

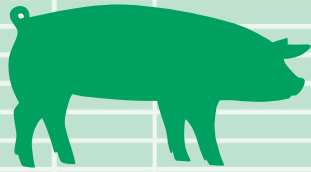


4H1064

Your 4-H Market Hog Project



4-H Youth Development
Michigan State University Extension



Your 4-H Market Hog Project

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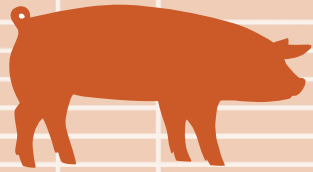
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Introduction

Welcome to an exciting 4-H animal project experience. As a 4-H market hog project member, you are part of a large group of young people who are learning by doing and directly applying the skills you learn.

4-H livestock projects, including hog projects, provide great opportunities for you to:

- Learn about animal and veterinary science.
- Explore animal production practices.
- Gain valuable life skills such as problem solving, decision making, critical thinking, record keeping, goal setting, teamwork, and taking responsibility for your project animals and yourself.

Livestock production is a part of Michigan's important agricultural industry, which is vital to the state's economy and future prosperity. Participating in a 4-H market hog project can set you on the path to an excellent career in agriculture.

You'll choose, feed, care for, train, and show your 4-H project animal as you learn more about breeds, selection, grooming, production, management, marketing, reproduction, health, and agribusiness careers. In addition to local county events, statewide competitions and educational events are all additional opportunities for involvement. Caring for one or more pigs to sell for market purposes is the most common 4-H swine project. The project doesn't require a large amount of money or expensive buildings. It takes a shorter amount of time than some animal projects.

The words **swine**, **hog**, and **pig** refer to animals of the porcine or pig family. In this manual, **swine** will be used in referring to the pig family in a general way, and **pig** will be used in referring to young animals. **Hog** will generally refer to animals at or nearing market weight or **finished** for market. The term **barrow** means a castrated male, and **gilt** means a young female.

What You Can Learn

In this 4-H market hog project, you'll have the opportunity to learn to:

- Evaluate pig prospects to select an appropriate market hog project animal.
- Select an appropriate feed for your hogs.
- Adjust feed ingredients as your project's nutrient requirements change.
- Determine your expenses and the possible profit from your project.
- Learn how to prevent illnesses, identify symptoms of various diseases and conditions, and properly treat sick hogs.
- Observe animal behavior.
- Prepare your animal for show.
- Exhibit and show your hog competitively.
- Determine whether your hog will be acceptable to the packer and why.
- Communicate effectively with supporters and possible animal buyers.
- Demonstrate proper animal handling techniques and care practices.

These are just a few of the many things you can learn from your market hog project. While working with your 4 H leader, you can make your own list of things you want to learn from this project. You can also set goals that you want to reach at the end of the project. This will help you decide how well the decisions you made throughout the year turned out. You also can decide if you should change anything for future animal projects.

Project & Member Objectives

The objective, or goal, of the 4-H market hog project is to encourage integrity, sportsmanship, cooperation, and an ability to communicate through activities such as demonstrations or presentations, judging events, tours, and exhibitions. Your market hog project will provide great opportunities for you to learn about animal and veterinary science, as well as animal production practices while gaining valuable life skills including decision making.

Here are some important learning objectives to keep in mind for your market hog project:

- Develop an understanding of scientific production and management practices by keeping records, and owning and caring for livestock.
- Improve skills in animal production best management practices.

Introduction

- Gain business experience and develop knowledge of the values and principles of purchasing, marketing, record keeping and balancing budgets.
- Determine efficient procedures and methods in marketing livestock and their products.
- Develop an understanding and appreciation of the livestock and meat industry, and its role in the state and national economy.

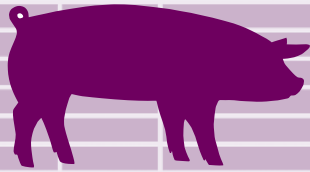
- Gather and interpret information, and identify the practices that will work best for your animal production system.
- Explore the livestock industry as a career opportunity.

The 4-H market hog project consists of feeding pigs to a market weight of around 250 to 290 pounds. As a member of the livestock industry, you will learn the same basic information as adults raising swine. One special note is that you shouldn't expect to make a large profit on your project. Your profit or loss will depend on the cost of the pigs when you start the project, the cost of the feed consumed by your animals, other costs (such as veterinarian and equipment bills), and the price you receive for your hogs when you sell them.

If you market your hogs at your county or area fair or show, generous people in your community may pay more for your animals than their true market value. This increases your chance for a profit. However, it's important that you know the difference between **market price** if sold at a local sale barn and the price you receive at your fair or show sale. If your hogs bring more than regular market price, the difference is your reward for having participated in the 4-H project and for working hard and carrying out what you learned throughout the project.

Photo by Will Neeley





Selecting Your Market Hog Project

The swine industry is diverse, reaching a variety of markets. Hogs raised in the commercial industry are usually very similar in appearance. Hogs raised for show are bred with traits that are more desirable for competition. You can obtain pigs from several sources, including:

- Your own or your parents' herd.
- A neighbor's or friend's purebred or commercial herd.
- Show pig auctions across the country.
- Online show pig sales.

Pigs are usually sold by the head, rather than by the pound, so you should have a good idea of how much the pigs weigh before buying them. An acceptable weight-for-age standard is 40 to 60 pounds at 8 to 10 weeks old. If they weigh less than that, they may be stunted and fail to perform in your desired timeline.

If you feed home-raised pigs, weigh them when they start on feed and determine their value using current market price, or place a value on them for their quality if you were to sell them as a show pig prospect. This information is needed to complete your livestock record book and to figure your profit or loss.

Before purchasing a pig, learn more about the person selling the animal and their production goals. As you grow in experience, study genetics of the pigs you are interested in purchasing to better predict their growth and **phenotype** (physical appearance) at market weight.

The price of a pig will vary depending on the quality of the pig and the reputation of the farm. It is common to

see pigs range from \$100 to even a few thousand dollars per pig. However, do *not* pay a high price for a pig with the idea that this alone will assure you of a winning champion.

Selection Criteria

Good pigs should appear thrifty, healthy, vigorous, and alert. Male pigs should be castrated and healed before purchasing. The most important thing to look for when selecting a project is that the animal is healthy.

Once you have determined the health of the animals, now it is your turn to be the judge. Select the 4-H project that fits your goals and reflects your price range. Although, this can be challenging, you can look for a few simple things to help you select a swine project. To help you better understand the selection concepts, begin by learning or reviewing the parts of a hog (see Figure 1). Knowing these parts will help you recognize quality pigs as well as market hogs.

In general, you are looking for a heavy muscled, well-designed pig that is structurally sound and able to move around the pen without any difficulty. Additionally, at this stage, you have a pig that has potential to grow and fit the desired timetable you have already determined. As the pig ages, body composition – specifically comparing the amount of muscle to the amount of fat – will also play a role in selection.

Muscle

When viewed from behind, the muscles of the ham region should be long, thick, and wide with the thickest point

through the stifle. There should be width between the hind legs, indicating ham muscling. The loin should have natural thickness and expression of muscling (muscle thickness) when viewed from the front or rear.

Structural Soundness

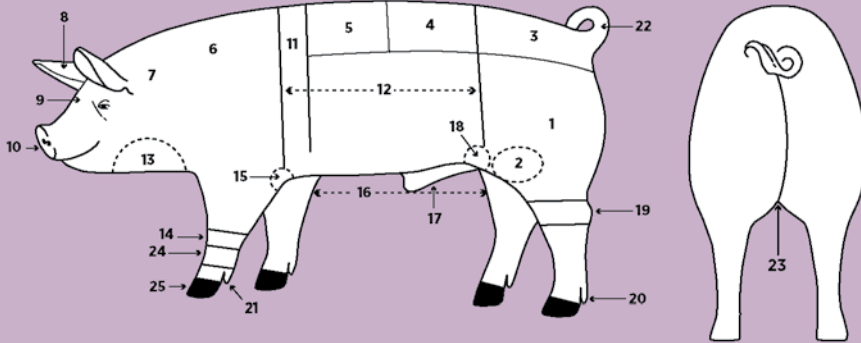
When evaluating structural soundness, you should look primarily at the pig's feet and legs. The pig's shoulder and front leg structures are very closely associated. Sloping shoulders give the front legs plenty of flex and cushion, which will properly distribute the pig's weight over the entire sole of its foot.

A very straight shoulder will cause the pig to be "over on its knees" and force it to stand too upright on its toes. Similarly, the rear legs should show flexibility and freedom of movement, allowing the pig to take a long flexible stride. Additionally, a pig's topline should be level. Generally, a level-topped pig will be free moving and structurally sound (see Figure 2 and Figure 3).

Design

A well-designed animal will have a balance that is pleasing to look at. Imagine a car built with the engine in upside-down and the mirrors facing the wrong direction. A poorly designed, poorly balanced animal has similar issues. Although it might have all the pieces you are looking for in a hog project, it lacks the final look. Poor design can also mean that the animal looks ideal when standing still, but when set into motion (asked to move), everything seems to fall apart.

Figure 1. Parts of a hog.



- | | | |
|-------------|---------------------|------------------|
| 1. Ham | 10. Snout | 19. Hock |
| 2. Stifle | 11. Rib | 20. Dew claw |
| 3. Rump | 12. Side | 21. Pastern |
| 4. Loin | 13. Jowl | 22. Tail setting |
| 5. Back | 14. Knee | 23. Seam |
| 6. Shoulder | 15. Elbow | 24. Cannon Bone |
| 7. Neck | 16. Underline | 25. Foot |
| 8. Ear | 17. Sheath (Barrow) | |
| 9. Head | 18. Rear flank | |

the jowl, be wastly through the elbow pocket, and have limited shoulder blade movement.

Breeds

No one breed of swine is better than others for 4-H market hog projects. Each breed has a specific purpose and will likely be a good 4-H project. Cross breeding is very common and is a way to increase growth and vigor. When evaluating an animal for a project, select it based on its physical attributes, or traits, and if known, the genetic performance records.

Figure 2. Hog with a desirable skeletal structure.

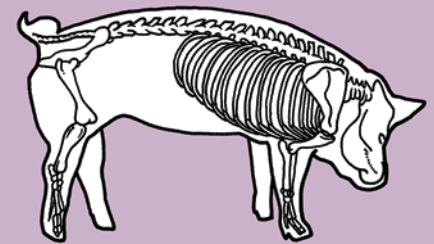
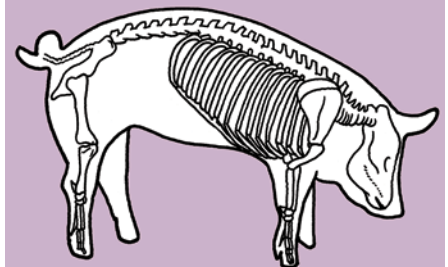


Figure 3. Skeletally incorrect hog that is high-topped, steep-rumped, and straight-shouldered.



Growth Potential

All animals raised for market projects need to be able to grow. In addition to genetics, one way to help determine potential growth is observing the center portion of the pig. The body cavity should be relatively deep, long, and wide, giving the pig plenty of body capacity. When the pig is seen from the side, body capacity can be described as the depth of rib and flank. When the pig is seen from the front, body capacity is the width of the chest floor. When seen from above, body capacity is the width between the shoulder blades and over the loin.

