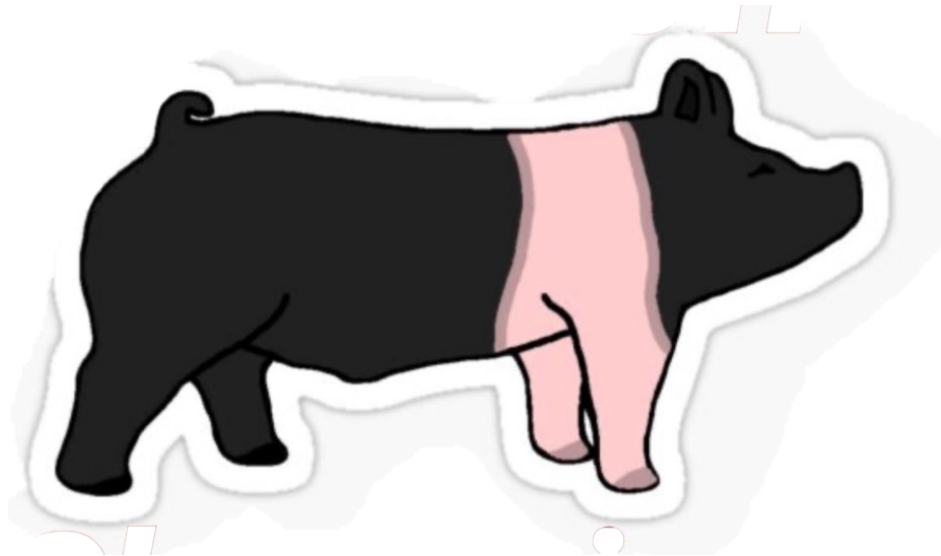


Osceola County 4-H

Market Hog

SKILL-A-THON REFERENCE BOOK & SENIOR SKILL-A-THON ACTIVITIES

2023-2024



UF | IFAS Extension
UNIVERSITY of FLORIDA



	BEEF CATTLE	SWINE	SHEEP
INTACT MALE	BULL	BOAR	RAM
MALE CASTRATED PRIOR TO DEVELOPMENT OF SECONDARY SEXUAL CHARACTERISTICS	STEER	BARROW	WETHER
MALE CASTRATED AFTER DEVELOPMENT OF SECONDARY SEXUAL CHARACTERISTICS	STAG	STAG	STAG
FEMALE THAT HAS PRODUCED PROGENY	COW	SOW	EWE
YOUNG FEMALE WITH NO PROGENY	HEIFER	GILT	EWE
VERY YOUNG PROGENY	CALF	PIG	LAMB

HOG SKILL-A-THON

Introduction

This manual is provided as a *study guide* for the skill-a-thon competition and should be used as an additional aid to ongoing educational programs. Sections are labeled **Junior, Intermediate & Senior, Intermediate & Senior, Senior or Bonus** to help exhibitors and educators identify which materials are required for their age level. The topic for this year's Skill-a-thon is **Digestion**.

Topics for the Knowledge and Skills Stations may include the following:

Juniors (age 8-10 as of September 1, 2023)

Body parts
Breeds
Structure
Digestive Anatomy
Digestive Function
Common Livestock Terms

Intermediates (age 11-13 as of September 1, 2023)

All of the above plus...
Parts of a Feed Label
Basic Livestock Terms

Seniors (age 14 and over as of September 1, 2023)

All of the above plus....
Common Nutritional Disorders

Bonus

Ear Notching

The contest will be held on **January 24, 2024, from 2:00 p.m. until 6:00 p.m. in the KVLS Arena.**

The contest will be held on January 24, 2024, from 2:00 p.m. until 6:00 p.m. in the KVLS Arena

