>
<td>Daily Feed Required (kg/day)</td>
<td>2.6</td>
<td>2.7</td>
<td>2.8</td>
<td>2.8</td>
<td>2.8</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Maintenance Energy calculated using .415 MJ per kg BW
Energy for growth is calculated using 32.8 MJ per kg of weight gained. Daily Feed required assumes energy content of feed is 13 MJ/kg

When you look at the table above and the numbers what are a few items that you notice and why would they go up or down as they do?

**EBV’s**

Information gathered by measuring backfat and the number of days required to reach 100 kg is used to calculate the Estimated Breeding Value of swine. EBV’s are estimates of the genetic (breeding) values of an animal for a particular trait. They take into account not only measurements on the particular animal, but information from relatives (mother, father, sister, brother) as well. They show what an animal is capable of passing on to its sons and daughters, regardless of environmental or management conditions. Boars going into a breeding farm for semen selection have to be a cut above the rest to make it into this elite group.

**Ontario Swine Improvement Inc.** (OSI) is an organization that is devoted to the improvement of swine in Ontario. Each year they weigh and backfat measure more than 50,000 boars and gilts for performance. Representatives from the company can go to breeding farms and electronically perform the testing and give the EBV’s of the animals tested immediately.
HOUSING SWINE
FOR ALL AGES AND STAGES
HOUSING
Overview - Leader’s Information

Suggestions to Begin this Section:
- Give the members a Roll Call Question and answer if you choose.
- Discuss in general some of the different types of barns for swine. Ask the members what important elements need to be in their swine barn to raise healthy animals. (waterers, feeders, pens, lighting, good ventilation, heat, etc.)

There are basic barn diagrams provided with this unit. These can be used as a reference when members are building their barn or when talking about the different kinds of barn units.

Because the housing section is mostly statistics and regulation, which can be very boring for members this hands on unit was devised. Watch for an open house of a new swine facility in your area - you may be able to tour the new swine barn. As you provide the statistical information about different aspects of the swine barns the members will build that part into their barn.

ACTIVITY: Build a Pig Barn
(This activity should take place throughout the unit.)

Supplies Needed:
Coloured duct tape or coloured paper.
Graph paper.
Extra pencils and rulers.
Extra box lids in case a member does not have access to this type of material.

Hands on unit.
Members will build their own mini barn for whatever age of swine they would choose, using the statistics that you will present to them at each meeting, they will build their model to scale (as best they can) as you progress through the various barn necessities in this unit. The club leader can provide some of the basic necessities to facilitate the building of the barns by the members.
ACTIVITY: Let’s Build a Pig Barn

Supplies Needed:
Coloured duct tape or coloured paper.
Graph paper.
Extra pencils and rulers.
Extra box lids in case a member does not have access to this type of material.

- This mini barn can be built in a cardboard box, wooden box, and plastic box, whatever they wish to do. The feeder, waterers, fans etc. can be made out of different coloured paper or coloured duct tape. The tape actually shapes quite well.

- Some younger members may need help with calculating size and length or items needed so pair them with an older member.

- Members could work in pairs to build their barn, this could be age or size of club dependent. If you have more than 1 family member in your group they may wish to work together. Ask the members what they are most comfortable with.

- This will make an interesting display project at the local fair, and also make an interesting judging competition entry.

- If the members are considering flooring you may suggest that some screening as the open slatted flooring and an item like spongy shelf liner as more like the mesh type flooring.
HOUSING
Overview

In Canada, the trend in swine production is toward totally enclosed, well insulated buildings with controlled ventilation. Pigs need specific temperature control and space requirements depending on the age and stage of the pig’s growth. For this reason there are often separate barns for the different stages of swine growth or at the least separate rooms to house the different stages. This provides the animals with the best possible environment for health, disease control and optimal growth.

The Federal Health of Animals Regulations do expect the barn to meet certain requirements for the humane rearing and treatment of animals. No matter how well you plan your barn there will always be external factors that are not in the farmers control that will require adjustments to air flow and temperature just to name a few.

The three main types of barns used today to house swine are Breeding/ Gestation barns (adult life and pregnancy), Weaner/Grower barns (infants and toddlers) and Finishing barns (teenagers and young adults). Some farms have all three on one farm while other specialize in just one area and when the pig reaches a certain stage they move on to another facility. All pigs no matter what age need these items of housing and equipment only in various sizes and numbers to suit the age of the animal being housed:

1. A pen or room of some kind
2. Ventilation, a source of fresh air
3. Flooring that is suited to the age and stage of the animal in that barn
4. Clean water supply at all times
5. Clean well balanced feed supply
6. Heat and the temperature will again depend on what age the animal is and also the temperature out of doors.

You are going to build a swine barn. Decide on what stage of swine production you find interesting, and this is the type of barn you will build.

You will need:
The lid of a box or a low box as your barn.
Glue, Scissors, Tape
Pencil and Ruler
Coloured duct tape or heavy paper in different colours to construct the different elements that need to go into your barn will be provided.
Graph paper will also be provided for your use.