Body Composition

As your pig continues to grow, it is important to know the difference between muscle and fat. This is

particularly important if you bought more pigs than you can take to the fair. To help you decide which hog(s) to take to the show, evaluate the degree of muscling and **finish** (fat) to better determine the body composition. When evaluating the degree of finish on a **finished hog** (one that is ready for market), only the fat a pig deposits over its muscles can be seen. Because of this, it is important to determine whether the thickness you see is due to muscle or fat.

A lean hog will be trim in the jowl, elbow pocket, and seam. It will exhibit a desirable arch or turn over the loin. On the other hand, a hog overly finished (fat) will appear flat over the loin of and square due to fat accumulation along the loin edge, with little expression or tone. In addition, a fat hog may have fat deposits in

Determining Proper Pig Starting Weights

Select pigs that will have the proper amount of **finish**, or fat cover, when they reach 250 to 290 pounds. This is the most desirable market weight. Additionally, select pigs that will stay within their frame size and skeletal design when they reach their proper finishing weight. Otherwise, the hog may become unsound. This will affect its overall performance.

Healthy pigs will gain from 1.5 to 1.8 pounds per day if fed properly. Many times, 4-H project pigs will gain over 2 pounds per day because they often have more desirable genetics, are raised in small groups and receive more individualized attention.

The following are two factors that are helpful in determining how much and how efficiently your market hog project will grow:

Growth rate – Average daily gain

(ADG) and days required to reach 250 pounds (**days to 250**) are both measurements of growth. A greater value for ADG and a smaller value for days to 250 indicate a faster growing pig.

Feed efficiency value – The feed

efficiency value measures the amount of feed a pig requires to gain 1 pound. A feed efficiency value of 3.5 means that a pig had to eat 3.5 pounds of feed to increase its body weight by 1 pound. A low feed efficiency value is more desirable.

When selecting pigs for a swine project, you need to keep the end goal in mind. If you plan to market your hogs at your county fair or show, consider the date of this event when selecting your pigs. For example, if you have 125 days to feed your pigs, it

will be best to start your project with pigs that weigh around 50 pounds (125 X 1.6 pounds per day = 200 pounds gain; 50 pounds + 200 pounds gain = 250-pound market hog). If the pigs gain 1.7 pounds per day, their finished weights will be 262.5 pounds. Both fall in the desired range of market weights.

Using the previous example, you can decide when you should choose to buy your project pigs. If you select a heavier pig or if you believe your pigs will gain more rapidly, fewer days will be required. Under those conditions, you can select your pigs or start your project later. Keeping accurate records the first year will help you plan your next project more accurately.

Predicting the Cost of Your Swine Project

“Where will I get the money to buy and raise my pigs?” There are probably three sources of money available to you:

- Your savings account
- Borrowing from your parent(s) or guardian(s)
- Borrowing from your bank or credit union

If you borrow the money from your parent(s) or guardian(s), pay them interest as if you were borrowing from a bank or credit union. Keep the transaction as businesslike as possible.

Borrowing from your local bank or credit union will provide you with basic business training. Your parent(s) or guardian(s) will need to go with you and most likely co-sign the loan. The loan officer will need to know the answer to at least three questions:

- How much money will you need?
- How long will you need the money?

- How will you repay your loan if your pigs die or your project loses money?

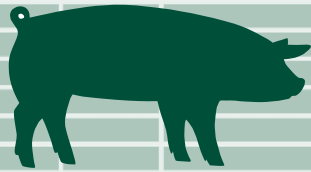
If you need to borrow money to buy the feed for your project, you need to calculate how much feed your pig will eat. If your 50-pound pig will be sold at 250 pounds, it will need to gain 200 pounds. You can estimate that it will take 3.5 pounds of feed per pound of gain. Therefore, your pig will probably need to eat about 700 pounds of feed. However, keep in mind that each pig may be a little different and could require more or less feed.

If your feed costs \$0.24 cents per pound (based on paying \$12 for a 50-pound bag of feed), you will need to borrow \$168.00 (700 X \$0.24) for feed. Additionally, you will need to also add whatever you expect to pay for your pig. In this example, you purchased a pig for \$132.

You will pay interest on the money you borrow from the bank or credit union. If you borrow \$300 per pig to finance your project, you will need the loan for about five months (for example, from April to August). At 12 percent annual interest, you will pay a 5 percent interest charge for the period of time you have the money (12 percent annual rate:

1 percent per month X 5 months = 5 percent interest charge). At this interest rate, you will pay \$15 (\$300 X 0.05%) in interest. So, when you repay the bank or credit union, you will need to pay them \$315 (the original \$300 you borrowed plus \$15 in interest).

Paying off your loan when it is due will help your standing as a borrower. This is called your **credit rating**. Whether you obtain the money from your parent(s) or guardian(s), or borrow it from a bank or credit union, it's important to pay your debts.



Pig Identification

Often times, pigs won't have any markings or traits that help you identify and recognize them. Consequently, swine producers use other methods to identify and keep track of their pigs. Ear tags can be used, but they are often lost and may be difficult to read. Many producers today depend on **ear notching** because it is a permanent method of pig identification. As a swine producer, or as someone who is involved in the industry, you should learn how to read the ear notching system.

Knowing a few basic rules will make understanding the universal ear notching system much easier.

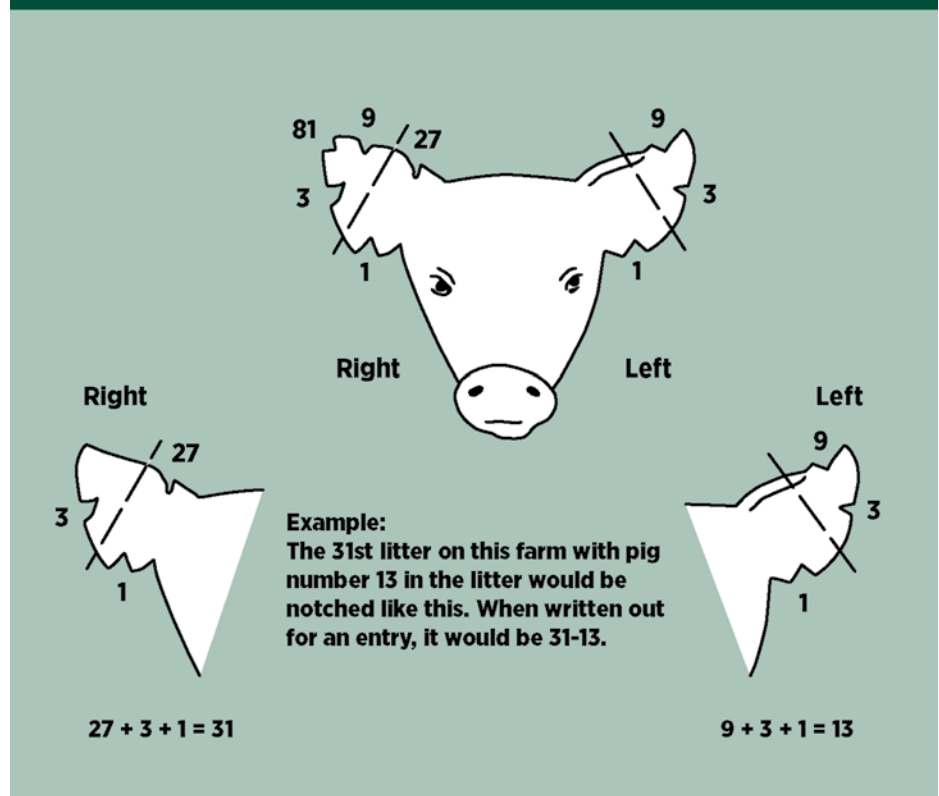
1. Notches in the pig's right ear represent its litter number. Notches in the pig's left ear are its individual number. Under this system, every pig in a litter has the same notch or notches in the right ear, while no two pigs from the same litter should have the same notch or notches in the left ear.
2. For ear notching, the pig's ear is divided into two halves – the tip half and the base half. By using the top and bottom edge of each half of the ear, four areas are available for notching. A notch in the lower edge of the base half is assigned a value of 1; while a notch in the lower edge of the tip half is 3. A notch in the upper edge of the tip half indicates a 9, and each notch in the upper edge of the base half is valued at 27. A notch in the very tip is assigned a value of 81 (see Figure 4).

3. The value of each notch in the right ear added together represents the pig's litter number; likewise, the values of all notches in the left ear are added to determine the pig's individual number.
4. There should never be more than two notches in any particular quadrant of the pig's ear.

Additional Exhibition Requirement

According to the Animal Industry Act of 1988, all swine shown at exhibitions, including county fairs, jackpot shows, birthing exhibits, and other events must be officially identified. The purpose of official identification is to help the state track swine if a disease outbreak occurs. The ability to verify identification is called traceability.

Figure 4. Universal ear notching system.



Pig Identification

For something to be considered official identification, it is imprinted with a nationally unique official animal identification number and bears the official U.S. shield.

The United States Department of Agriculture (USDA) establishes official identification guidelines. National Uniform Ear tagging System (NUES) tags and 840 tags are both official identification for exhibition swine.

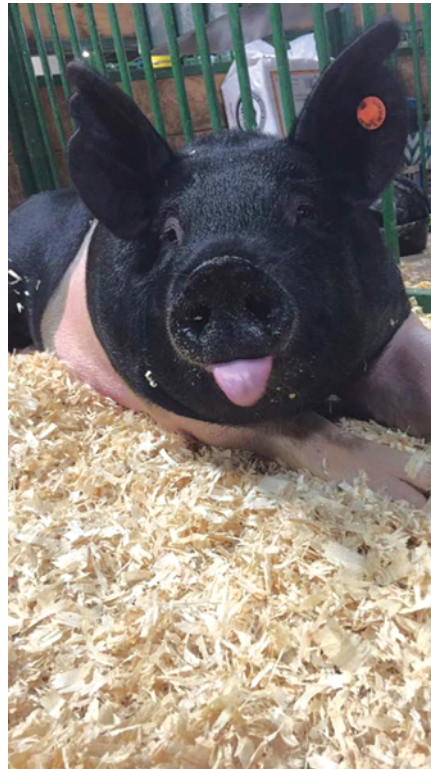
The 840 tags have a unique 15-digit number beginning with 840, and they bear the U.S. shield. Individuals may

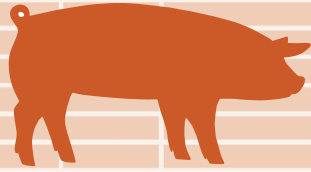
obtain 840 tags from USDA-approved manufacturers' distributors. (See http://msue.anr.msu.edu/program/info/exhibition_swine for a list of distributors.) These tags typically cost between \$1.25 and \$1.50 per tag. A Standardized National Premises Identification Number (PIN) is required to purchase 840 tags. You are typically required to order in bulk of 25 or more tags per order.

NUES tags are approved as official identification for exhibition swine. Fairs may order NUES tags for use in

exhibition swine from the Michigan Department of Agriculture and Rural Development. Only fairs may order official plastic NUES tags for use in exhibition swine. Alternatively, registered hogs can be properly ear notched and be accompanied by corresponding registration papers and count as official identification. Hogs that are not registered with their breed association must have an official ear tag.

Photo by Macayla Bogart





Early Care & Management

The best way to start your 4-H market hog project is with healthy animals. Continue this practice by providing your pigs proper care early in their growth. One way to do so is to reduce the amount of stress placed on the animal. Stress is an animal's physical or psychological reaction to circumstances that frighten, irritate, endanger, or excite it.