KVLS Skill-a-thon Rules for 2023-2024

1. All market exhibitors must take the Skill-a-thon in their project area for the animal that they are showing in order to participate in the market programs, i.e. steer exhibitors must take the Steer Skill-a-thon. Any exhibitor who does not meet the required grade average on their report card or who does not have a report card must score 70% on the Skill-a-thon to participate in the Market Animal Program.
2. All exhibitors must take the Skill-a-thon for the first time on their own, then a reader can be requested the second time, if a passing grade is not achieved.
3. Awards will be given on the score of the first Skill-a-thon taken. Top awards are only given for passing scores (70% or above).
4. Only those exhibitors who do not make a 3.25 grade point requirement are required to take and make a passing score of 70% or above in order to participate in the market animal program.
5. Exhibitors must stay in the testing room once they have signed up to take the Skill-a-thon.
6. Exhibitors showing a second animal must stay in the testing room to take the second animal Skill-a-thon.
7. No parents or other adults not on the Committee are allowed in the Skill-a-thon room.
8. No exhibitors are allowed to have cell phones while in the Skill-a-thon room.
9. No time limit will be imposed on the exhibitors.
10. Skill-a-thon handbooks will be given at the start of the project.

KVLS Awards

There will be a Junior (8-10), Intermediate (11-13), Senior (14 - graduate from High School) division for the contest. Within each division, 1st, 2nd and 3rd place will receive rosette ribbons and a monetary award.

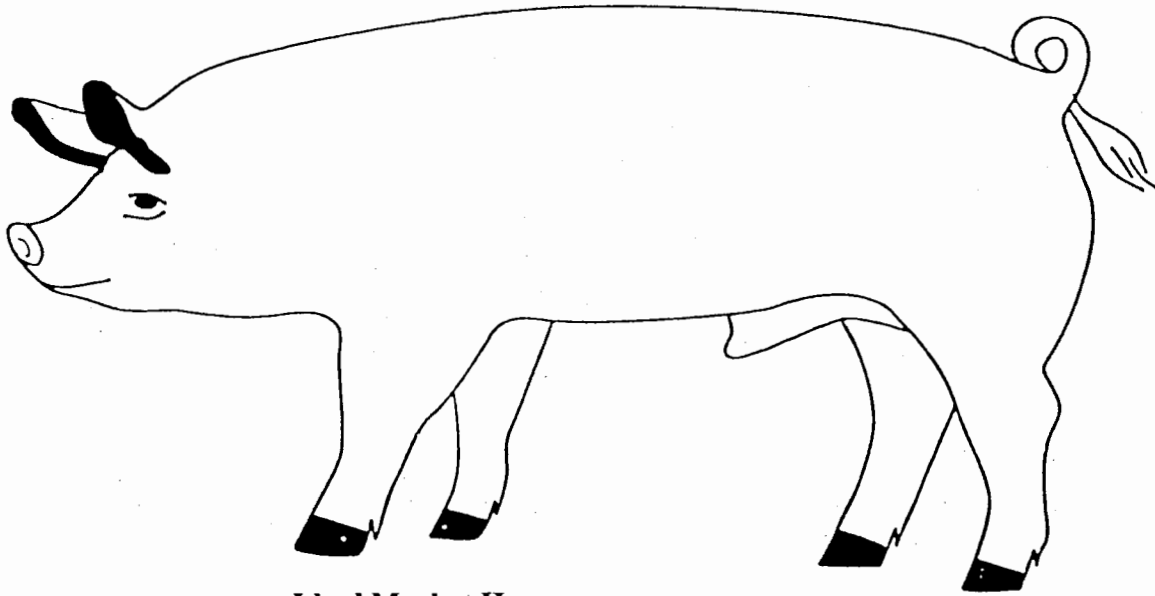
The Ideal Market Hog

SYMBOL III* is a Standard of Excellence for the pork industry, developed by the National Pork Board. The standards include production guidelines, carcass characteristics, carcass quality characteristics and a picture of the ideal market hog. The SYMBOL III picture of the ideal market hog illustrates what a market hog should look like. From this picture, we can see that the ideal market hog should have a long muscular body, with good physical structure.



Ideally, this hog should be able to produce one pound of live weight with 2.4 pounds of feed and should produce a carcass with 6.5 square inches of loin eye area (7.1 for gilts) and a 10th rib back fat of .7 inch (.6 for gilts).