Every week bring your barn with you and as we discuss the different elements of what is required in our swine barns you can add this
element to your barn in the proper proportions for your barn in the box. For the next meeting bring your box and the items listed above so we can get started with our building project. Have your box measured so you know the size of your barn. This will help you to understand how many animals you can house and what you need to keep them comfortable and healthy.
Let’s Build our Pig Barn Sections

Suggestions for These Sections:
- If members are showing pigs discuss what type of flooring they are housed on now and get them to take the room temperature in the pen and record it in their record keeping book for next week.

Size of Your Barn, Age of Animal in Your Barn and Flooring:
ACTIVITY: Have Members begin building their barns after material is discussed.

Temperature, Humidity and Ventilation:
ACTIVITY: Humidistat Demonstration (page 7)
Supplies Needed: Humidistat, rooms with running tap water.

ACTIVITY: Build a Thermometer (page 8)
Supplies Needed:
- tap water
- rubbing alcohol
- clear narrow necked plastic bottle (water bottle works well)
- food colouring
- clear plastic drinking straw
- modeling clay

ACTIVITY: The Soda Pop Test (page 9)
Supplies Needed: Bottle of pop (preferably cola), drinking straw.

Water Section:
The answers to the water questions (on page 27):
- Drinking water must be available ALWAYS
- Drinking water must be CLEAN
- Water should be tested REGULARLY for contaminants.

ACTIVITY: Water Output (on page 10)
Supplies Needed: 1 L milk jug, tap water.

Lighting Section:
ACTIVITY: Measuring Light with a 35 mm Camera (on page 11)
Supplies Needed:
- 35 mm camera with light meter
- Film

ACTIVITY: Other Items Required in your Barn (on page 12, Member’s section on page 33).
Activity - Humidistat Demonstration

Supplies Needed: Humidistat

A humidistat is an inexpensive but handy item to show members at different locations how the humidity can change, for example, from the room you are meeting in to a bathroom with a hot water tap running, or a freezer. This activity makes for a good discussion also on how each of those humidity areas feel to them: comfortable or not, hot or cold, as this is how the pig would also feel.
Demonstration - How to Make a Thermometer

When talking about temperature try to find a maximum/minimum thermometer like they used to use so the members can see how the magnets work to tell the farmer what the temperature in the barn has been doing. You can also purchase a humidistat for a reasonable price. Place it in the room you are working in, try putting both in a fridge or freezer for a short time to see what the rates are. Use the wetted back of the hand to check wind speed, in the room, outside or in the barn if you are lucky enough to have access to that.

Supplies:
- tap water
- rubbing alcohol
- clear narrow necked plastic bottle (water bottle works well)
- food colouring
- clear plastic drinking straw
- modeling clay

1. Pour equal amounts of water and alcohol to fill the bottle about ¼ of the way up the bottle.
2. Add a couple of drops of food colouring and mix it up.
3. Put the straw in the bottle, but don’t let it touch the bottom (DO NOT DRINK THIS MIX!!)
4. Using the modeling clay seal the neck of the bottle so the straw stays in place.
5. Now hold your hands on the bottle and watch what happens to the mixture in the bottle.

What you will discover!!!
Congratulations you have just made a thermometer. Just like any thermometer the mixture will expand when it is warmed. The heat of your hand made the liquid no longer fit in the bottom of the bottle so it starts to travel up the straw. If the bottle got hot enough it would go all the way to the top of the straw. (The bottle is plastic so do NOT heat it to this point!!)

You can leave your thermometer throughout the day and watch the level in the bottle change.

What happens when it is in the sunlight, or in a shadow?
What happens when it gets colder?
How does the wind affect the thermometer?

Of course, to figure out the real temperature you need a real thermometer that has been calibrated for such use. This one is just to show you the mechanics of how a thermometer works, and what causes changes to a thermometer.
Activity/Demonstration- The soda pop test.

Using a bottle of pop so you can see liquid level (coca-cola would be best- clear bottle and dark liquid), draw up enough soda into a drinking straw so that there is an amount in the straw equal to the thickness of a Canadian Loonie. This does not take much vacuum, but that low amount is the amount of vacuum that will bring air into the barn at 5 m per second (1000 ft./min) about the rate a person would travel if they ran as fast as they possibly could.

NOTE to the members that if the air comes in the inlet too slowly the air will not mix. If the air comes in the inlet too fast, it can cause drafts down at pig level and stir up gases in the manure pit.
ACTIVITY - Water Output Demonstration

Supplies Needed:
1L empty plastic mild jug
Tap water

The members can measure the output of water in their barn. For now we can do this where we are meeting.

The water nipple should run at 2 L per minute to satisfy a sow in the summer.

Use an empty plastic milk jug that holds a bag of milk holds 1 L. When the tap runs, the jug should fill up in 30 seconds. Similarly the water nipple in the sow's farrowing crate should run at the same speed to satisfy her needs for water in the summer. If the flow rate is too slow, the sow may not drink as much and her milk production will be reduced. This activity will show the members an easy way to go home to their barn and check out their flow rate. Encourage them to do this and record the results in their record books and bring the results with them to the next meeting.
Activity - Measuring Light Intensity using a 35 MM Camera

If you have a camera with a built in light meter, you can estimate the intensity of light reaching the pigs. The recommended level of the breeding area is 16 hours of light/day, at 100 lux (10 foot candles) at the level of the back of the sow.