Hauling, vaccinating, introducing it to strange surroundings and unknown pigs, and many other things can stress the pig. A stressed pig is more likely to become sick. It may eat less feed and grow slower. Reduce stress throughout the feeding period, but especially when you first get your pigs home.

Trucking Your Pigs Home

Take time to handle your pigs carefully and quietly during loading and hauling to avoid getting them too excited. Before you leave the producer who raised your pigs, try to find out as much as possible about your animals. If you don't already know, ask about their breed and age as well as how long they've been weaned and whether they've been treated for internal and external **parasites**. Find out what feeds, or **diet**, they have been fed previously, and what type of diet they recommend moving forward. If possible, buy a bag of their feed and start your pigs on it in their new home to help ease the transition period.

Use extra care and caution in getting your pigs home. To avoid chilling your pigs, always haul them in a covered truck or trailer. In cold weather, bedding the truck with dry straw will keep your pigs warm. In hot weather, sawdust makes good truck bedding. Additionally, don't park your truck in direct sunlight during hot weather as the pigs may become overheated.

When you arrive at the pigs' new home, have a clean pen ready for them with the feeder and waterer in place. Provide a clean, dry, draft-free sleeping area under a roof. During cold weather, bed the sleeping area with straw. Remember, you want to reduce stress on your pigs during this part of the feeding period. Avoid **comingling** (mixing of animals from more than one farm) if possible for at least 30 days to help reduce the risk of spreading possible diseases.

Familiarize your pigs with their new home so that they know where the feed, water, and shelter are located. It may be necessary to let the waterer drip slowly and to fasten the feeder lids open until your pigs learn to operate these devices.

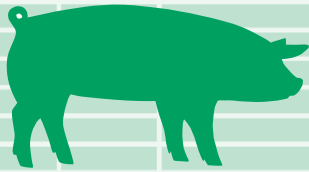
General Health

It's important to maintain the health of your newly acquired pigs. The first two or three weeks are critical, so you should check your pig several times each day during this period. Checking on your pigs often allows you to notice any small changes in behavior, which could be a sign of illness. Healthy pigs are active and alert with a bright look in their eyes. Additionally, strong appetites, body temperatures of 102.5 °F, sleek hair coats, and solid stools (defecations) are all signs of healthy pigs. Consider using the B.E.S.T. System to observe the health of your animal by checking each of these areas:

B – Body; E – Eyes, ears, and nose; S – Skin and hair; and T – Temperament.

A pig will give you many clues when it isn't feeling well. Some of the clues are poor appetite, extreme thinness, rough hair coat, pale-looking skin, a dull look in the eyes, excessive coughing, diarrhea, inactivity, and lameness.

If you think a pig is sick, take its rectal temperature. If its temperature is 2 degrees or more above normal, separate the pig from other pigs and call a veterinarian immediately. Quick diagnosis and treatment can pay off. Always handle sick animals last when working with more than one animal. As with any animal project, continue to treat your animals with care.



Facilities & Equipment

Housing

Many farms have barns or buildings that can be converted cheaply into pens for raising market hogs. You need to think about three things when designing housing for your swine project:

- Swine need a clean, dry, draft-free area under a roof to sleep. Pen floors should be concrete so that animals can be kept clean and dry. Between animal projects, it is important to clean, disinfect, and dry all equipment that was used.
- Swine have specific space requirements that vary according to their weight. If animals are crowded, they will be stressed, resulting in decreased **growth rates**. The space requirements of growing and finishing swine are presented in Table 1. **Growing pigs** weigh 40 to 125 pounds. **Finishing hogs** weigh from 125 pounds to market weight (about 270 pounds).
- Swine, like people, have a temperature range at which their body functions normally. This is called the **thermoneutral zone**. The ideal temperatures for growing and finishing swine of various weights are presented in Table 2.

Table 1. Space Requirements of Growing and Finishing Swine

Swine weight	Space requirements/pig
40–60 pounds	4 square feet
60–125 pounds	6 square feet
125 pounds–market weight	8 square feet

Table 2. Ideal Temperature for Growing and Finishing Swine With a Bedded Floor

Swine weight	Temperature
40–60 pounds	70–75 °F
60–125 pounds	65–70 °F
125 pounds–market weight	60 - 65 °F

If the temperature falls below this ideal zone, supply some type of bedding, such as wood shavings or oat or wheat straw, in the sleeping area to help keep the pigs warm. When the temperature rises well above the thermoneutral zone, fans can help keep hogs cooler. Mistlers will help cool your hogs by continuously spraying a fine mist of water on them. Leaving misters on all night can chill your hogs and result in very sick animals, so be sure to turn the misters off in the early evening. If your hog does not have access to a mister to help keep it cool, frequently spray it with a light mist from a garden hose. Maintaining a hog's thermoneutral zone is important to maintain a proper growth rate and to minimize stress.

Feeders

The feeder is one of the most important pieces of equipment in your swine enterprise. Feeding is commonly done in two different methods: **hand-feeding** or self-feeders.

Hand-feeding pigs daily helps control their growth and ensures that each animal gets the correct amount of feed. If you choose this method, maintain a clean feed pan or trough, and feed the pigs around the same time or times each day. Keeping your pigs on a schedule will help them remain satisfied throughout the day, once they are familiar with the routine.

Self-feeders are the second method and when properly maintained, they

can supply the proper amount of feed to your pigs around the clock. In this case, you adjust the feeder **baffles** (mechanism to adjust the flow of feed) up or down to allow feed into the feeder. Baffles should be set to provide about 0.5 inch to 0.75 inches of space. Baffles adjusted too low will prevent feed from flowing into the trough, while a high adjustment will result in wasted feed. Check feeder holes daily to make sure the feeder is working properly. When selecting feeder size, allow four to five pigs per feeder hole. Only put enough feed in the feeder to last three to four days. This keeps the feed from getting stale as it sits in the feeder so it doesn't go to waste. Be aware that rodents may take advantage of self-feeders.

In some cases, a combination of the two methods may be helpful, beginning with a self-feeder and then moving over to hand-feeding. Whether you choose to hand-feed your pigs or use a self-feeder, you'll need to watch the feed, checking on it often, and keep the area clean daily.

Waterers

The ideal way to supply fresh, clean water to your pigs is through a nipple drinker or a water cup (see Figure 5).

Unfortunately, these can be expensive to install. Water barrels and dishes are less expensive and work well. Clean water cups, dishes, and water barrels regularly to make sure that your pigs always have fresh, clean water to drink.

Figure 5: Swine waterer option with permanent wall attachment.



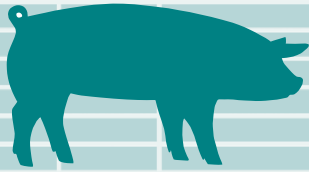
Other Equipment

The 4-H market hog project doesn't require a great deal of expensive equipment. As a beginner, you won't need all of the items on the following list immediately; you can buy them from livestock supply companies as needed. Your local 4-H staff or other 4-H members may be able to help you locate equipment as well.

- Small, covered sleeping area
- Two- or three-hole hog feeder, or feed pan or trough
- Water barrel or dish, or nipple waterer
- Hog panels to fence in pen
- Posts or beams to support hog panels and maintain structural integrity of pen

A list of equipment recommended for preparing your animal for exhibition includes:

- Garden hose
- Rubber boots
- Sorting board
- Scrub brush
- Small brush that fits in a pants pocket
- Soap specified for use on swine or a mild soap
- Clippers
- Cane, whip, or plastic pipe
- Rags
- Waterer and feed pan
- Show box for storage



Feed Nutrients

To feed your swine project correctly, you need to know what the various feed nutrients are and how they help your project grow and stay healthy.

Water

Water is the most important part of a pig's diet. Strictly speaking, water is not a nutrient. However, without it many of your pig's important body functions can't happen. One-half to two-thirds of a pig's body is made up of water. Therefore, supply your pigs with as much clean, fresh water as they will drink.

The pig needs water to properly digest its feed and carry nutrients to body cells. Water also carries away waste products, lubricates joints, and acts as a built-in cooling system. A pig can live longer without feed than without water, so it is important to make sure your pigs have clean, fresh water.

Proteins

The **protein** a pig eats as part of its feed is called **dietary protein**. It is broken down by the pig's body into **amino acids**. These amino acids are then used by the pig to build **body proteins**, which make up muscles, internal organs, bones and blood. Body proteins are also part of hair, toes, skin and many other body parts.

There are two kinds of amino acids: those the pig's body can make and those the pig's body can't make on its own. The second group of amino acids is called **essential amino acids**. This group must be included in the pig's diet to maintain a healthy pig with proper growth.

Grains such as corn supply part of the pig's protein (amino acid) needs. A commercial **protein supplement** or soybean meal is used to balance the protein content of the diet. However, if you feed too much protein it can be hard on the pig's system and could lead to poor health issues.

Carbohydrates

Carbohydrates are to a pig what gasoline is to an automobile. They supply the energy or fuel the pig needs to walk, breathe, stand, and grow. Carbohydrates also produce heat to keep the body warm. Energy nutrients not used right away are stored as fat until the body needs them.

Sugars and starches are carbohydrates. Grains such as corn and wheat contain a lot of sugar and starch. Cellulose is one of the more complex carbohydrates. Grasses and hays are high in cellulose. Since pigs can't readily use cellulose for energy, swine diets shouldn't contain hays or grasses as major energy sources.

Fats

Fats also provide energy for movement and heat. They contain about 2.25 times more energy than carbohydrates. Fats are also needed to help digest certain vitamins. Fats digest easily in the pig's body, but at a slower rate than carbohydrates.

Minerals

Minerals are used for growth and general health as well as to build bones and support the life processes. Minerals

are classified as either **macrominerals** or **microminerals**, depending on whether they are found at levels greater than or less than 100 parts per million (ppm) in the animal's body.

Macrominerals, minerals required in larger amounts for pigs, include **calcium**, magnesium, **phosphorus**, potassium, sodium, and chloride. Pigs usually have enough magnesium and potassium in their diets so you don't need to add them.

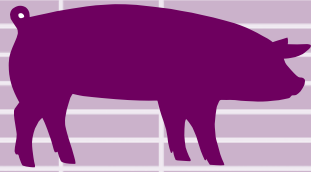
Minerals that are needed in very small amounts are called **microminerals**, or **trace minerals**. The microminerals in swine rations include iron, manganese, copper, zinc, selenium, and iodine.

When feeding or storing feed for more than one animal species, pay special attention to microminerals as some of them can be toxic to other species, particularly copper. Minerals can be added separately to diets or can be supplied in a commercial supplement.

Vitamins

Vitamins are just as important as other feed nutrients, but they are needed in smaller amounts. Vitamin A is needed for the health of the eyes, nasal passages and lungs. Vitamin D is necessary for strong bones, and vitamin K is needed for blood clotting. Additionally, pigs need other vitamins to aid other body functions.

Most of the grains fed to swine contain all or part of the necessary vitamins. One vitamin, vitamin D, can be made by pigs that are exposed to sunlight. If a swine diet made from grains contains only part of the needed vitamins, extra vitamins must be added to the diet.



Feeds for Swine

Depending on the cost of your pig, feed will represent 50 to 70 percent of the cost of your market hog project. It's a good idea to learn and use the proper terms when referring to swine feeding programs. Your 4-H market hog project is a great place to begin. Often, the terms **diet** and **ration** are used to refer to the same thing, but there is a difference between the two. A swine **diet** is a nutritionally balanced mixture of feed ingredients. A **ration** is the amount of feed an animal is allowed to eat in a 24-hour period.