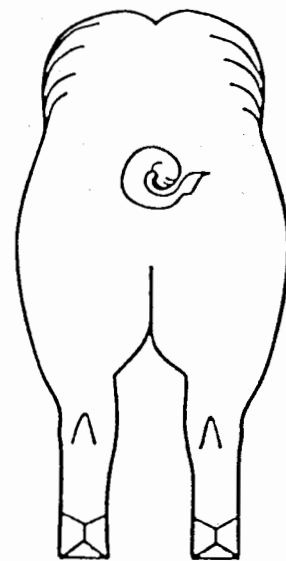
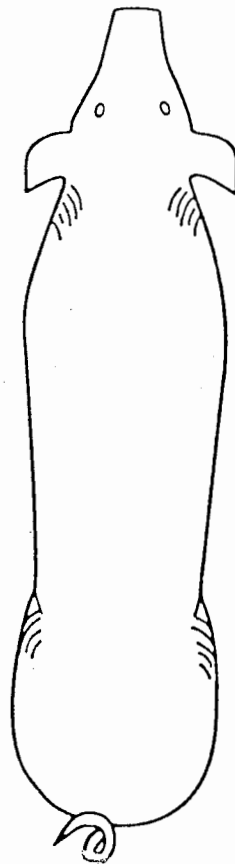
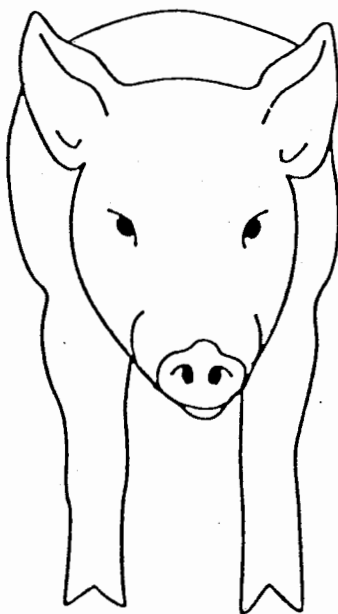
The Ideal Market Hog



Ideal Market Hog

- *240-260 pounds
- *has a 10th rib backfat thickness of .7 or less
- *is a minimum of 32 inches long
- *has a loin eye area of 6.0 square inches or more

Ideal Hog Views



Evaluation of Market Hogs

A market hog should be moderate in height, long bodied, lean, heavy muscled, big volumed and structurally sound.

Market hogs should have the same general body conformation as breeding swine. In addition to volume and capacity, size and structural correctness traits such as muscling and fat which affect carcass merit are highly emphasized. The primary purpose of a market animal is for meat production. Frame size and structural soundness are examined but to a slightly lesser degree.

Muscle

*The correct muscle structure is long and thick to fit the frame of a hog. An excess of round, tight, bunched muscle may adversely affect farrowing ease, reproductive efficiency and is related to stress problems. Traits that are found in the ideal market hog include:

- long, thick muscular ham
- wide set to rear legs
- thick rump
- muscular top and loin

Fat

*Fat in market hogs is undesirable. Presently, a back fat thickness of .7 or less measured at the 10th rib is acceptable. Desirable traits in regard to leanness include:

- freedom of fat in elbow pocket
- trimness in ham seam and crotch area
- trimness over the loin edge
- no excessive fullness in jowl

Excess fat is a common fault in market hogs. It reduces the cutability (retail value) of market hogs. The amount of back fat on a hog is a reliable measure of overall finish and should be used as a judging tool whenever available. 10th rib back fat thickness on superior hogs should be less than .7 inches. It should also be noted that fat indicates inefficiency of gain. It takes 2.5 times the amount of feed to produce a 1 lb. of fat vs. a 1 lb. of lean.

Besides muscling and fat, the overall weight of the market hog is important. Large-scaled, heavy-muscled hogs can be carried to heavier weights. Use weight per day of age if available. Many packers want hogs in the 240-260 pound weights.