Set the film speed to 200 ASA and adjust the lens opening to an f-stop of 8.

Put a piece of white paper on the floor of the pen, which houses the sows to be bred.

Focus the camera on the paper so the white sheet fills the viewing frame. Note the shutter speed-reading. Make sure you are not casting a shadow on the paper.

The formula to determine light levels as measured in lux is as follows:

\[
\frac{100xtxf^2}{ASA}
\]

f=f-stop; t=shutter opening; ASA= film speed

With the film speed at 200 ASA and the f-stop at 8, the formula simplifies to the following.

\[(32) \times t\]

With the film set at 200 ASA and the f-stop set at 8, the shutter speed-reading was 15.

What is the light level?

\[32 \times 4 = 128 \text{ lux}\]

As this level is above 100 lux, it should be adequate.

Try this in different parts of the barn or room. Have the junior members take the reading and the Senior members work through the calculations.

If you do not have a camera that can do this try to find a camera club or photographer with a light meter to help with this experiment.
### Housing

**Other items required in the barn (blank sheet for members on page 33):**

<table>
<thead>
<tr>
<th>Items</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerator</td>
<td>Store: drugs, employee’s lunch, artificial insemination vials. (probably not the best idea to use the same fridge for lunches as for medications!!)</td>
</tr>
<tr>
<td>Freezer</td>
<td>In summer to store little dead pigs until there are enough to take to the dead stock</td>
</tr>
<tr>
<td>Scale</td>
<td>Weigh pigs at weaning and again at shipping</td>
</tr>
<tr>
<td>Loading equipment, gates, handling boards</td>
<td>Guide the hogs and protect people moving them, the board's make moving hogs easier.</td>
</tr>
<tr>
<td>Shovels</td>
<td>To move manure</td>
</tr>
<tr>
<td>Standby generator</td>
<td>To provide power in case of supply interruption</td>
</tr>
<tr>
<td>Footbaths</td>
<td>Helps with disease prevention and transmission</td>
</tr>
<tr>
<td>Breeding charts</td>
<td>Record keeping</td>
</tr>
<tr>
<td>&quot;No Admittance&quot; sign</td>
<td>Safety, bio-security</td>
</tr>
<tr>
<td>Pickup truck</td>
<td>Carrying pigs and doing odd jobs</td>
</tr>
<tr>
<td>Computer</td>
<td>Record keeping</td>
</tr>
</tbody>
</table>
HOUSING
LET’S BUILD OUR PIG BARN!!
SIZE OF YOUR BARN, AGE OF ANIMAL IN YOUR BARN AND FLOORING...

What type of swine barn have you chosen to build? What is the length and width of the item you are using for your barn? With this number, instead of using the centimeters turn the number into meters. This will give you more room to work with.

E.g. my box measured 45 cm long x 30 cm wide therefore my barn area to work with will be 45 meters x 30 meters.

NOW- take these two numbers and multiply them together to get the number or square meters you will have in your barn.

E.g. 45 x 30 = 1,350 square meters is the size of my barn.

Write your barn size here L________W________Sq.meters________

In the designing of a barn it is not the square area alone that will determine how many animals you can safely house. The amount of floor space also depends on:
- body size of the animal to be housed
- floor construction
- environmental temperature
- allowances for alleys
- loose housing or individual penned housing

Below is a table of the recommended pen floor space allowances for growing pigs based on body weight as found in the Recommended Code of Practices from Agriculture and Agri-Food Canada:

<table>
<thead>
<tr>
<th>Body Weight Kg.</th>
<th>Fully slatted floor</th>
<th>Partially slatted floor</th>
<th>Solid bedded floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.16</td>
<td>0.18</td>
<td>0.21</td>
</tr>
<tr>
<td>20</td>
<td>0.26</td>
<td>0.29</td>
<td>0.33</td>
</tr>
<tr>
<td>50</td>
<td>0.48</td>
<td>0.53</td>
<td>0.61</td>
</tr>
<tr>
<td>75</td>
<td>0.62</td>
<td>0.70</td>
<td>0.80</td>
</tr>
<tr>
<td>90</td>
<td>0.70</td>
<td>0.78</td>
<td>0.91</td>
</tr>
<tr>
<td>100</td>
<td>0.76</td>
<td>0.85</td>
<td>0.97</td>
</tr>
<tr>
<td>110</td>
<td>0.81</td>
<td>0.90</td>
<td>1.03</td>
</tr>
</tbody>
</table>

In very hot weather floor space allowance may need to be increased by 10-15% on slatted floors and may require an even greater increase on solid floors.

Pigs housed on solid, bedded floors or partial slats require more space for control of the manure than those kept on fully slatted floors over a
manure pit. They also need more space because the cooling capacity of the air is less.