Pigs are **non-ruminant** animals, meaning they have a single compartment stomach, in contrast to **ruminants** such as cattle and sheep, which have a stomach that is divided into four compartments. To grow rapidly and efficiently, swine need a high-energy, concentrated grain diet that is low in fiber (cellulose) and is supplemented with adequate protein. Cattle and sheep, on the other hand, can digest large quantities of fibrous feeds such as hay and pasture.

Concentrates

Grains are the most common and the best source of energy feeds for swine. The following states how grains can be used and how they compare as a swine feedstuff.

Corn

Corn is an excellent energy feed for all classes of swine. It is an ideal finishing feed because it is high in digestible carbohydrates and low in fiber, and it has a pleasant taste. Corn can be

fed shelled, ground, mixed, or **free-choice**, at a dry or high moisture. Most commonly, ground corn is used.

Corn contains 7 to 9 percent protein, but the protein does not have enough of practically all of the essential amino acids required by the pig. It is also so lacking in calcium and other minerals, and so scarce in vitamin content, that pigs will perform very poorly if they are limited to a diet containing only corn. Corn must be supplemented with a protein that makes up for what it lacks in amino acids. It is equally important to supply the needed minerals and vitamins. When corn is properly supplemented, it is an excellent swine feed.

Barley

Barley is an excellent energy feed when corn is not available. But because of its higher fiber content, barley has more bulk and is slightly lower in energy than corn. It contains more protein than corn, but the amino acid balance isn't as good. In feeding value, it is worth about 90 percent of corn.

Barley should be rolled or ground to a medium degree of fineness for swine. When fed in this manner, it can replace all or part of the corn in a swine diet.

Oats

Oats are a highly palatable feed for any age of swine but are not a good energy feed for pigs because of their high fiber content. This bulk makes oats a better feed for breeding animals than for young pigs, which need high-energy diets for quicker gains.

General feed value is considered to be around 80 percent of what corn offers; however, if the hulls are removed or it is ground finely, it can improve feed efficiency. When ground oats comprise a maximum of 20 percent of the total diet, the swine growth rate will not be reduced.

Wheat

Wheat can be used as almost a pound-for-pound substitute for corn; but because of its relatively high cost, it is not widely used as a swine feed. Low-quality wheat not suitable for milling and damaged wheat can be profitably used by swine. Wheat should be coarsely ground or rolled for hogs. When ground too fine, it often forms a pasty mass in the pig's mouth and becomes difficult to eat.

Grain Sorghums

Grain sorghums (milo) have many of the same strengths and weaknesses as corn and can replace corn in all swine diets. The kernel is hard and small and should be ground before mixing with other ingredients. The feeding value of grain sorghums is approximately 95 percent that of corn.

Protein Supplements

After reading about the common grains fed to pigs, be aware that they all fall short in both the quantity and quality of protein they provide. Because of this, you must supplement the grains used in swine diets with protein-rich feeds. Usually, 4-H

members will find it more convenient and cheaper to purchase a commercial protein, vitamin, and mineral supplement prepared especially for swine.

The commercial supplement should contain all the required minerals and vitamins along with the protein (amino acids) missing in the grain ingredients.

Premixed Feeds

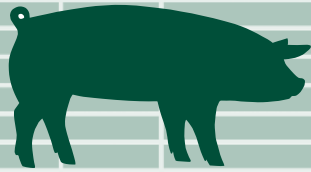
For beginning or even experienced swine exhibitors, working with your feed mill or local feed dealer is a great learning opportunity. Research continues to be conducted to learn ways to improve swine feed efficiency as well as improve other attributes. Additionally, pre-bagged feeds from stores may be more available in your area. These feeds generally will have a slightly higher cost, but may be worth it for the added nutritional benefits.

Table 3. Basic Daily Feed Intake of Growing and Finishing Swine

Pig weight in lbs.	Feed intake in lbs.	Feed intake as a percentage of body weight
40	2.75	6.88
60	3.25	5.42
80	3.75	4.69
100	4.25	4.25
120	4.75	3.96
140	5.25	3.75
160	5.75	3.59
180	6.0	3.33
200	6.25	3.13
220	6.5	2.95
240	6.75	2.81
260	7.0	2.69
280	7.0	2.50

Created with assistance from Dave Chamberlin, nutritionist, Barton Farms, Homer, Michigan.





Feeding Your Pigs

The nutrient requirements of growing and finishing swine are presented in Table 4. Remember the table only displays an average swine's requirements for growth – not necessarily a diet that will maximize genetic potential. Swine weighing 40 to 125 pounds are referred to as **growing pigs**. Swine weighing over 125 pounds to market weight (about 270 pounds) are referred to as **finishing hogs**.

Since smaller pigs don't eat as much feed each day as heavier pigs, the percentage of protein in grower diets must be higher so that the growing pigs still receive their daily protein requirement. As a result, grower diets are often referred to as **nutrient-dense diets**. At the same time, older pigs eat more feed so they can meet

their daily requirements with a less nutrient-dense diet. Specifically, during the finishing phase, the pig's weight increase is partly due to increased fat deposits throughout the body, which explains why the concentration in protein can be decreased in finishing diets.

In Michigan, corn is the most popular source of energy for pigs because it is readily available and is generally more cost effective compared to other feeds. A supplement is still needed to fulfill animal needs. In addition to providing protein, minerals, and vitamins, the supplement should be adequate in filling the pig's lysine requirement. Lysine is the most likely amino acid to be deficient in a corn-based diet.

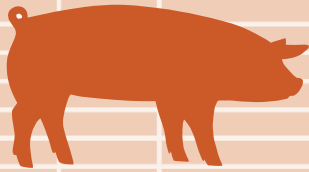
Amount of Feed

A good standard to keep in mind is that finishing hogs will consume 3 to 4 percent of their body weight in dry feed. When pigs are at lower weights, they will consume a higher percentage of their body weight since they will be eating less and weigh less. To better illustrate this and indicate when they need to consume a higher percentage of their body weight, the daily feed intake of swine of different weights is presented in Table 3 (see page 14). This information will help you calculate the approximate amount of feed you will need to meet the animal's daily requirements during each feeding period. Remember, you should switch swine from the grower to the finisher diet when they weigh about 125 pounds.

Table 4. Nutrient Requirements of Growing and Finishing Swine

Nutrient	Percentage needed for swine weighing 40-125 lbs.	Percentage needed for swine weighing 125 lbs. to market weight
Crude Protein	18.00	14.00-16.00
Lysine	1.16	0.80
Calcium	0.65	0.52
Phosphorus	0.56	0.47

Adapted with permission from *Nutrient Requirements of Swine*, 11th Rev. ed., 2012, pp. 210-211, by the National Academy of Sciences, Courtesy of the National Academies Press, Washington, D. C.



Common Diseases: Their Prevention & Control

Maintaining the health of your swine project is critical. Early diagnosis and treatment of any illness will pay big dividends. To ease the discomfort of the pig during its illness, give it nutritious feed, plenty of water, and a clean pen protected from dampness and drafts. In addition, you should learn about virology and bacteriology. The study of viruses and bacteria is important for animal and human health.

The following sections outline and discuss some common diseases that affect swine. Seeking advice from your veterinarian is important in identifying a disease and selecting the appropriate treatment.

Zoonotic Diseases

Zoonotic or **zoonosis** refers to a disease that can be spread from animals to humans. With many concerns about zoonotic diseases, you need to take additional steps to keep you and your animals healthy. Michigan 4-H offers resources on its website (http://msue.anr.msu.edu/resources/zoonotic_disease) to help improve awareness and understanding related to the possibilities of zoonotic disease transmission. There are also resources available to motivate you to take precautions; this is an important life skill in personal safety and disease prevention.

Due to the many similarities between human and swine biology, there is potential for a variety of zoonotic diseases. Some of the diseases that

can be transmitted between swine and humans include swine influenza, ringworm, and gastrointestinal infections such as E. coli and salmonella. Most commonly, pathogens are contracted through direct contact with infected animals or their bodily secretions. The bottom line is to always remember to wash your hands thoroughly after coming into contact with swine.

Infectious Diseases

Erysipelas

Erysipelas is a disease caused by a bacterium that can affect swine of all ages.

Signs – High fever (104 to 106 °F), poor appetite and stiffness are characteristics of an acute form of this disease. Affected pigs may stand with their feet well under their body, giving their backs an arched appearance. They may also constantly shift their weight in an effort to relieve the pain. Diamond-shaped skin lesions may appear during an acute infection.

Prevention – Vaccinations are particularly effective against this disease. Erysipelas vaccinations are usually given at the beginning of the feeding period.

Treatment – Antibiotics such as penicillin are good treatment for an acute infection of erysipelas, but they may not cure severe cases.

Pneumonia

Pneumonia is caused by inflammation or irritation of the lung. Bacteria, viruses, or mycoplasmic organisms can cause pneumonia. Additionally, internal **parasites** living in the pig's lungs or the breathing in of large amounts of dust can also cause pneumonia. Parasites are organisms, often insects, that live in or on another species and feed on it. Stress is also an important factor in respiratory diseases such as pneumonia because stress weakens the pig's immune system.

Signs – Some common signs of pneumonia are abnormal nasal discharge, a cough that does not go away, and labored breathing—sometimes called **thumping** (struggling to breathe). Pigs may also not want to eat, appear thin and depressed, and their eyes and hair coat appears dull.

Prevention – Because so many factors can cause swine pneumonia, it is difficult to guard against all causes of the disease. Providing a well-ventilated, draft-free environment with as little stress as possible will go a long way toward preventing pneumonia.

Treatment – Due to the wide range of pneumonia-causing organisms in swine, no treatment will be effective in all cases. If you suspect that your pig has pneumonia, contact your veterinarian about treatment options.

Atrophic Rhinitis

Atrophic rhinitis results from a bacterial infection of the **turbinate bones** of the pig's snout. The turbinates are small scroll-like bones in each nostril that warm, moisten, and filter the air a pig breathes. This disease is not fatal, but infected pigs have slower growth rates and are more likely to get pneumonia.

Signs – The most common signs of atrophic rhinitis are sneezing, sniffing, snorting, and coughing. Pigs may have moist areas below their eyes due to producing a lot of tears. In severe cases, twisting, shortening, and thickening of the nose is common.

Prevention – Vaccines are available for use in the prevention of atrophic rhinitis.

Treatment – If you suspect that your pig has atrophic rhinitis, contact your veterinarian about treatment options.

Swine Dysentery (Bloody Scours)

Swine dysentery (bloody scours) is caused by a bacterium that affects the pig's large intestine. Typically, affected pigs have diarrhea with mucus and blood in it.

Signs – It causes reduced rates of weight gain and poor feed efficiencies (gaining less weight per amount of feed consumed). In severe cases, pigs may die. Dogs, birds, and flies, and people wearing contaminated clothing can spread this disease.

Prevention – Commercial vaccines against swine dysentery are available. Work with your veterinarian to develop a vaccination program that fits your operation. The best way to prevent the disease is to limit human and pet traffic around the swine pens. Keep pigs with swine dysentery away from other pigs.

Treatment – If you suspect that your pig has swine dysentery, contact your veterinarian about treatment options. Having a good veterinarian-client-patient-relationship is helpful. He or she will provide guidance on which drug is most effective. Take extra measures to keep your hog hydrated during illness.

Porcine Epidemic Diarrhea Virus

Porcine epidemic diarrhea virus (PEDv) is caused by a coronavirus that can produce a major or minor case of diarrhea among swine of any age.