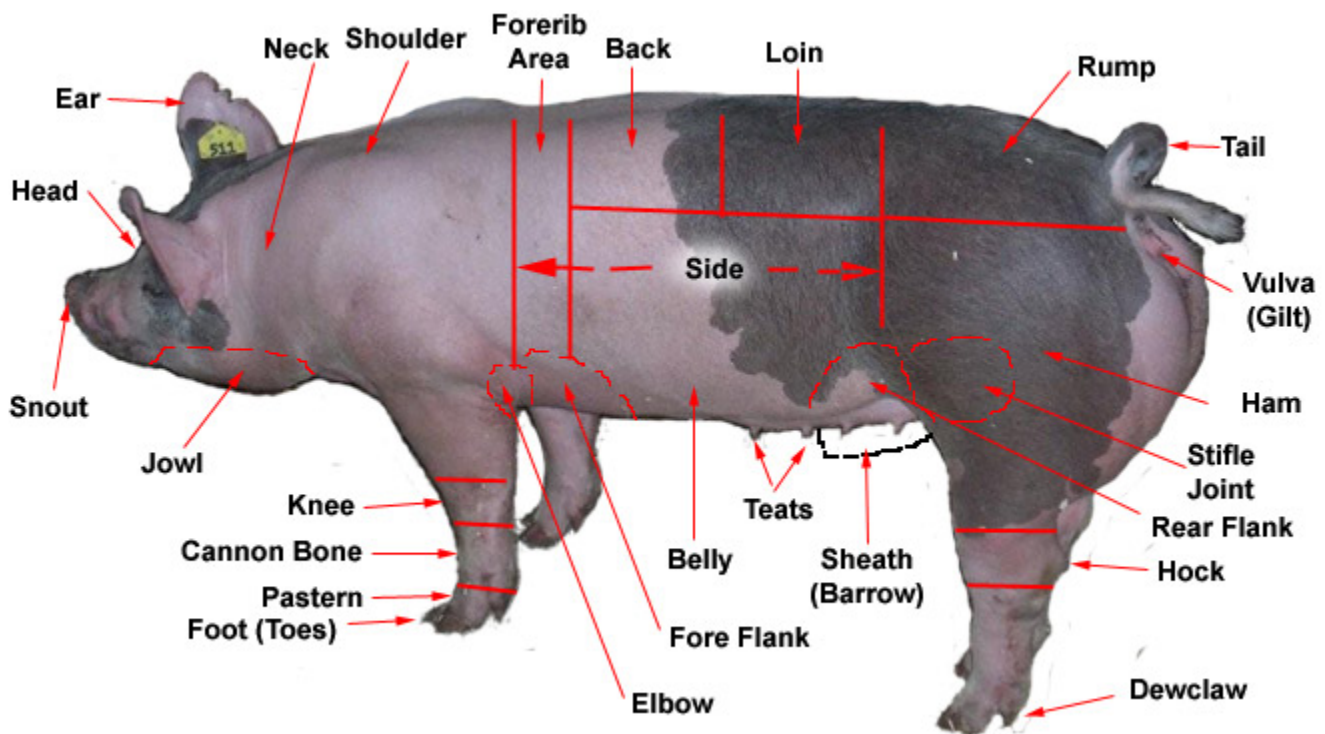
Carcass Merit

*Muscling and fat are two major factors in carcass merit. Meaty, heavy-muscled hogs are preferred to over-fat or light-muscled hogs. Thickness and firmness through the ham and over the back are indications of overall muscling.

(Rev. 9/07)

Parts of a Hog

It is important for livestock producers to share a common language. Using the correct names for various body parts is one way to be certain your message is understood. Study the pictures with the names of the body parts labeled so that you can communicate with other producers using correct terms.



Breeds



Yorkshire- Coming from England, these animals have long, large-framed, white bodies with erect ears. They are known as the "mother" breed because they produce large litters and are good mothers.



Hampshire- Developed in England, these animals have black bodies with a white belt around their shoulders and both front legs. They also have erect ears and heavy muscles.



Duroc- This American breed came from crosses between red hogs in New York and red hogs in New Jersey. These animals have light red to dark red bodies and droopy ears. They grow quickly and efficiently and are good mothers.



Berkshire- This breed came from England. These animals have black bodies with white feet, tails, and faces. They also have sound skeletons; dish snouts; and short, erect ears.



Chester White- This breed was developed in Pennsylvania. These animals have white bodies and medium-sized, droopy ears. They are also good mothers.



Poland China- The members of this Ohio breed have black bodies with six white points. The white points are their four legs, tail, and nose. They also have droopy ears. These animals are lean with heavy muscle.



Spotted- Developed in Indiana, these animals are medium-sized. They have black and white spotted bodies and droopy ears. Also, they gain weight easily and are aggressive breeders.



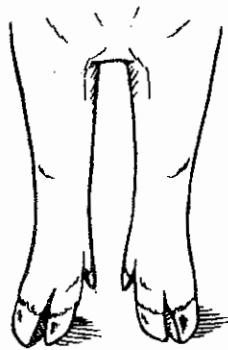
Landrace- Coming from Denmark, these animals have very long, white bodies and very large floppy ears. They are good mothers.