**Under the Recommended Codes of Practice they state that:**

**Weaner pigs** may be housed with just their littermates or may be housed with 2 litters in one pen depending on litter size and closeness in age. They need to be monitored for tail biting and sucking and if this occurs the offender needs to be removed from the pen. This would mean that you could safely house 10 to 20 piglets. As litter sizes increase (some up to 20+ piglets) you may choose to house the littermates by themselves. They would stay with this group until they are about 3 weeks of age.

**Growers** as they get older and larger swine become more aggressive with one another. Generally the group size for this stage of growth would be 10-15 animals as long as there is a minimum of disruptive behavior. At this stage some barns will split the animals off into pens by sex and/or size of the animal.

**Finishers and Mature animals** it is recommended that there be 10 or less animals per pen.

**Adult confinement** stalls should always be large enough to allow the pig to lie fully relaxed without its head or nose touching the feeder or front of the stall. The stall must be wide enough to allow the animal to lie fully relaxed on its side without its feet and legs extended comfortably. A stall that is usually about 0.65 m will usually be sufficient.

Usually if there is some belligerent interactions between individuals within the group it should subside as the social hierarchy is established; however it is difficult to add new animals to a previously established group. This is where the best course appears to be all in and all out with a group of animals to avoid fighting, stress and injury.

There have been some studies done with large housing pens (100+) animals in loose housing and access to outdoors for short periods of time. The studies found the animals for the most part got along very well and seemed to grow just as quickly as their fully housed counterparts. This type of study also showed a decrease in labour, feed, injury, hydro and wear and tear on the barn facility. This is NOT however an accepted practice at this time in Ontario due to disease and bio-security needs for our swine industry.

**Gilt and Sow** housing will require more space. When the animal is dry she may be held in loose penning, which gives her freedom to walk about freely as opposed to the type of farrowing crate she will be put into after becoming pregnant. There are pros and cons to loose housing of gilts and sows, and some farms prefer to house these sows in individual stalls as soon as they are bred to avoid fighting, stress, over
or under feeding and therefore the possibility of litter loss.

Other farms will hold the sows that are pregnant in small loose housing pens of about 10 animals or less until they are close up to farrowing. The sows would be sorted by age and weight in order to maintain optimal health and proper feeding rates. Farms that house gilts and sows in loose housing pens find that they have a reduction in foot and leg problems. The table below shows the type of floor space required for loose housed gilts and sows.

<table>
<thead>
<tr>
<th>Body Weight Kg.</th>
<th>Partial slatted floor Square meters</th>
<th>Solid bedded floor Square meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-150</td>
<td>1.5</td>
<td>1.7</td>
</tr>
<tr>
<td>150-200</td>
<td>1.8</td>
<td>2.0</td>
</tr>
<tr>
<td>200-250</td>
<td>2.1</td>
<td>2.3</td>
</tr>
<tr>
<td>&gt;250</td>
<td>2.3</td>
<td>2.6</td>
</tr>
</tbody>
</table>

My barn is_______square meters.

I am going to house________________kind of pig.

Therefore based on the numbers above I can hold approximately _____ many animals in my barn.

Oh!! But wait!!

If I am going to put farrowing sows in my barn I need farrowing crates and how big are they and how much room do they need? Well then there is also the piglet area to consider beside the crate.

There are quite a few variations on farrowing crates in shape, size and stall configurations. There are rectangular pens, square pens, round pens and ellipsoid crates. There is also a lot of controversy about the size the pens for the sow should be for maximum comfort and limited piglet loss.

Conventional farrowing crates measure 2.2 m long x 1.8 m wide, with the sow stall being 0.6 m wide x 2.15 m long and centrally located within the crate.
So if I want to build a farrowing barn and use a standard crate:
My barn is __________________ square meters.
I could therefore house approximately ________ farrowing crates.

When talking about any swine barn remember to include aisle ways that are easy to work through as well as bio-security areas, a space for an isolation pen if needed and when working with a farrowing barn a weanling pen area in your barn. The following are 3 types of barns that are very basic for you to look at.

Start building your barn!! Start on graph paper to get your ideas if you choose and then begin to work with your “barn” area.

Age of animal I am housing: ________.

Type of floor I am going to use: ____________________

I will need ________ pens in my barn based on its size.

One of many farrowing crate layouts:
Below is a diagram of a concrete slatted finisher pen system.
Below, you will find some examples of types of flooring used in swine barns today. There are many barns switching to plastic or cast iron slat flooring as opposed to the use of concrete or wood flooring. These newer types of floors are warmer for the piglet areas and the slat widths come in all sizes. The cast iron flooring is often plastic coated for sow comfort. These newer types of flooring provide easy cleaning and increase warmth for the piglet and cool for the sow, they are have a non-slip surface.
Farrowing Stall and Dry Sow Facility (1500 Head)
Nursery Barn (holds 2,400 head)
Finishing Facility (900 head)
Housing

Let’s Build Our Pig Barn

Temperature, Humidity and Ventilation

The environment felt by animals is determined by temperature, humidity and air speed.