Signs – PEDv produces extreme diarrhea in young pigs. It can have devastating effects on pigs 6 weeks of age or younger, usually resulting in death. Once contracted, it can spread very quickly.

Prevention – Commercial vaccines are available. The most logical method for prevention is, as often as necessary, to thoroughly clean and disinfect all materials and equipment that play a role in raising your market hog project. Other animals, equipment, and people can bring in the disease. Limit human traffic as much as possible, especially during known outbreaks. Work with your veterinarian to develop good biosecurity, prevention, and **treatment protocol** that best fits your facility.

Treatment – Be sure your pig gets plenty of water throughout the period they are sick. As long as the animals get plenty of water, most growing pigs can return to a healthy state without treatment unless the case is very severe. Young pigs with the disease are more likely to die.

Porcine Reproductive and Respiratory Syndrome

Porcine reproductive and respiratory syndrome (PRRS) is a viral infection spread by nasal secretions, saliva, feces, urine, and semen. This infection primarily affects the swine respiratory and reproductive systems. Infected hogs will have a compromised immune system and will be more likely to catch other diseases.

Signs – Clinical signs vary greatly from herd to herd. For growing and finishing swine, the primary symptoms will be respiratory related (coughing, thumping and nasal discharge). In a breeding age swine, similar but less severe respiratory symptoms can be expected. The primary symptoms for breeding stock are reproductive deficiencies (reduced conception rates, increase in late-term abortions, still-born litters and failure for newborn litters to thrive).

Prevention – A commercial vaccine is available. Biosecurity methods including limiting human traffic and isolating and testing incoming animals will help reduce the spread of the disease. If tests return positive, do not introduce the animal to your herd. All positive testing animals should be isolated from the rest of the herd.

Treatment – There is no direct treatment. Treatment of other underlying conditions allows for reduced immune system stress.

External Parasites of Swine

Parasites are organisms, often insects, that live in or on another species and feed on it. External parasites live outside the body.

Lice & Mange Mites

Lice and **mange mites** are common external parasites frequently found on pigs. Lice are small insects that suck blood from the pig. On a white pig, lice look like small specks of dirt. They are difficult to see on a dark-colored pig. Mange mites, on the other hand, can't be seen because they burrow under the skin.

Both lice and mange mites irritate the pig's skin, causing the pig to scratch constantly. Irritation caused by these parasites makes pigs restless. They may eat less and also grow at a slower rate. Check your pigs often for any signs of discomfort. If you think your animal has lice or mange mites, contact your local veterinarian.

Internal Parasites of Swine

Internal parasites live inside the body. Swine are hosts to a wide variety of internal parasites. Different parasite species affect different swine organs. Several of the internal parasites found in swine as indicated in Table 5.

The internal parasite that can cause the most financial harm in swine production is the roundworm or **ascarid**. High infestations of ascarids will reduce growth and keep pigs from gaining weight. The pig ingests roundworm eggs found in soil or manure, which then hatch in the pig's intestine.

During its life cycle, the immature roundworm passes from the pig's intestine into its liver. While in the liver, the roundworm causes scar tissue to form, which will result in a **condemned liver** at harvest.

From the liver, the ascarid travels to the lungs where it causes irritation. This irritation causes the pig to cough up the worm and swallow it. Once in the intestine, the ascarid matures and lays eggs, which will be passed in its manure. These eggs can then re-infect the same pig or infect its pen mates.

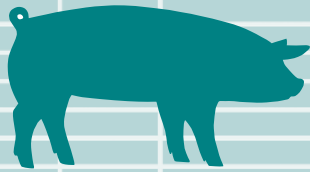
De-worming medication can be administered with a shot, or be added into the feed or water. Pigs should be wormed once with one wormer and then again 30 days later with a different wormer. The second treatment is needed to kill the adult worms that were larvae at the time of the first treatment. Before de-worming, make sure to check withdrawal times of any medication (a **withdrawal time** is the amount of time a producer must wait after a medication is administered to an animal before it can be harvested).

Although **whipworms**, **nodular worms**, **stomach worms**, **kidney worms**, and **lungworms** are not usually a major problem in market hogs, you should be aware of what they can do. Many of the de-wormers used for ascarid treatment will kill several species of parasites. Your veterinarian can aid you in the diagnosis and control of these other internal parasites.

In summary

Talk with the swine producer you purchased your swine project from to find out what your animal has been vaccinated and treated for, and what it should be given in the future. Nothing can guarantee your animal's health, but prevention through vaccines and good management practices including using proper biosecurity methods is the key to giving your project animal the best opportunity for good health.

Parasite name	Usual location
Ascarid (large roundworms)	Small intestine
Whipworm	Large intestine
Nodular worm	Large intestine
Stomach worm	Stomach
Kidney worm	Kidneys
Lungworm	Lungs



Exhibiting Your Hogs

In raising a 4-H project, many young people will choose to exhibit and then sell their animals at a local or county fair. If you do so, make sure to check and abide by all rules for the shows you participate in. You'll need to pay attention to registration dates that may be many months before the fair.

If you have a chance, attend other shows or fairs beforehand to learn more about showing and exhibiting animals. There is a lot to learn from watching others and asking questions.

You and your project will be evaluated in two different classes. Those classes include market and showmanship. In the market class, the judge evaluates all the animals in the class and makes decisions based on the hog's phenotype. The selection criteria will be focused on the industry's needs and shifts with consumer demands for pork. In the showmanship class, the judge evaluates both you and your animal on how well you work as a team. He or she will also judge you on how knowledgeable you are about your project and how well it was cared for.

To exhibit your hog properly and to enjoy your experience in the show ring, you must begin with a healthy animal. Your hog must be healthy and free from internal and external parasites. Additionally, at many fairs, it must also weigh within a certain range to be eligible to show.

In addition, you must work with your animal routinely. Training needs to begin several weeks before the show. Although a hog is an easier animal than some species to train, if you do not work with it consistently or long enough, your performance will suffer. You should train your hog to move easily at a slow walk. Have your 4-H volunteer leader or a parent or guardian act as a judge while you train your hogs. This will help both you and your animals know what to expect when the actual judging takes place at your fair or show.

Preparing Your Hogs for Show

Proper grooming improves the general appearance of swine. Your hog's general appearance is the first thing a judge will notice. This first impression is important, just like in a job interview.

Washing

The most helpful thing you can do in grooming a hog is to wash it. Wash your hog once a week or more as you get closer to the fair. Begin by wetting the hog's feet, as this will help it to get used to the cold water. Once the hog seems comfortable with the water, begin wetting the legs and then the body to remove loose dirt, and wet the skin and hair before soap is applied. After you rinse the hog, apply enough soap or mild detergent to work up a good lather. Then scrub its skin with a stiff brush. Don't forget to scrub its underline, head, and feet as these parts are often skipped.

If the lather from the first wash is dirty, rinse it off and start over. If you use a mild, liquid detergent, mix it with water in a bucket and apply it with a brush. Don't ever use a strong soap or detergent because it will irritate the hog's skin.

When you have finished scrubbing, rinse the hog with cold water again starting at the feet and working your way up until all the soap is removed. Give special attention to your hog's underline and the area between its legs. Keep the hog on a clean surface after leaving the wash rack. Continue to dry the hog by brushing it with a dry brush. Brush the hair in the direction that it will lay naturally until it is dry.

Clipping

Clipping your market hog is optional. Some shows have specific rules about the length of the hair so check on rules concerning the clipping of hogs before an event. If you plan to clip your hogs, use either a hand clipper or an electric barber's clippers, and clip them one to three days before leaving for the event.

Using a ½-inch plastic guard, clip the entire body to remove long hairs starting back on the ham and working your way forward. Clip all parts of the hog including the head, giving it a fresh look. As you become more experienced, you may want to take the guard off to blend portions of the face and underline tighter.

Fitting

Although **fitting** involves both the selection and many aspects of care of an animal for show, the most important

part of fitting is having a clean hog. Once the hog is clipped and washed, it is ready for show. Check the show rules to determine allowable fitting supplies. If there are not any rules, apply a conditioning spray or light oil to your hog's hair. Brush it in and then you are ready to show.

In the Show Ring

The following are generally accepted procedures in exhibiting your hogs.

Exhibitor Attire

Dress in a manner that doesn't divert attention away from your hog, but rather, complements the exhibit. Your

clothing should be clean, attractive, and practical. Dress pants or denim jeans, and a shirt or blouse are recommended. Some shows may have a uniform dress code that includes a specially designed collared shirt or T-shirt. Check on rules before the show. Shorts, skirts, or dresses are not appropriate clothing for the show ring unless required by religious affiliation.

Suggested Guidelines for Fitting & Showing Swine

As an exhibitor, you will be evaluated. Evaluation includes the indication of care and preparation of the animal and the appearance of the exhibitor. Note: These guidelines are written for exhibitors who use their own animals in the show. However, the general principles also apply in contests where animals are provided for exhibitors.

Attribute	Perfect Score
<p>Appearance of the Exhibitor</p> <ul style="list-style-type: none"> • The exhibitor and his or her clothing should be neat and clean. • Clothing should be appropriate for the task and should not attract undue attention to the exhibitor or the exhibit. • Boots or leather shoes should be worn for protection. Canvas shoes should not be worn. • Exhibitor has brush and whip, cane or plastic pipe when entering the ring. • Hair is neat in appearance and no hat is worn. 	10
<p>Attitude of the Exhibitor</p> <ul style="list-style-type: none"> • Exhibitor has a professional attitude like that of going into a job interview (for example, refraining from chewing gum or using a cell phone). 	20
<p>Appearance of the Hog</p> <ul style="list-style-type: none"> • The animal should give every indication of being healthy and free of disease and parasites. • The animal should show evidence of proper nutrition. • The animal must be clean and free of dirt and bedding. • Hair should be brushed or combed in a way that emphasizes the animal's strong points. • The hog should be thoroughly washed, including its ears and feet. 	35
<p>Show Ring Procedures</p> <ul style="list-style-type: none"> • The exhibitor should enter the show ring promptly with the hog under control at all times. • When driving the hog, exhibitors should have a cane or whip in one hand, a small brush in one pocket, and one hand free to open gates. • Exhibitors should never do anything that will divert attention from another exhibitor's hog. • Exhibitors should be courteous to the judge and try to do as he or she asks. 	35
	100

Leather footwear such as boots should be worn in the show ring. This is primarily for safety reasons. Athletic shoes or higher heeled fashion boots are not appropriate footwear for the hog show ring. Do not tuck pants inside western boots, because this may detract from the exhibit. It also is suggested that you wear a belt.

Your clothing should be clean, attractive, practical, and professional. Leave hats and caps back at the pens. Additionally, your hair should be well combed or brushed and not be falling in your face while showing.

Exhibitor Attitude

Your attitude in the show ring should reflect that of going into a job interview. You should act in a courteous and professional manner. This includes how you interact with the judge as well as other exhibitors. Additionally, turn your cell phone off or leave it with someone else during your class. Moreover, do not chew gum while in class. Your attitude will leave an impression on the judge and spectators.

Your Hog's Appearance

Your hog should fit the desired weight range of the show or event. Animals should be healthy and prepared for the show ring following the steps outlined in the sections of this manual on grooming, washing, clipping, and fitting. Additionally, hogs should be fed properly to be marketed as a livestock project.

Show Ring Procedures

Enter the show ring on time when your class is called with the hog under control at all times. Show your hog to the best of your ability as learned through practicing at home. One of the most important factors is knowing where the judge is at all times and switching sides as needed.