STRUCTURAL DIFFERENCES DESCRIPTIONS

Buck-kneed	When the calf is "over at the knees" or buck-kneed, full extension of the knee cannot occur when observed from the side. This is usually seen in cattle that are also too straight in their shoulder.
Calf-kneed	This is the other extreme, where the calf stands "back at the knees" when viewed from the side.
Weak Pastern	Having an angle greater than 45 degrees in the pastern/hoof alignment, putting too much pressure on the joint.
Postlegged	The hock has too little angle or set. The calf is too straight through the joint, resulting in very stiff, constricting movement because of the lack of flexibility. More cattle become unsound because of being postlegged than sickle hocked.
Sickle-hocked	When viewing the rear legs from the side, the hock has too much angle or set, causing the steer to stand too far underneath itself. Often these calves also will droop excessively from hooks to pins.
Bowlegged	When viewed from the front or rear, the knees set too far out.
Knock-kneed	When viewed from the front, the knees are close together.
Toed-out (splayfooted)	The feet toe out away from each other. This problem is often seen in extremely light-muscled, narrow-chested cattle, where the legs are naturally set too close together.
Toed-in (pigeon-toed)	Toes turn in towards each other.
Cow-hocked	When viewing the rear legs from the rear, the hocks are turned in or placed too close together.

Juniors, Intermediates, Seniors

Front view

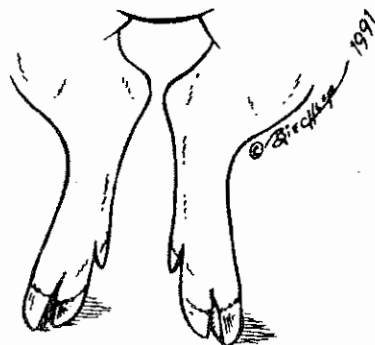


Splayfooted
(toes pointed out)



Pigeon-toed
(toes pointed in)