Temperature

When you house pigs indoors, you must consider the temperature of the barn. In pig barns you often have different ages of pigs and so should have different temperatures for each age group. The younger the animal, the warmer the temperature will need to be. A thermometer should be placed so that the temperature is monitored at pig level on a constant basis. Most new barns are equipped with digital temperature sensing devices that record barn temperature on a continual basis. These thermostats will be located throughout the barn at regular intervals so that the barn maintains an overall comfortable temperature, or so that the farmer can manually set a certain part of the barn to a different setting or temperature depending on what age of animal is being housed.

Below is a table that gives the recommended room temperature ranges for different ages of swine:

<table>
<thead>
<tr>
<th>Type of Pig Room</th>
<th>Pig Weights</th>
<th>Fall-Winter-Spring</th>
<th>Summer Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaned pigs</td>
<td>5 kg</td>
<td>28.5 C - 32.5 C</td>
<td>28.5 C - 32.5 C</td>
</tr>
<tr>
<td></td>
<td>10 kg</td>
<td>25.5 C - 31.5 C</td>
<td>25.5 C - 31.5 C</td>
</tr>
<tr>
<td></td>
<td>15 kg</td>
<td>24.0 C - 31.0 C</td>
<td>24.0 C - 31.0 C</td>
</tr>
<tr>
<td></td>
<td>20 kg</td>
<td>23.0 C - 30.5 C</td>
<td>23.0 C - 30.5 C</td>
</tr>
<tr>
<td></td>
<td>25 kg</td>
<td>22.0 C - 30.0 C</td>
<td>22.0 C - 30.0 C</td>
</tr>
<tr>
<td>Grow-Finish Pigs</td>
<td>25 kg</td>
<td>22.0 C - 29.0 C</td>
<td>22.5 C - 29.5 C</td>
</tr>
<tr>
<td></td>
<td>35 kg</td>
<td>21.0 C - 28.0 C</td>
<td>22.0 C - 29.0 C</td>
</tr>
<tr>
<td></td>
<td>50 kg</td>
<td>20.0 C - 27.0 C</td>
<td>21.5 C - 28.5 C</td>
</tr>
<tr>
<td></td>
<td>70 kg</td>
<td>19.0 C - 26.0 C</td>
<td>21.0 C - 28.0 C</td>
</tr>
<tr>
<td></td>
<td>90 kg</td>
<td>18.0 C - 25.0 C</td>
<td>20.5 C - 27.5 C</td>
</tr>
<tr>
<td></td>
<td>110 kg</td>
<td>17.0 C - 24.0 C</td>
<td>20.0 C - 27.0 C</td>
</tr>
<tr>
<td>Gestation/Breeding</td>
<td>120 kg -180 kg</td>
<td>17.0 C - 24.0 C</td>
<td>20.0 C - 27.0 C</td>
</tr>
<tr>
<td>Farrowing</td>
<td>150 kg-200 kg</td>
<td>21.0C - 27.0 C</td>
<td>22.0 C - 28.0 C</td>
</tr>
</tbody>
</table>

The above table assumes that the pigs housed on total slat flooring with liquid manure systems. Grey numbers indicate an elevated temperature range for summer conditions. This recommended temperature for larger pigs should be increased in the summer to more closely match the outdoor temperatures. This reduces the chance of animal chilling during...
the transition from warm days to a cool night.

This does not take into account humidity, which can also play an important role in temperature as well as swine body heat produced in the barn itself. The temperature in a swine barn is not an exact science but should be monitored closely every day at regular intervals.

A good ventilation system will have exhaust fans, re-circulating fans, air inlets, heaters and controls both electronic and manual.

Some of the symptoms that pigs may demonstrate when the temperature is not at the correct level for the age of animal are:

- pigs huddling together indicate that they are cold
- panting to try to alleviate heat buildup
- dunging in the eating and sleeping areas
- decreased feed consumption and growth rates
- outbreaks of disease, such as scours

The farmer should be prepared to provide supplemental heat or sufficient bedding when needed for all age groups of pigs so that the comfort zone is maintained at all times.
HUMIDITY

How do we feel on a hot, humid day in the summer? Sticky, sweaty uncomfortable, and that is how the pig feels also if his environment is not controlled well. Humidity refers to the amount of moisture in the air. Humidity in the barn causes far more than moist uncomfortable temperature, gases and odors are stronger when the humidity is high. Humid air does not just come from the environment but the pigs breathing and from evaporation of water and urine from the floor. If there is not enough good ventilation or insulation in the swine barn the humidity can get very high even in cold weather.
In the cold weather the fresh air coming into the room gets foggy, the walls and ceiling sweat or the room feels damp and stinky, then the humidity is probably too high.