When driving your hog, have a cane, whip, or pipe in one hand, a small brush in your pocket, and one hand free to open gates. You can use the small brush to remove sawdust and dirt that may get on your hog while showing in class.

If you use a cane, hold the straight end in your hand and guide the hog with the curved end. This gives you more surface area to guide the hog with. Never use the hook except to separate hogs that are fighting. If you use a whip, make sure it is not more than 3 feet long. If you use a plastic pipe, make sure that it is lightweight and cut to the proper length you need based on your height.

Whichever equipment you are using, drive your hog by gently tapping it on the shoulder or neck. Tap the hog gently behind the front flank or on the side to move it forward. Treat your animal with respect only using the level of assertiveness needed to communicate with your hog. Additionally, avoid shoving your hog or using your knee to make it move.

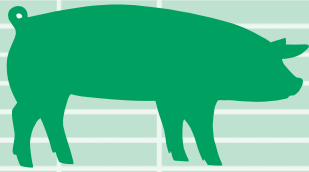
Keep the hog between you and the judge. Avoid being caught between the hog and the judge or between another exhibitor's hog and the judge. Try to keep your hog in the judge's view and not too close or too far away. Generally speaking, the hogs should be kept 10 to 15 feet away from the judge.

When showing your hog, stay out of bunches or large groups. Try to drive your hog in an open area where the judge can see it. This means that you will try to anticipate the judge's movements and have your hog where the judge is looking and will be looking. Keep your hog at a slow walk as hogs look better when walking than standing still.

Sportsmanship

Sportsmanship is a representation of your character and attitude in and outside of the show ring. Whether you win or lose, be humble and gracious. Congratulate the winners and be sincere. In a similar fashion, if you are fortunate enough to win a class or a show, accept congratulations from others humbly and sincerely.

After returning home from the show, be sure to express appreciation with a thank-you note or letter to the people who helped.



Pork Quality Assurance

In addition to learning about swine selection, showing and management, it is also important to focus on the end product as swine are also raised for human consumption. You must make certain that the product you produce is safe and wholesome for consumers. To ensure this quality, follow the guidelines of the national youth quality assurance program.

Continuous Quality

When consumers purchase a product such as pork, they place trust in pork producers to provide them with safe wholesome products and an enjoyable eating experience. While people buy pork for many reasons, consistency and quality are two main elements. As a pork producer practicing pork quality assurance, this means that you ensure there are no drug residues or other concerns that will decrease the quality of the meat product.

Many things contribute to a successful pork quality assurance program. Especially important is following medicine instructions and withdrawal times. Various organizations, such as consumer groups, pork producers, and government agencies all work together to ensure that pork products are wholesome and safe. As a producer, you must take the necessary steps in your production practices to avoid residue. To carry out these production practices, you need to know the medicines you are using and their withdrawal times. You'll also need to work with your veterinarian to ensure they are properly administered.

Additionally, you should keep thorough records of treated hogs with proper animal identification. The National Pork Board has additional resources on how to create a successful quality assurance program.

What Is Drug Residue?

To gain a clearer understanding of what **drug residue** is, imagine mixing a bowl of chocolate pudding. If you finish making chocolate pudding and want to make vanilla pudding in the same bowl without rinsing it, your vanilla pudding may taste faintly of chocolate; this is because of the chocolate residue that remained in the bowl.

A drug residue is the tiny amount of a medication that remains in an animal's body tissue after the medication is given. Substances that leave residues can enter the animal when injected through shots, applied to the body, given as a feed or water additive, or obtained by accident.

It may only take a few hours for some medications to leave an animal's body; others may take months or may never completely leave certain body tissues. While these low-level drug residues are not harmful to human health, they may cause consumers to lose confidence in pork producers. As a pork producer, it is your responsibility to ensure that withdrawal periods are properly followed.

Why the Concern?

The USDA and the Food and Drug Administration (FDA) work together to create standards that all animal

producers must follow. These strict guidelines help to protect our food supply. Specifically, random testing for drug residue at harvest facilities can indicate which producers are violating regulations. If illegal levels of drug residue are found in a harvested animal, the USDA has the authority to prevent a harvest facility from accepting hogs from that producer until the producer's herd tests at or below the legal limit for any residue.

Consumers are becoming increasingly interested in how their food is produced. They have many options when it comes to making food choices. One of the most damaging results of not following withdrawal guidelines is the loss of consumer confidence in the pork industry. Consumers demand safe, wholesome food, and it is your responsibility as a pork producer to provide it.

Preventing Residue Problems

Withdrawal times are different for every medication. They can vary from one day to several months, while some medications are not a residue concern and have no withdrawal time. Because of these differences, you must read the medication label.

Metabolism is the process a body uses to break down a medication. As medication is metabolized, the medicine leaves the body through urine and feces. The rate at which a medicine is metabolized is called the **half-life** (the amount of time it takes for a substance to decrease its concentration by half). Once a

medication is no longer being given, the half-life countdown begins. Every medication has a different half-life and withdrawal time because withdrawal times are based on half-life rates.

Producers must take special care to make sure that medications don't carry over in feeders, bulk bins, auger systems and feed mixers as this can cause problems when calculating the withdrawal time. Additionally, if injectable products are given improperly or too much medication is given, the withdrawal time may be longer than expected. The best way to prevent residue concerns and produce a safe pork product is to follow the medication label instructions and veterinarian directions.

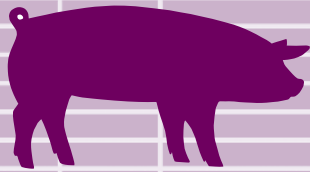
Points to Remember

Part of your job as a pork producer is knowing which feed additives and other medications you are using and why. Work with your veterinarian to make sure that you're using all products according to label instructions as well as observing the directions and cautions. Additionally, consult your veterinarian to make sure you are only giving feed additives at approved levels and in approved combinations as required by the Veterinary Feed Directive (VFD).

Practicing proper management is crucial to preventing a residue problem within your herd. Develop a treatment protocol to identify treated animals and practice good record keeping.

For example, you could mark on your calendar to indicate withdrawal periods according to the date that you plan to sell your hogs. Make sure you plan in advance to stop giving medications to animals that you will be exhibiting at the fair so they meet all FDA guidelines by show day. When working with your veterinarian, be sure to tell him or her of your plans to sell or exhibit your hog *before* treatment is given. Serious consequences including financial loss may result if you ignore regulations such as the VFD and withdrawal times. Finally, remember all producers will benefit from producing safe and wholesome pork for consumers.





Marketing & Pork Products

Swine producers, like other business operators, are working to produce and sell a high-quality product. To properly market your hogs and decide on a market price for them, you must be able to determine their quality.

A **carcass** is the muscular and skeletal system of an animal. **Carcass traits** are measured after the hog has been harvested. If you know where your hogs are being processed, consider requesting carcass information or looking at the hogs hanging on the rail at the processing facility as this can be very educational. Work with local 4-H volunteers and staff to learn more about the processing facilities in your area.

The following section describes the physical measurements and characteristics of swine known as carcass traits.

- **Dressing percentage** is the portion of live weight that is represented as carcass weight. To calculate dressing percentage, divide the carcass weight by the live weight and multiply by 100. A normal dressing percentage for a market hog is approximately 72 percent.
- **Backfat depth** is measured at the tenth rib. The most desirable backfat depth on a market hog is from 0.5 to 0.9 inches.

- **Loineye area** is determined by cutting the loin crosswise at the tenth rib and measuring the area of the muscle face. Loineye area is a good indicator of the total amount or degree of muscling in an animal. A typical loineye area of a market hog is 6 to 8 square inches.

Selling Your Hogs

Most 4-H members market their hogs at their county fair or show sale. If you sell your hogs by this method, think ahead as you invite buyers to the auction. Remember that it takes at least two buyers for the price of your hog to increase, so invite at least two buyers to the auction – the more buyers, the better. Consider hand-delivering buyer invitations to the auction as well as other efforts such as including photos of you and your project in the invitation.

You can thank your buyers in numerous ways. Send a thank-you letter to the buyer of your 4-H project as soon as you get home from the show. This lets the buyer know you appreciate his or her efforts and encourages the person to support future sales. Be creative and work with other members of your club or group, and your volunteer leader to brainstorm other ideas. Michigan State University (MSU) Extension has a great resource available for purchase to help you continue to improve your animal marketing skills – consider purchasing the *Youth Business Guide to Success: Make the Most of Your 4-H Market Animal Project* (http://msue.anr.msu.edu/program/info/youth_business_guide_to_success).

If you don't market your hog at your county fair sale, you can sell it at a livestock auction barn. Desirable market hogs are usually in demand and there is an increase in the desire to purchase freezer meat. Portioning a hog and dividing the meat among a few people is also an option. Make sure to check with your MSU Extension office to determine if there are additional recommendations and laws about selling meat.

Pork Products

The final step in pork production is the processing carcasses to yield a nutritious and wholesome product for human consumption. After the hog has been harvested, carcasses are cut into five **primal cuts**, or **wholesale cuts**. The five primal cuts are the ham, loin, Boston butt or shoulder, picnic shoulder, and side or belly (see Figure 6).

Each wholesale cut is trimmed of excess fat and then separated into **retail cuts**. Retail cuts of pork are the meat sold in grocery stores and restaurants (see Figure 7). You should know all of the wholesale and at least some of the more popular retail cuts of pork. This will give you a greater appreciation of the pork you produce. It will also be beneficial when selecting your own meat.

Figure 6. Wholesale or primal cuts of pork.

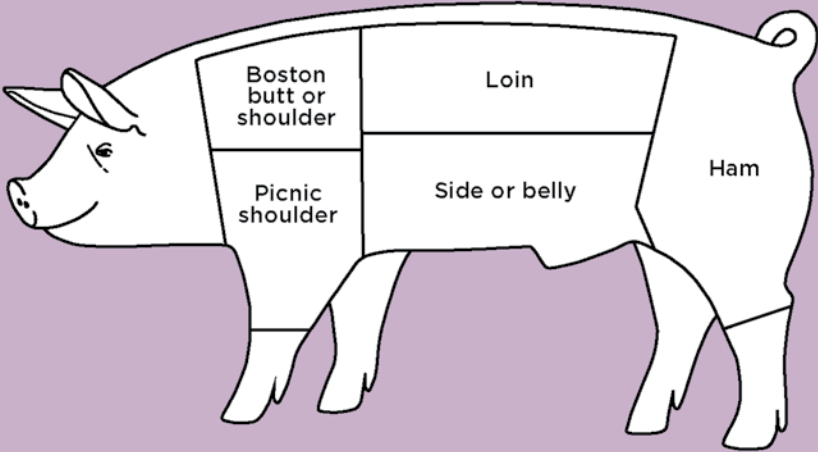
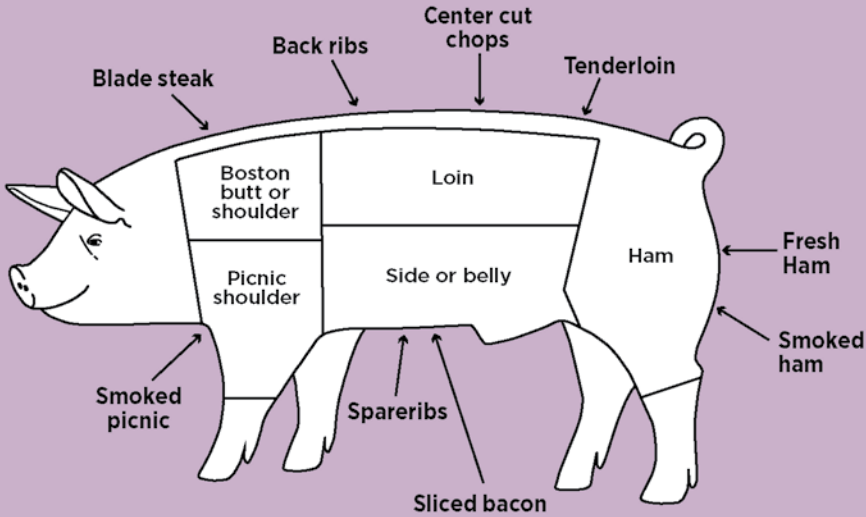
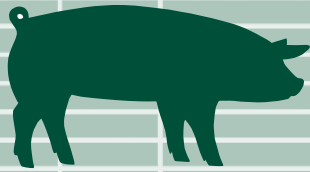


Figure 7. Common retail cuts of pork.





