



Lesson Two: Picking Pigs

Level: Elementary

PURPOSE

Students will communicate the evidence of the inheritance and variation of traits by developing a model to build their own pig.

NEBRASKA STATE EDUCATION CONTENT STANDARDS CONNECTION

SC.3.9 Gather and analyze data to communicate an understanding of inheritance and variation of traits through life cycles and environmental influences.

SC.3.9.3.B Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

ESTIMATED TIME

40 minutes

MATERIALS NEEDED

- » Design a Pig Worksheet
- » Coins – 1 per group of 2 students
- » Swine Breed PDF
- » Colored Pencils

VOCABULARY

Average Daily Gain: The weight gain of an animal per day.

Backfat Thickness: A measure of the amount of backfat a pig has. It is measured at the tenth rib.

Carcass Length: An indicator of the overall length of a pig's carcass.

Consumer: Someone who consumes (eats) an agricultural product, such as pork.

Corn: A yellow, starchy grain fed to pigs primarily to give them energy.

Feed Conversion: The ability pigs have to turn feed into muscle.

Heritability: The proportion of differences among animals due to differences in breeding values. This can be attributed more to genetics than the environment.

Loin Eye Area: A measurement of the meat that makes up a pork chop.

Market Weight: The weight at which a pig may be marketed or sold to be processed into pork products. This weight is achieved at 250 – 280 pounds.

Producer: Someone who raises an agricultural product, like pigs, to be processed into food or other goods.



Soybean Meal: A brown, powdery feed fed to pigs primarily to meet their protein needs. It is made from ground up soybeans.

BACKGROUND INFORMATION

Read or summarize the following information for students prior to the lesson:

After pigs are weaned and raised from approximately 13-55 pounds in a nursery, they are transferred to a new barn, called the finishing barn. Finishing barns are similar to farrowing barns and nurseries in that they are climate-controlled and allow pigs easy access to water and food.

In this growth/finishing phase of production, pigs will grow from approximately 55-280 pounds. This is accomplished through a primarily corn and soybean meal diet. During the finishing phase, pigs eat about 6-10 pounds of feed per day. When pigs have grown to weigh between 250-280 pounds, hogs are moved from the finishing barn and taken to market. In the moving process, pork producers use large sorting boards to help direct the pigs where to go. They also try to move only a few at a time down the alleyway to help the pigs stay as calm as possible.

After pigs are sold, they are processed into pork products for consumers to enjoy. Examples of pork products include loin chops, ham, bacon, tenderloin, sausage, and 'picnic' roasts. Through the entire pig production process, careful measures are taken to ensure that pigs remain well-cared for and healthy; safe pork comes from healthy pigs.

Throughout the life and growth of pigs, various differences can be observed, depending on the pigs' genetics and their environment. Examples of traits observed include color, litter birth weight, loin eye area, and backfat thickness. Some of these traits have a higher heritability, meaning the differences we observe among pigs can be attributed more to the pigs' **genetics** than their environment.

Many of the highly heritable traits are of great importance when it comes to finishing pigs, as they directly impact the pig's ability to grow, and later, the quality and quantity of the pig's meat. Highly heritable traits include: carcass length, backfat thickness, lean percentage, loin eye area, average daily gain, and feed conversion. Through careful selection of boars and breeding programs, producers can work to provide the consumer with the highest quality meat at the lowest price.

There are eight major breeds of pigs: Berkshire, Chester White, Duroc, Hampshire, Landrace, Poland China, Spotted Swine, and Yorkshire. Each of these breeds have unique markings and characteristics, such as whether their ears droop or stand naturally upright.

Part One: Learning Activity

INTEREST APPROACH

Genetics is the study of how certain traits pass from parents to offspring. Do you have blonde hair or brown hair? Are you tall or are you short? Those are all traits that can be passed down from your parents. Pigs have traits too; their traits affect their hair color, how much food they eat, and how fast they grow. A breed



is a group of animals with similar traits. Discuss their responses and guide them to the understanding that pigs have the same basic needs as humans. Just like humans, pigs also need space, social interaction, and treatment for injuries and disease.