When the farmer finds it unpleasant to breathe in the barn then the pigs are finding it hard too. Most of the newer barns are equipped with humidistats that control airflow panels, chimneys, vertically sliding sidewall panels and windbreak skirts as well as fans or heat panels to help the barn adjust to the temperature changes that cause this problem of humidity. The correct relative humidity for adult and growing pigs is within a range of 40-80%.
VENTILATION

When we think of ventilation we think of moving air into and out of the barn. If the incoming air is not controlled properly, it may cause a draft in the pig pen and cause the animals to feel cold. An air speed of 2.5 metres / sec is the maximum to which a pig should be exposed. An air speed greater than that would be considered a draft. At an air speed of 2.5 metres/sec we humans can barely feel the air moving on the back of a wetted hand. This can be a good test. Wet the back of your hand and get down where your pig is - if you feel a draft you can bet your pigs can feel it also, and this in turn will make them feel chilled.

For warm, environmentally controlled buildings, a well-insulated building is always easier to ventilate than one with too little or poor insulation. A well insulated building will be easier to heat in the winter and allow for better air exchange. Insulation will also prevent excess solar heat gain in summer months and lower the incidence of animal heat stress.

Insulation can be costly and sometimes inconvenient to install, but it will improve animal performance and allow for better ventilation no matter what type of system your barn has in it. It will also save the farm many dollars in extra heating and cooling units that may be required for the barn to stay in good control.

Keep all fans and moving parts of your ventilation system in good repair and clean. This will help them work more efficiently. Systems made of plastics, cast aluminum and fiberglass will outlast metal by twice as long, although they may be a little more costly to install initially the savings over time and the efficiency of the working unit will pay for itself many times over. KEEP THE EQUIPMENT CLEAN AND IN GOOD REPAIR.

Natural ventilation systems require less maintenance than fan-type systems. Both types of systems still require adjustable air inlets and thermostatic controls but mechanical fans also have a fan motor, blades, and louvers to maintain and keep clean.

No matter what the ventilation type used in the barn it will still require electrical energy. Hydro is expensive so choose the type of system that best suits the method in which you wish to run your barn and what will be effective but also cost efficient.
An example below can help you see some of the energy differences in systems:

<table>
<thead>
<tr>
<th>Animal type</th>
<th>Year Round Housing</th>
<th>Exhaust Fan Energy</th>
<th>Circulation Fan Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swine</td>
<td>Gestating sows</td>
<td>59kWh</td>
<td>20-30kWh</td>
</tr>
<tr>
<td></td>
<td>Farrowing sow</td>
<td>180kWh</td>
<td>100-130kWh</td>
</tr>
<tr>
<td></td>
<td>Weaning pigs (7-25kg)</td>
<td>25kWh</td>
<td>8-17kWh</td>
</tr>
<tr>
<td></td>
<td>Grower/Feeder pigs</td>
<td>32kWh</td>
<td>6-10kWh</td>
</tr>
</tbody>
</table>

So what does this all mean? kWh means________________________.

And this measure that is beside the different age of pig is per animal. So when you are building your barn you have calculated how many animals you can house, so now you can compare the 2 ventilation type systems to figure out how much hydro per animal per hour it will cost you to ventilate your barn. Assume in your calculation that kWh costs $0.08 cents.

You have _____ pigs. Each animal needs_______ space in the barn, therefore,

_____ pigs x ____kWH/pig space x $0.08 of current energy price = $ ______ per year.

The drawing above shows an example of exhaust fan placement in a 500 growing/finishing pig barn. This barn has self-adjusting slot air inlets and proper fan capacity for animal age and barn size.

The picture at right shows central fans in the middle of a grower barn. One is for good air intake the other for bad air exchange to go out of the barn.

Time for you to place your ventilation system in your model barn. Don’t forget to bring your record keeping books on your project swine with you to every meeting for review. If there are any questions, just ask and we will try to help clear them up!
**LET’S BUILD OUR PIG BARN FEEDERS AND WATERERS**

Nothing can stress a pig out more than having to fight for food and water. Even pen crowding doesn’t compare to this stress level. For this reason there are recommendations set out in the “Code of Practices” for best care of swine.

**WATER:**

Drinking water must be available_______________.

Drinking water must be ________________________.

Water should be tested_______________________ for contaminants.

There are recommended water flow rates for nipple drinkers, as well as height recommendations depending on the age and stage of the swine pen. Below is a table to show this:

<table>
<thead>
<tr>
<th>Size of pig</th>
<th>Flow rate of water</th>
<th>Height of nipple drinker</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Litres per minute</td>
<td>Centimeters from floor</td>
</tr>
<tr>
<td>First week</td>
<td>0.3</td>
<td>15</td>
</tr>
<tr>
<td>Weaned pig or starter</td>
<td>0.5-1</td>
<td>20</td>
</tr>
<tr>
<td>Grower</td>
<td>1-1.5</td>
<td>20-30</td>
</tr>
<tr>
<td>Finisher</td>
<td>1-1.5</td>
<td>30-40</td>
</tr>
<tr>
<td>Boar</td>
<td>2</td>
<td>50-61</td>
</tr>
<tr>
<td>Pregnant sow</td>
<td>2</td>
<td>50-61</td>
</tr>
<tr>
<td>Lactating sow</td>
<td>2</td>
<td>50-61</td>
</tr>
</tbody>
</table>

The height of the nipple drinker from the floor is based on nipple angle being at 90 degrees to the wall. The height should be higher for a 45 degree slope downwards, or lower for a 45 degree slope upwards.