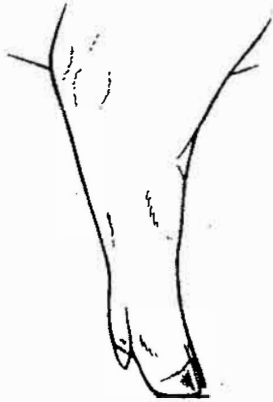
Rear view



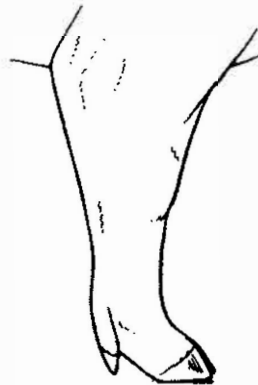
Cow-hocked

Foot and Leg Structural Deficiencies

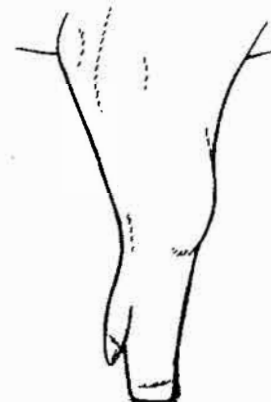
Side view of front leg



Normal

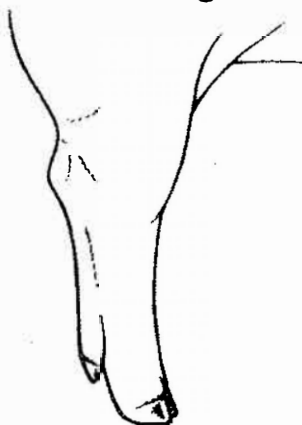


Weak pastern

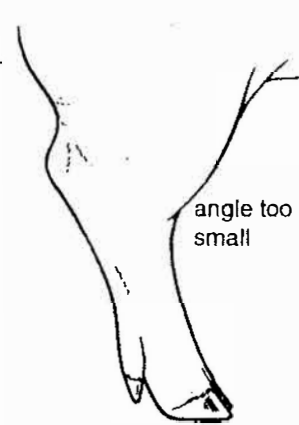


Buck-kneed

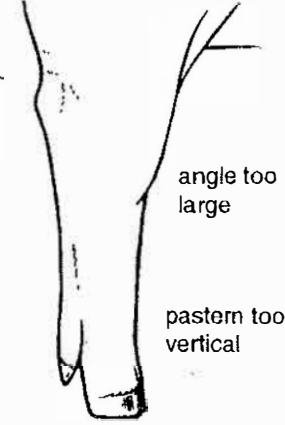
Side view of rear leg



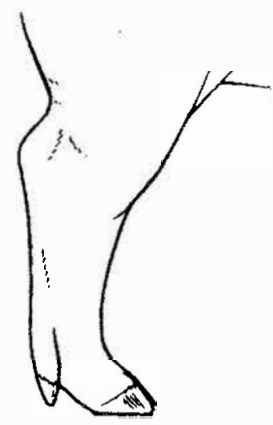
Normal



Sickle-hocked



Post-legged



Weak pastern

angle too small

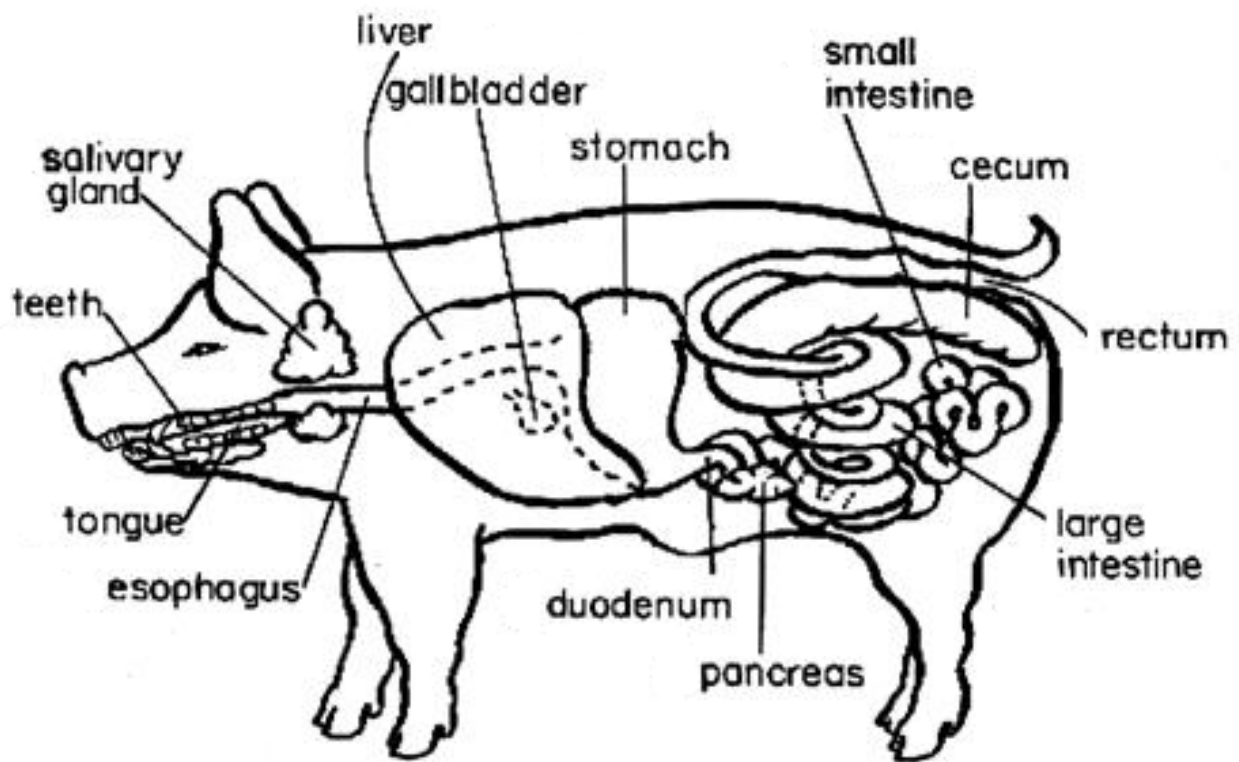
angle too large

pastern too vertical

Digestive Anatomy

You are what you eat sounds silly but is somewhat true. Farm animals are grouped by what they eat, which is based on the type of digestive system they possess. Herbivores are vegetarians (cattle, sheep, goats, rabbits). Carnivores are flesh eaters (dogs). Omnivores eat both plants and flesh (pigs, chickens, humans). Based on the digestive system, animals are grouped as **monogastric** or simple stomach (pig), polygastric or **ruminant** (cattle, sheep, goats), avian (chickens), or **pseudo-ruminants** with a functional cecum (rabbits). Understanding the digestive system is fundamental to selecting proper feeds and feeding system for your animal.