CONDUCT ACTIVITY

1. Show the class the *Swine Breed PDF*.
2. Explain to students that it is the decision of the pig farmer which breed of pigs he or she raises. The characteristics of the pigs are dependent upon breed characteristics and the genetics of each specific mother pig (sow) and father pig (boar.)
3. Have each individual student select a breed from the poster of pig breeds.
 - Based upon the breed students pick, pass out a *Design a Pig Worksheet* to each student.
 - If they have selected *Chester White, Duroc, Landrace, Poland China, Spotted Swine*, they need a “droopy ear” worksheet
 - If they have selected *Berkshire, Hampshire, Yorkshire*, they need an “upright ear” worksheet.
4. Divide students into groups of 2. Pass out one coin to each group. Students will be completing the activity individually but will share a coin.
5. Explain that pigs exhibit differences that can be observed, depending on the pigs’ genetics and their environment. Examples of traits observed include color, litter birth weight, loin eye area, and backfat thickness. Some of these traits are more dependent upon genetics than the environment, meaning they are more heritable. Each student will be “designing” their market pig based upon the traits that are more heritable.
6. Students complete worksheet, following the instructions for each of the 3 parts.
7. Collect coins.

FOLLOW UP QUESTIONS

1. What breed did you choose to begin? Why did you select it?
 - **Answers will vary.**
2. What things do pig farmers think about when they pick their pig breeds?
 - **How the pigs behave or grow, or farmer preference such as, “one they have always raised”.**
3. If your selected trait was higher than breed average, do you think that is a good thing?
 - **Answers will vary, although in general, it would be advantageous to have all traits higher, except for back fat. The higher these traits are in turn create pigs that grow more efficiently and with more muscle.**
4. How do traits relate to the price of pigs?
 - **Pork is sold by the pound. When pigs are grown lean, with a lot of muscle, the pig farmer receives**



more money because muscle weighs more than fat.

5. Why is the loin eye area important?

- This is an indicator of the size of the muscle that makes up the pork chop. More muscle means more meat for the consumer to enjoy.

Part 2 (Optional): Attend a Virtual Field Trip

Biosecurity is a procedure to protect animals against disease. Farmers limit travel to their pig barns by practicing biosecurity. This ensures they can raise their pigs in a safe and healthy environment.

Virtual Field Trips allow farmers to open their barn doors to show students what happens inside. The farmer uses a tablet to connect with classrooms to be a part of a live, video-chat allowing students to have their questions answered in real time.

Visit the Nebraska Farm Bureau Foundation website, www.nefbfoundation.org/educators/get-involved/virtual-field-trips, to see a list of upcoming Virtual Field Trips and to sign up for a time to attend. If you have questions, please contact Nebraska Farm Bureau Foundation at foundationforag@nefb.org or (402) 421-4747.

SOURCES UTILIZED

Mississippi State University Extension

extension.msstate.edu/sites/default/files/pdf/meat_judging_manual_updated_march2015.pdf