Animal Care & Well-Being

What Is Animal Welfare or Well-Being?

Animal welfare, or animal well-being, is a hot topic. More than ever before, consumers are questioning the way food animals are raised. New laws are being passed with guidelines for housing, transportation, care, and euthanasia (intentionally ending life). All of these factors may affect you and your 4-H animal science projects.

When you are at fairs, shows, and other animal events, you'll be in contact with the public, most of whom consume animal products, but often know little about raising livestock. People may question why you use certain production practices, and you will want to be prepared with answers.

The terms **animal welfare** or **animal well-being** are heard a great deal, but what do they actually mean? The World Organisation for Animal Health (OIE) (2015) defines animal welfare as:

... how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behavior, and if it is not suffering from unpleasant states such as pain, fear and distress.

Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling and humane slaughter or killing. Animal welfare refers to the state of the animal; the treatment an

animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment (Chapter 7.1, Article 7.1.1).

The American Veterinary Medical Association (AVMA) (n.d.) explains:

... a human responsibility that includes consideration for all aspects of animal well-being, including proper housing, management, nutrition, disease prevention and treatment, responsible care, humane handling, and, when necessary, humane euthanasia (¶12).

There are numerous perspectives on animal welfare that are influenced by a person's values and experiences. There are also various means of measuring animal welfare, including (but not limited to) health, productivity, behavior, and physiological responses (¶13).

The preceding definitions come from two important papers in the history of animal welfare, which introduced the Five Freedoms of Animal Care and the Three Circles Model. Each will be discussed in the next sections.

Five Freedoms of Animal Care

In 1965 in Great Britain as a response to animal production concerns raised in the book *Animal Machines* by Ruth Harrison, the scientific committee chaired by Professor Roger Brambell, presented a report that said animals should have the freedom "to stand up, lie down, turn around, groom

themselves and stretch their limbs" (Farm Animal Welfare Council, 1979). These freedoms became known as "Brambell's Five Freedoms" or simply, "The Five Freedoms." They are five ideals that consider the basic physical and mental needs of animals. As a result of the report, the Farm Animal Welfare Advisory Committee was created to monitor the livestock production sector. In 1979, the name was changed to the Farm Animal Welfare Council and by the end of that same year, the Five Freedoms had been written into the following format.

The Five Freedoms, which includes considerations for the physical and mental state of animals, are:

1. Freedom from Hunger and Thirst: by ready access to fresh water and a diet to maintain full health and vigor.
2. Freedom from Discomfort: by providing an appropriate environment including shelter and a comfortable resting area.
3. Freedom from Pain, Injury or Disease: by prevention or rapid diagnosis and treatment.
4. Freedom to Express Normal Behavior: by providing sufficient space, proper facilities and company of the animal's own kind.
5. Freedom from Fear and Distress: by ensuring conditions and treatment which avoid mental suffering

(Farm Animal Welfare Council, 1979)

The Five Freedoms are used by veterinarians and other groups across the world. Most of the animal welfare audits developed for use on farms and

in processing facilities are based on the Five Freedoms. The items on the list are easily understood, common sense considerations that caretakers routinely provide their animals.

The Three Circles Model of Animal Welfare

The Three Circles Model was introduced by David Fraser, Dan Weary, Ed Pajor, and Barry Milligan (1997) in a paper titled, “A Scientific Conception of Animal Welfare That Reflects Ethical Concerns.” It addresses three concepts to evaluate animal welfare: basic health and functioning, natural living, and affective states (emotional conditions) (see Figure 8). The concepts presented in this model take the Five Freedoms to a deeper level, showing how they can both overlap and separate at the same time. You can think of this model as a window people look through to better understand their own thoughts about animal well-being – and how others think about it.

Defining the Concepts of the Three Circles Model

1. Basic Health and Functioning –

This concept addresses the physical fitness of the animal, including good health, normal body function, and normal growth and development. This circle relates back to the freedoms from hunger and thirst (Freedom 1); discomfort (Freedom 2); and pain, injury and disease (Freedom 3).

2. Natural Living –

This circle emphasizes that animals should be able to lead reasonably natural lives. This includes being able to perform important, normal behaviors (for

example, dust bathing for chickens or grazing for horses) and to have some natural elements in their environment (for example, sunlight, fresh air, or social contact for herd species). This concept relates back to the freedom to express normal behavior (Freedom 4).

3. Affective States – This circle considers the emotional state of the animal in that animals should feel mentally well and should not be subjected to excessive negative emotions. Negative emotions include unpleasant states such as pain, hunger, and distress. Beyond just avoiding the negative, animals should be able to experience positive emotions in the forms of pleasure or contentment (for example, play or social contact). Affective States relate to freedom from hunger and thirst (Freedom 1); pain, injury, and disease (Freedom 3); and fear and distress (Freedom 5).

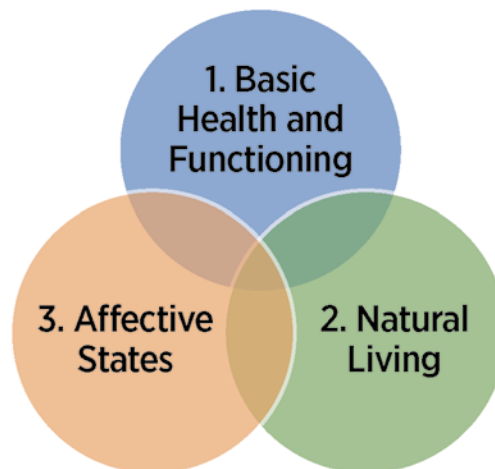
What Does This Mean for You and Your Animals?

All of this shows us that animal welfare is complicated. The condition of the animal is most important, but people’s attitudes and beliefs are part of the conversation too. We use scientific observation – looking at and listening – to evaluate animal welfare, but we do it through the window of our values.

Animal welfare *is not the same as animal rights*. **Animal rights** are about the legal and moral standing of animals in society. Animal rights activists seek to stop all use of animals by humans, including use for food, fiber, entertainment and even animals as pets.

Often times, you’ll find it challenging to determine how these freedoms and viewpoints fit into your day-to-day actions and care of your animals. The following example works through one scenario of three hogs raised by a 4-H member and incorporates both the Five Freedoms and the Three Circles Model to assess the animals’ welfare.

Figure 8. Three Circles Model of Animal Welfare,
adapted from Appleby, Lund, and Fraser, et al.



Example: 4-H Market Hog Project

A 4-H member is raising three female market hogs to show at a fair in central Michigan. The hogs are kept in an outdoor pen with a 2-foot by 8-foot shaded section and a single waterer. The hogs are fed commercial feed once a day in one trough feeder. In this group-feeding method, the hogs sometimes fight for position at the feeder, with one animal dominant over the other two. Upon observation, two hogs sometimes exhibit abnormal oral behaviors, such as chewing on the bars of their pen or sham chewing. **Sham chewing** occurs when a pig sits and chomps with nothing in its mouth, like a cow chewing its cud. The pen is cleaned weekly. The 4-H'er works with the hogs individually three times per week for 10 to 30 minutes per hog so the animals become used to walking in the show ring. Veterinary visits are scheduled as needed.

Points to Remember

As this example illustrates, although animal welfare is a complex issue, working toward positive care and well-being of your animals can be challenging, rewarding, and even fun. You can view and analyze an animal situation in many different ways. An exercise like this provides you a wonderful opportunity to practice critical thinking skills, evaluation, and communication as you discuss your ideas with peers and adults.

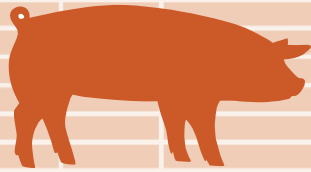
Using the Five Freedoms and the Three Circles Model, the following assesses the welfare of this example scenario.

Basic Health and Functioning: The hogs are fed a balanced diet for growing market-weight animals and always have access to fresh water (Freedom 1). Cleaning the pen weekly helps to improve the hogs' environment and minimize disease potential (Freedoms 2 and 3). Veterinary care is given to the animals when it is needed (Freedom 3). Shade coverage ensures the animals are not heat stressed during hot summers and they may also seek shelter during inclement weather such as high winds or thunderstorms. All of these points help to improve the welfare of the hogs.

However, two areas need improvement. More shade coverage should be provided in this case to ensure all three hogs can avoid direct sunlight. This will help to better meet Freedoms 2 and 4, improving overall animal welfare. When all three swine arrived, they likely were all able to rest in the shaded area at the same time. As the animals grew, so did their need for space. The shaded area is no longer big enough for three growing hogs. Since one hog is guarding the feeding area, either multiple feeding areas should be created or there should be a bigger feeder to allow all animals to eat at once, reducing competition. Making sure the feeding area is increased – either in size or by number – and adding a larger shade area will help to further improve animal well-being by ensuring enough space and proper facilities, helping to better meet Freedom 4.

Natural Living: Having the animals housed in groups helps to meet the hogs' social needs (Freedom 4). One animal becoming dominant in the pen is a normal behavior that occurs when swine are housed in groups. Fighting, though completely natural, is an undesirable behavior that in this case reduces the welfare of the other two hogs. The nutritional needs of the hogs are met with one feeding per day (Freedom 1) as well as the behavioral need to root, explore, and scavenge for feed as they are housed on dirt (Freedom 4). Providing opportunities for enrichment, such as introducing a straw bale, may help enhance their exploration needs and decrease the abnormal behaviors. Feeding multiple, smaller meals throughout the day would be another option, which could also help reduce fighting between the hogs since feed would be available in more than one location and at various times.

Affective States: The 4-H member interacting with the hogs by training them for the show is a positive experience that provides exercise, mental stimulation, and enrichment for the hogs, improving their welfare. In addition, the training will allow the animals to know what is expected of them when it comes time to show, meeting the needs of Freedom 5. Simple actions could help to resolve the concern with the two nondominant hogs. Offering feed to the nondominant hogs when the dominant one is being worked with by the 4-H'er would remove competition and can allow for all three hogs to have positive, though different experiences. Another option is to hand-feed all three hogs individually.



Other Activities & Opportunities

Other Related 4-H Projects

A 4-H market hog project involves more than just owning and caring for hogs. Other projects you take part in will broaden your experiences and help you with your 4-H market hog project. These include projects in the areas of:

- **Veterinary science** – Study how to keep your hogs healthy.
- **Crop science** – Produce grain for your hogs.
- **Photography** – Tell the story of your hog project with photographs.
- **Entomology** – Learn about parasites of hogs.