After studying this manual, you should be able to identify the parts of the digestive tract of a hog and tell the function of each part.



Digestive Function

The physical and chemical changes of feed within the gastrointestinal tract that allow nutrients to be released and absorbed into the body are called digestion. There are significant differences in the digestive processes between species. The type of digestive system an animal has determines what the animal can successfully use as feed. Complicated feed (forage) requires a complicated digestive tract (ruminant). However, monogastric animals, such as swine require grains which are digested more easily. The steps in digestion include: prehension (gathering), mastication (chewing), salivation, deglutition (swallowing), microbial, enzymatic and chemical breakdown, absorption of nutrients, defecation, and micturition (urination). For a review of swine digestive anatomy visit: <http://www.thepigsite.com/articles/2749/digestive-system-of-the-pig-anatomy-and-function/> or <http://edis.ifas.ufl.edu/AN012>.

Digestive Function

Digestion Definition: The process of breaking down food by mechanical and enzymatic action in the stomach and intestines into substances that can be used by the body.

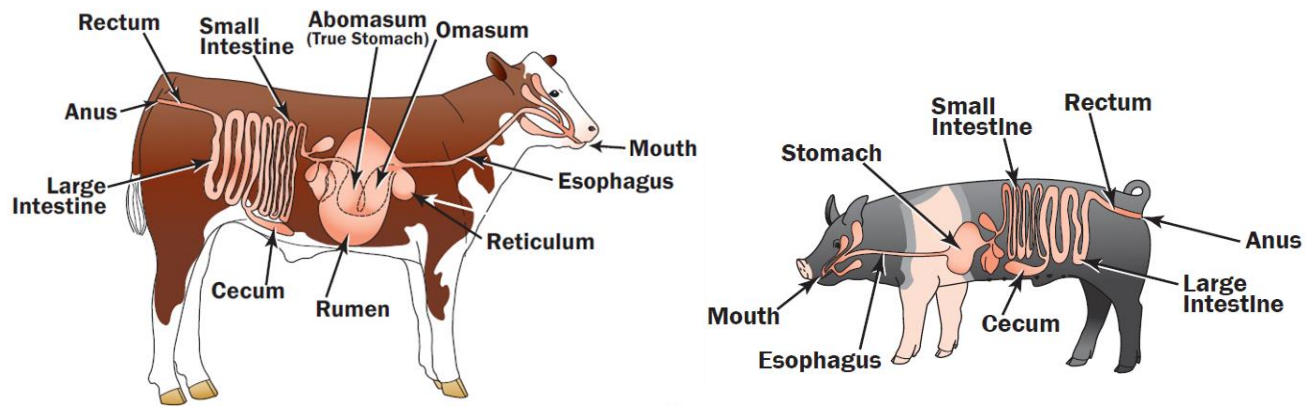
What are the differences between the monogastric and ruminant systems?

There are two main differences between monogastric and ruminant animals:

1. **Monogastric** animals only have one compartment to their stomach. Ruminants have four compartments to their stomach.
2. **Ruminant** animals chew their food numerous times through a process called regurgitation or rumination. That means that food that travels first from the mouth to the esophagus to the rumen. From the rumen, the food then moves to the reticulum where it can then come back up the esophagus to the mouth to be chewed again and the process is repeated.

Do the monogastric and ruminant digestive systems look different?

The systems look different in terms of their stomach compartments and the size of the organs.



What are parts of the monogastric digestive tract?

Mouth: Lips, tongue and teeth used in grasping, chewing, and salivation processes.

Esophagus: Hollow muscular tube that transports food from the mouth to the stomach

Stomach: Hollow, pear-shaped, muscular organ with acidic secretions.