Penn State Extension

extension.psu.edu/courses/swine/reproduction/breeding-management

Pork Checkoff

www.pork.org/facts/pig-farming/life-cycle-of-a-market-pig/

www.pork.org/wp-content/uploads/2017/11/Screen-Shot-2017-11-30-at-4.08.09-AM.png

Purdue University Cooperative Extension Service

www.nsif.com/factsheets/nsif3.pdf

Texas A&M University

texas4-h.tamu.edu/wp-content/uploads/Evaluating-Market-Swine.pdf

NATIONAL AGRICULTURAL LITERACY OUTCOMES

Science, Technology, Engineering & Mathematics

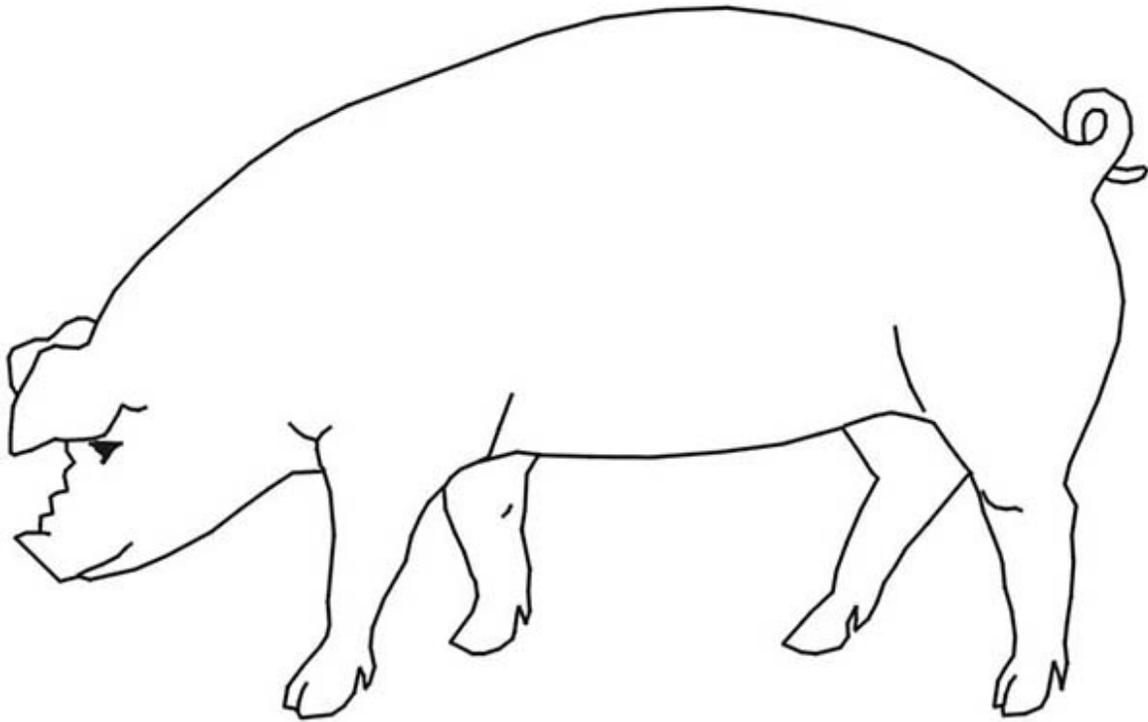
T4.3-5c. Identify examples of how the knowledge of inherited traits is applied to farmers plants and animals in order to meet specific objectives (i.e. increased yields, better nutrition, etc.)

Name: _____

Date: _____

DESIGN A PIG: DROOPY EARS

Part One: Select Breed



Part Two: Trait Differences

Trait	HEADS (+ Breed Average)	TAILS (- Breed Average)
1. Average Daily Gain		
2. Feed Conversion		
3. Carcass Length		
4. Back fat Thickness		
5. Loin Eye Area		

Part Three: Describe Your Pig

Circle the best choice from the bolded words.

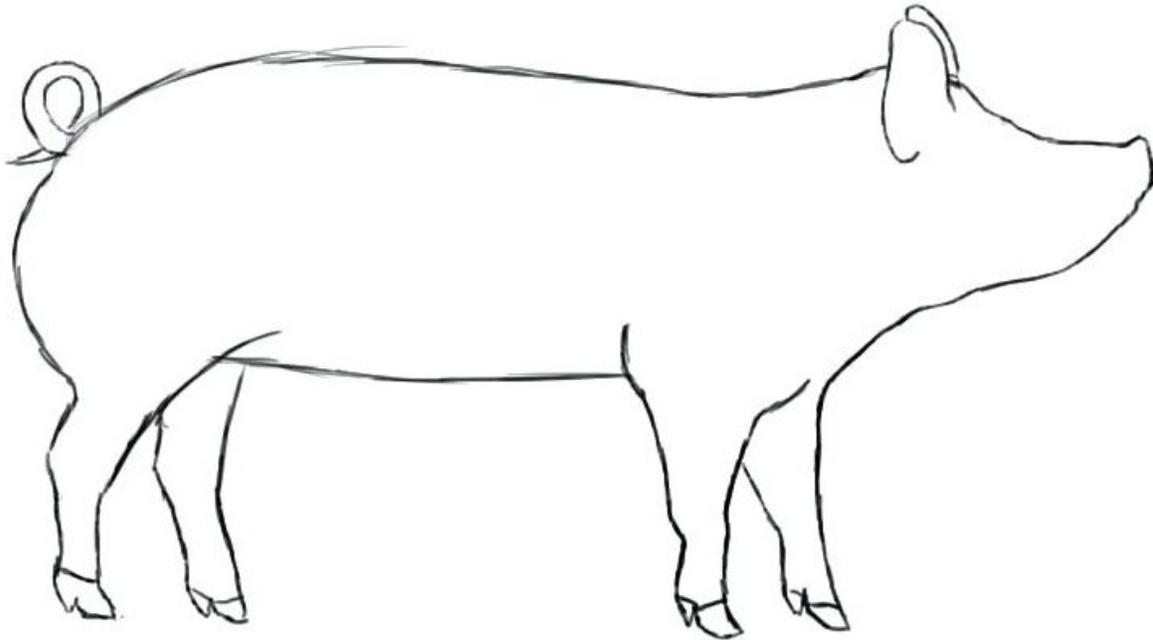
My pig has an average daily gain that is **HIGHER OR LOWER** which explains how fast my pig has been growing. It's ability to convert its corn and soybean meal into muscle is **BETTER OR WORSE** than average. My pig is **LONG OR SHORT** bodied. The back fat is **ABOVE OR BELOW** average, which plays a role in how much lean muscle my pig will have. Generally, if a pig has less backfat it will correspond to a greater percentage of lean muscle. My pig has a **LARGER OR SMALLER** loin eye area than average, which is a measurement of the meat that makes up a pork chop.