Demonstrations & Public Speaking

Giving a speech or demonstration on some phase of swine production will help you learn to express yourself and give you a chance to learn more about swine. You may want to pick a topic you don't know much about to increase your knowledge. You learn from the preparation and practice while your audience learns from your presentation. You can give demonstrations and speeches at a 4-H club or group meeting, at the county fair, or even in a national contest.

Possible topics for your demonstration or speech include:

- The swine industry in Michigan
- The importance of swine to the American people

- The nutritional value of pork
- By-products of pork production
- Differences between breeds of swine
- Why I chose a market hog project
- The effect of disease outbreaks on swine operations
- Implementing biosecurity practices on your farm
- Zoonotic disease prevention methods
- How to select a swine project
- The nutritional requirements of swine
- How to prepare a diet for swine
- How to control parasites in swine

Work with your 4-H volunteer leader to think of other topics and ways to highlight your 4-H swine experience.

Judging Contests

Livestock judging contests will help you learn to observe, evaluate, problem solve, and make decisions. It will give you a chance to see quality livestock and to meet other 4-H members. Additionally, giving oral reasons will help you become comfortable expressing yourself and defending your rationale.

Meat judging contests will assist you in understanding and evaluating pork carcasses, wholesale cuts, and retail cuts. As in livestock judging, you will learn to make decisions efficiently and defend them in a set of oral reasons.

4-H Trips & Tours

Consider traveling with your 4-H club or group to other areas to learn more about agricultural production. The following is a list of a few of the many trips and tours your 4-H club or group might take:

- A tour to 4-H members' homes to observe their hogs (remember to practice biosecurity measures while going to another farm)
- A visit to one of the animal science teaching and research centers at MSU
- A trip through a feed manufacturing plant or a local elevator (When there, consider having one of the nutritionists discuss how the livestock diets are formulated.)
- A visit to a packing plant to learn how carcasses are evaluated
- A visit to a grocery store to discuss popular pork cuts
- A visit to a large livestock show or sale

Careers in Animal Science

Use your 4-H swine project as a way of exploring careers in animal science. Many professionals, such as farm managers, herdsman, nutritionists, geneticists, hog buyers, and veterinarians, work directly with animals. Others develop, produce, or sell products or services used in hog production such as feed,

artificial insemination products, health products, and hog equipment. Additionally, professionals such as food scientists, meat cutters, meat inspectors, food service providers, and chefs work with animal products.

With the help of your 4-H volunteer leader, make a list of all the careers you can think of related to animal science. Choose three or four careers from your list to research. You may want to present your findings at your 4-H club or group meeting so others can benefit from your research.

U.S. Swine Breed Associations

Many of the major U.S. swine breeds have chosen to join together to better serve their memberships. Below is a list of the more common swine breed associations. These associations have free or low-cost resources to help youth with their swine project.

American Berkshire Association

2637 Yeager Road
West Lafayette, IN 47906
Phone: 765-497-3618
E-mail: berkshire@nationalswine.com
Internet: www.americanberkshire.com

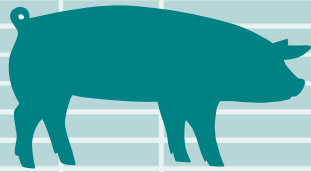
Certified Pedigreed Swine (Chester White Swine Record Association/ Poland China Record Association/ National Spotted Swine Record Inc.)

PO Box 9758
Peoria, IL 61612
Phone: 309-691-0151
E-mail: cpspeoria@mindspring.com
Internet: cpsswine.com

National Swine Registry (United Duroc Swine Registry/Hampshire Swine Registry/American Landrace Association/American Yorkshire Club)

2639 Yeager Road
West Lafayette, IN 47906
Phone: 765-463-3594
E-mail: nsr@nationalswine.com
Internet: www.nationalswine.com





Resources & References

Resources

Practices used in the swine industry change as new technology becomes available. As you make decisions concerning your 4-H swine project, you'll need to obtain the most up-to-date information. Current information is available from a number of sources, such as those listed in this section.

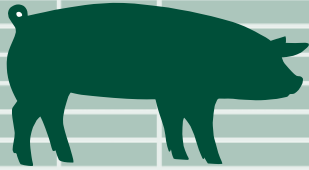
- Learning opportunities exist specifically for 4-H'ers in the swine project. Visit with your county 4-H staff and volunteer leader for information about educational activities at the county, district, state, and national levels.
- The Michigan Pork Producers Association provides information and educational materials about the swine industry. Their contact information is:

Michigan Pork Producers Association
3775 Forrest Road, Suite 2
Lansing, MI 48910
<http://www.mipork.org/>
- The Michigan 4-H Youth Business Guide to Success... Make the Most of Your 4-H Market Animal Project is a great resource for other content for 4-H youth raising animals: http://msue.anr.msu.edu/program/info/youth_business_guide_to_success
- MSU produces numerous publications and other resource materials dealing with various phases of swine production. Find these resources on the MSU Extension website:
 - 4-H swine production and management resources: http://msue.anr.msu.edu/program/resources/4_h_swine_production_management

- Animal care and well-being: http://msue.anr.msu.edu/resources/animal_care_and_well_being
 - Michigan 4-H Animal Treatment Record Sheet: http://msue.anr.msu.edu/resources/michigan_4_h_animal_treatment_record_sheet
 - Michigan 4-H Market Animal Project Record Book: http://msue.anr.msu.edu/resources/4_h_market_animal_record_book
 - Pork Quality Assurance certifications: http://msue.anr.msu.edu/resources/pork_quality_assurance_certifications
- Other books dealing with swine and livestock in general may be found in your library.

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Glossary

amino acids – small compounds that are the building blocks of proteins

animal rights – societal and value based view of animal care

animal welfare – scientific understanding of meeting an animal's physical, environmental, nutritional, behavior and social needs

animal well-being – See animal welfare.

ascarid – an intestinal parasite of swine, commonly called large roundworms

atrophic rhinitis – a contagious disease caused by a bacterium that makes the turbinate bones of a pig's nose stop growing and eventually deteriorate

average daily gain (ADG) – a measure of the pig's daily growth rate; calculated by dividing the pig's total weight gain by the number of days required to achieve that gain

backfat depth – a measure at the tenth rib of the thickness of the fat layer covering a pig's back

baffles – mechanism that increases or decreases the amount of feed or water released during a set time

barrow – a castrated male pig

bloody scours – bloody diarrhea; a sign of a very contagious disease called swine dysentery

body proteins – amino acids linked together to form protein molecules that make up muscles, skin, internal organs, bones, blood, hair, and hooves

calcium – a macromineral pigs need to build bones and teeth and to support other life processes

carbohydrates – source of energy found in feedstuff including starch, sugar, and cellulose

carcass – the muscular and skeletal system of the body of an animal

carcass traits – characteristics of pigs such as muscling, leanness, and length, which can be estimated on live animals but accurately measured only on pork carcasses

comingling – mixing of animals from more than one farm

condemned liver – when pig livers are inspected by federal meat inspectors and determined to be unfit for humans to eat

credit rating – an assessment of the ability of a borrower to pay back money

days to 250 – measures the pig's growth rate by recording the number of days it takes the pig to reach 250 pounds

diet – nutritionally balanced mixture of feed ingredients

dietary protein – protein in feed ingredients used by pigs as a source of amino acids

dressings percentage – the portion of live weight that is represented as carcass weight; calculated by dividing live weight into carcass weight and multiplying the result by 100

drug residue – the amount of a medication that can remain in an animal's body tissue after the medication is administered if withdrawal time is not followed

ear notching – a method of permanently identifying pigs by altering their ears

erysipelas – a bacterial disease characterized by poor appetite, high fever, stiffness, and diamond-shaped skin lesions

essential amino acids – amino acids that must be present in the diet because pigs can't make them in their bodies

fats – a dietary compound that supplies energy for the pig and aids in digestion of certain vitamins

feed efficiency value – a measure of how many pounds of feed are required for the pig to gain one pound; calculated by dividing the pounds of feed the animal eats by the weight gain of a pig over that time period

finish – fat on a swine

finished hog – one that is ready for market

finishing hogs – swine of either sex weighing over 125 pounds

fitting – final preparation of an animal for show

free-choice – a feeding system that offers feed ingredients cafeteria-style to the pig

gilt – female pig that has never given birth

growing pigs – swine of either sex weighing between 40 and 125 pounds

growth rate – rate of weight gain

half-life – the length of time it takes a substance to reduce its concentration by one-half

hand-feeding – a feeding system in which each animal is fed a ration manually

hog – usually refers to swine weighing more than 125 pounds; may refer to any class of swine

kidney worm – an internal parasite that lives in the pig's kidneys

lice – small insects that suck blood from the pig

loineye area – area of the major muscle in the loin; determined by cutting the loin of a pork carcass crosswise and measuring the area of the exposed muscle

lungworm – an internal parasite that lives in the pig's lungs

lysine – the essential amino acid that is most likely to be deficient in a standard swine diet

macrominerals – minerals required by the pig in relatively large amounts because they make up the largest percentage of minerals in the pig's body

mange mite – common external parasites frequently found on pigs

market price – the amount of money being paid for pigs on any given day

metabolism – the process a body uses to break down a medication

microminerals – sometimes called trace minerals because they are required in very small amounts by the pig

minerals – elements required by the pig to build bones and teeth and to support other life processes

nodular worms – an internal parasite that lives in the adult pig's large intestine

non-ruminant – an animal having one stomach compartment, such as swine

nutrient-dense diet – a feed that contains high concentrations of the required nutrients, such as carbohydrates, amino acids, minerals, and vitamins

parasites – organisms, often insects, that live in or on another species and feed on it

phosphorus – a macromineral required by the pig to build bones and teeth and to support other life processes

phenotype – physical appearance based on observations

pig – usually refers to swine of either sex weighing less than 125 pounds

pneumonia – inflammation of the lungs that results in breathing difficulties

porcine epidemic diarrhea virus (PEDv) – a coronavirus that can produce a major or minor case of diarrhea among swine of any age

porcine reproductive and respiratory syndrome (PRRS) – a viral infection spread by nasal secretions, saliva, feces, urine, and semen that primarily affects the swine respiratory and reproductive systems

primal cuts – often called wholesale cuts; the five parts of a pork carcass that are further divided into retail cuts

protein – a dietary nutrient that supplies amino acids to the pig

protein supplement – an ingredient of swine diets that supplies protein and often is combined with vitamins and minerals

ration – the amount of feed consumed by a pig in one day

retail cuts – cuts of meat sold in grocery stores and restaurants, made by cutting wholesale cuts into smaller portions

ruminant – an animal that has four stomach compartments

sham chewing – what occurs when a pig sits and chomps with nothing in its mouth

stomach worm – an internal parasite that lives in the pig's stomach

swine – refers to the porcine or pig family in general

swine dysentery – a contagious disease caused by a bacterium; bloody scours is the major sign of this disease

thermoneutral zone – a temperature range in which an animal can maintain normal body function

thumping – the labored (struggled) breathing of a pig

traceability – ability to track animals in case of emergency such as a disease outbreak

trace minerals – See microminerals.

treatment protocol – guide for medical treatment of an ailment provided by a veterinarian or drug label

turbinate bones – small, curled bones in the pig's snout that warm and help remove dust from inhaled air

vitamins – dietary nutrients needed in very small amounts for the health of eyes, nasal passages, and lungs for strong bones, blood clotting, and other body functions

whipworm – an internal parasite that resembles a whip and lives in the pig's large intestine

wholesale cuts – See primal cuts.

withdrawal time – the amount of time to wait after injecting medicine before harvesting an animal

zoonotic – diseases that can be spread from animals to humans



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