Nursing Piglets still need water from day 1. They may only drink a little at this time but it is good to introduce them to the nipple drinker early. This will alleviate stress about water when they are weaned. There should be one nipple drinker for the piglets and one for the sow.

**For all other ages of swine it is recommended that there be no less than one nipple drinker or water bowl for every 10-15 pigs that are either penned or loose housed.**

Starter pigs when the pig is about 5-10 kg and are being introduced to creep feed they may consume 1.3-2.5 liters of water daily even though they are still nursing. At first the piglet may not understand the nipple drinker and it may be advisable until they are used to it to place a pan of water in the crate to encourage increased water intake.
Grower pigs of about 10-35 kg will consume about 2.5-3.8 liters of water per day.

Finisher pigs of about 35-100 kg will consume about 3.8-7.5 liters of water per day.

Dry sows, gilts and boars will consume 13-17 liters and Lactating sows and gilts will consume 18-23 liters of water per day.

The amounts indicated above are just to offset the amount of dry feed they are consuming per day. If the weather is very hot and humid the amount of fluid intake will increase accordingly. The amount of water the pigs drink will also depend on the type of feed they are being fed. If they have a wet/dry feed they may drink less water than those pigs getting just a dry pellet or flaked feed.

Check the water systems daily for ensure they are not plugged or broken. Pigs are curious animals and may play with the nipple drinker or rub up against it.

My barn is housing ____________ stage of swine.

My pigs are housed in pens of_______________.

So I will need to install_________ waterers into my barn at a flow rate of__________ to be able to sufficiently water my pigs.
Feeding Space Allowances:

The largest amount of swine production dollars goes into feed: approximately 70%. It is therefore critical that the farm has and maintains proper and efficient feed trough systems for all ages and stages of swine being fed.

- Check the feeders to ensure there is no waste food.
- Check below the slats for waste feed.
- If there is too much feed waste the farmer may have to adjust the height of the feeder, try a different type of feeder or try a different type of feed. Feed must be palatable, free from molds and dust. Feeders must be cleaned out regularly to avoid toxic buildup of molds, saliva and old feed which makes for a finicky pig when it comes to his food.

When it comes to feed trough space the amount of space needed will depend on the barn system used, whether the animals are restrict fed or ad lib fed and the age of the animal being fed.

Below is a table to show some approximate sizes for trough space:

<table>
<thead>
<tr>
<th>Weight of pig (kg)</th>
<th>Trough/hopper length per pig</th>
<th>Restricted feed (mm)</th>
<th>Ad lib feed (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>100</td>
<td></td>
<td>75</td>
</tr>
<tr>
<td>10</td>
<td>130</td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>15</td>
<td>150</td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>35</td>
<td>200</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>60</td>
<td>240</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>90</td>
<td>280</td>
<td></td>
<td>70</td>
</tr>
<tr>
<td>120</td>
<td>300</td>
<td></td>
<td>75</td>
</tr>
</tbody>
</table>

With 300 mm (12") single-space feeders allow 15 finishing pigs per hopper. With trough fed pigs there should always be enough space to allow all the animals to feed at one time i.e. 1.1 x shoulder width x number of pigs.
**Housing**

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Shoulder width (mm)</th>
<th>Feeder space (mm) 1.1 x shoulder</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>130</td>
<td>140</td>
</tr>
<tr>
<td>30</td>
<td>190</td>
<td>210</td>
</tr>
<tr>
<td>50</td>
<td>230</td>
<td>260</td>
</tr>
<tr>
<td>70</td>
<td>270</td>
<td>290</td>
</tr>
<tr>
<td>90</td>
<td>290</td>
<td>320</td>
</tr>
<tr>
<td>110</td>
<td>320</td>
<td>350</td>
</tr>
</tbody>
</table>

**Recommendations are:**
- 6 pigs per feed space when using a dry feeder with no full head barrier between each feeding place.
- 10 pigs per feed place where there are full head barriers
- 14 pigs per feed place where there is the opportunity to mix water with the feed (wet and dry feeders)

In my barn I am feeding this type of pig______________________.

There are _______ pigs per pen.

I am feeding _______ type of feed in a _____________ feeder, therefore I need _____________ mm of trough space to feed _______ pigs per pen in my barn.

Do the math!! And build your waterers and feeders in your barn.

Ask for help if you need it.

How is my record keeping book coming along?

My problem is__________.
LET’S BUILD OUR PIG BARN continued...

LIGHTING

Animals can be affected by the level, timing and quality of light. There has been little research done yet on lighting for pigs. Energy costs are very high in livestock operations of all types. To know what type of lighting is best for your barn, you first need to know some terms used in light measure.

- **Lumen** - light output from a lamp is measured in the term lumen (lm). For example a 40 watt (W) incandescent light bulb (the type normally used in the home) produces about 13 lumens per watt or 13 lb/W

- **Lux or Foot Candle** - the light level at the working surface is measured in lux or foot candle (fc). 10lux=1fc. Typical light levels in animal pens and corner areas of barns can be as little as 5 lux or ½ fc. Outside on a bright sunny day the light level will be around 80,000 lux or 8,000 fc.