Name: _____

Date: _____

DESIGN A PIG: STRAIGHT EARS

Part One: Select Breed



Part Two: Trait Differences

Trait	HEADS (+ Breed Average)	TAILS (- Breed Average)
1. Average Daily Gain		
2. Feed Conversion		
3. Carcass Length		
4. Back fat Thickness		
5. Loin Eye Area		

Part Three: Describe Your Pig

Circle the best choice from the bolded words.

My pig has an average daily gain that is **HIGHER OR LOWER** which explains how fast my pig has been growing. It's ability to convert its corn and soybean meal into muscle is **BETTER OR WORSE** than average. My pig is **LONG OR SHORT** bodied. The back fat is **ABOVE OR BELOW** average, which plays a role in how much lean muscle my pig will have. Generally, if a pig has less backfat it will correspond to a greater percentage of lean muscle. My pig has a **LARGER OR SMALLER** loin eye area than average, which is a measurement of the meat that makes up a pork chop.

Major Swine Breeds



Duroc

The second-most recorded breed of swine in the United States, the red pigs with the drooping ears are valued for their product quality, carcass yield, fast growth and lean-gain efficiency. They also add value through their prolificacy and longevity in the female line. Much of the U.S. breed improvement has occurred in Ohio, Kentucky, Illinois, Indiana, Iowa and Nebraska.



Berkshire

The third-most recorded breed of swine in the United States, Berkshires are known for fast and efficient growth, reproductive efficiency, cleanness and meat flavor and value. The first U.S. meeting of Berkshire breeders and importers was held in 1875, with the American Berkshire Association formed shortly after – making it the oldest swine registry in the world.



Yorkshire

The most-recorded breed of swine in North America, Yorkshires are white with erect ears. They are found in almost every state, with the highest populations being in Illinois, Indiana, Iowa, Nebraska and Ohio. Yorkshires are known for their muscle, with a high proportion of lean meat and low backfat. Soundness and durability are additional strengths.



Spotted

The Spotted swine breed is characterized by large, black-and-white spots. Many breeders in central Indiana specialized in breeding Spotted hogs through the years. Today, Spots are known for their feed efficiency, rate of gain and carcass quality. In addition, commercial producers appreciate Spotted females for their productivity, docility and durability.



Landrace

White hogs with droopy ears, Landrace are the fifth-most recorded breed of swine in the United States. Known as “America’s Sowherd,” Landrace females are heavy milkers and often farrow large pigs. Crossing well with other breeds, Landrace often possess length of body, a high percentage of carcass weight in the ham and loin and the ideal amount of finish.



Poland China

In the early 1800s, Poland China hogs originated in Ohio. Today, Poland China hogs are known for their large frame, length of body, leanness and muscle. They also are excellent feeders, gaining well under good care and management. They also are quiet in their disposition.



Hampshire

The hogs with “the belt,” Hampshires are the fourth-most recorded breed in the United States. Most popular in the Corn Belt, Hampshires are known for producing lean muscle, high carcass quality, minimal backfat and large loin eyes. Females also are known for their mothering ability, with longevity in the sow herd.



Chester White

Chester Whites originated in Chester County, Pa., from which their name was formed. These white hogs with droopy, medium-sized ears are known for their mothering ability, durability and soundness. Packers also tout their muscle quality.

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