- **Average rated life** - the average time it takes for 50% of light bulbs to fail.

- **Colour Rendering Indexes (CRI)** - the measurement of the light sources ability to render colour the same way sunlight does.

In the breeding barns, for example some recent research showed that a 14-16 hour “daylight” period promoted estrus in gilts and unbred sows, resulting in more piglets per litter. The lux at pig level should be around 150 lux or higher (or 14 in foot candles) which is about the amount of light needed for comfortable reading.

In the late spring and summer month’s light can come from windows or electric sources. The rest of the year however the farm will need to rely on electric lighting with a time clock setting as required.

In other areas of pig production windows add construction costs, lose valuable heat and require extra housekeeping. These three factors have led to windowless barn construction and the sole use of electric lighting. When considering what light source to use in the barn you must consider the best quality of light with the most cost effectiveness for the age and stage of animal housed in that barn.

**Lighting types used in barns today are:**

- **Incandescent** - light bulbs like those used in most homes. This style of light is about 5% efficient in converting light energy and the rest goes into heat. This type of lighting attracts flies and other insects as well as dust in the air that can crust on the bulb very quickly and easily making it even less effective in lighting your barn. They have a life expectancy of about 63 days if run for 16 hours per day.
Fluorescent – fluorescent lighting is a very cost effective light source. They require less energy than incandescent; they provide the required light over a larger area. Fluorescent lights cost less over their lifespan of about 20,000 hours. Conversion from incandescent to fluorescent will reduce energy costs by up to 75%. For the best light, longest lasting bulb use what is considered to be the compact size of fluorescent, one that is rated for agriculture use. Dimmable tube lights are currently being tested in commercial barns. The advantage of the dimming system is to simulate the dawn and dusk periods by slowly raising and/or lowering light levels. The cost savings with this type of system increase dramatically.

High Intensity Discharge (HID)- are the best units to use if the barn ceiling is greater than 3.6 m. This type of lighting is high efficiency, and high light discharge. The barn will require fewer fixtures to provide the same light levels as fluorescents. This type of light is also currently being tested for use with a dimmer system.

And coming soon - Light Emitting Diode (LED)- are currently (at the time of this writing) not used in livestock operations yet. Research is ongoing to determine if this system is compatible for agricultural use. All types of LED light can be used with dimmers in their current application. Advantages for the future on the farm include:

- Environmentally friendly, energy efficient, use 1/5th less power.
- Longer life
- Low cost and low maintenance.
- Miniaturization – small size allows them to be used in areas that are not easily accessible.
- Low maintenance cost
- Reliable – no moving parts, glass or filaments to break, immediate response, no pre-heat time.
The following table from the **Recommended Code of Practice** for the care of animals has put together a table recommending at least 8 hours of light per day that number varying with the age and stage of the animal.

<table>
<thead>
<tr>
<th>Type of housing</th>
<th>Light levels (fc) lux</th>
<th>Photo-period (h/d)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breeding/gilts</td>
<td>&gt;10</td>
<td>14-16</td>
<td>Necessary for estrus cycling</td>
</tr>
<tr>
<td>Gestation</td>
<td>&gt;5</td>
<td>14-16</td>
<td>To assist missed cycles, bring estrus on again.</td>
</tr>
<tr>
<td>Farrowing</td>
<td>5-10</td>
<td>8</td>
<td>If not using heat lamps some light in the room 24 h/d</td>
</tr>
<tr>
<td>Nursery</td>
<td>5</td>
<td>8</td>
<td>Some light in the room 24 h/d</td>
</tr>
<tr>
<td>Grower-Finisher</td>
<td>5</td>
<td>8</td>
<td>Minimum 8 h/d unbroken light recommended/</td>
</tr>
</tbody>
</table>

Now you can add your lighting system to your barn. Don’t forget to allow alleyways for easy access to pens in your barn. You need an office or place to keep records. You also need a shower in/shower out area for all persons entering or leaving your barn. This is good biosecurity.

**Why would you also need the following items in your barn?**

<table>
<thead>
<tr>
<th>Items</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerator</td>
<td></td>
</tr>
<tr>
<td>Freezer</td>
<td></td>
</tr>
<tr>
<td>Scale</td>
<td></td>
</tr>
<tr>
<td>Loading equipment,</td>
<td></td>
</tr>
<tr>
<td>gates, handling boards</td>
<td></td>
</tr>
<tr>
<td>Shovels</td>
<td></td>
</tr>
<tr>
<td>Standby generator</td>
<td></td>
</tr>
<tr>
<td>Footbaths</td>
<td></td>
</tr>
<tr>
<td>Breeding charts</td>
<td></td>
</tr>
<tr>
<td>“No Admittance” sign</td>
<td></td>
</tr>
<tr>
<td>Pickup truck</td>
<td></td>
</tr>
<tr>
<td>Computer</td>
<td></td>
</tr>
</tbody>
</table>

Add these items above to your barn where they belong. Review your record book.