Sm. Intestine: Pancreatic and intestinal juices break down proteins and carbohydrates while bile from the liver breaks down fats. The first section (duodenum) is involved in digestion, and the next two sections (jejunum & ileum) are actively involved in nutrient absorption. (2.5 gallons and 60 feet long)

Lg. Intestine: Three sections: cecum, colon and rectum. The cecum has little function in swine. The colon is the site for water resorption and storage reservoir of undigested material which passes out of the rectum as feces. (2.5 gallons, 17 feet long)

COMMON LIVESTOCK TERMS

BOAR	Intact male of hog
SOW	Female that has produced progeny in hog
PROGENY	Offspring, young
PIG	Very young progeny
GILT	A young female of hog usually less than 12 months of age which has not farrowed a litter
BARROW	Male castrated prior to development of secondary sexual characteristics in hog
CARCASS	The dressed body of a slaughtered meat animal, offal having been removed.
FINISH	Refers to the amount of external fat covering on an animal.
MARBLING	Refers to flecks of fat distributed within the muscle.
MILKING ABILITY	Refers to the amount of milk an animal can produce
FARROWING	Giving birth
PASTER	Sloping part of the leg just above the hoof.
HAM	The thigh
PARASITES	Organisms living on other organisms - doing harm
CROSSBREEDING	Is the mating of two animals from different breeds.
HYBRID	The offspring produced from crossbreeding.

Feed Label Information

A commercial law requires each bag or bulk load to be accompanied by a label showing several key items:

- Net weight
- Product name and brand name
- Drug additives
- Guaranteed analysis of the feed – crude protein, crude fat and crude fiber must be guaranteed on all feeds except straight mineral or vitamin supplements, molasses or drug compounds.
- Minimum percentage of crude protein, percentage of equivalent protein from non-protein nitrogen, if any. The amount of crude or total protein in a feed is guaranteed. Crude protein is determined by multiplying the nitrogen content of a feed by the factor 6.25.
- When non-protein nitrogen (NPN) is applied to feedstuffs, a statement “for ruminants only” must appear underneath the name of the feed. Additionally, it must also have a guarantee for crude protein which has been supplied from non-protein nitrogen.
- Minimum crude fat content – Fat has an energy value approximately 2.25 times the value of carbohydrate feedstuffs.
- Maximum crude fiber content – Crude fiber is a measure of the indigestible or non-useful portion of a feed. Feeds having low fiber values tend to be higher in digestible energy or total digestible nutrients than those feeds having high fiber values.
- Minerals – feeds containing 6.5 percent or more minerals must show a guarantee of: calcium – minimum and maximum; phosphorous- minimum; salt – minimum and maximum
- Vitamins, only if guaranteed
- Common and usual name of each ingredient or the collective term for each grouping of feed ingredients
- Directions for use and cautionary statements
- Name and principle mailing address of the manufacturer

50 lbs net weight

Brand Name Show Feed
(for ruminants only)

Medicated

Feed for 28 days as an aid in the maintenance of weight gains in the presence of respiratory diseases, such as shipping fever.

Caution: Use only as directed.
Discontinue use 14 days prior to slaughter.

Active Drug Ingredients:
Chlortetracycline 7.6 grams/ton

Guaranteed Analysis

CRUDE PROTEIN, not less than 12%

This includes not more than 1.00% equivalent crude protein from non-protein nitrogen.

CRUDE FAT, not less than 2.0%

CRUDE FIBER, not less than 19%

Ingredients: Grain products, roughage products, plant protein products, processed grain by-products, forage products, molasses products, calcium carbonate, salt, vitamin E supplement, vitamin A supplement, ferrous sulfate, potassium iodide, manganese oxide copper chloride, cobalt glucoheptonate, vitamin D3 supplement, sodium selenite.

RUMINANT MEAT AND BONE MEAL FREE

FEEDING DIRECTIONS: Feed at the rate of 12 pounds per head per day.

MANUFACTURED BY:
The Best Feed Company
P. O. Box 00000
Small Town, USA

BASIC LIVESTOCK TERMS

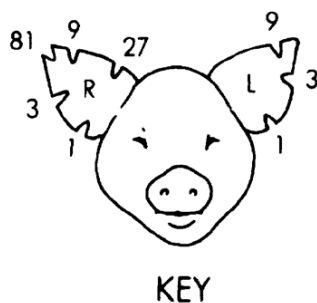
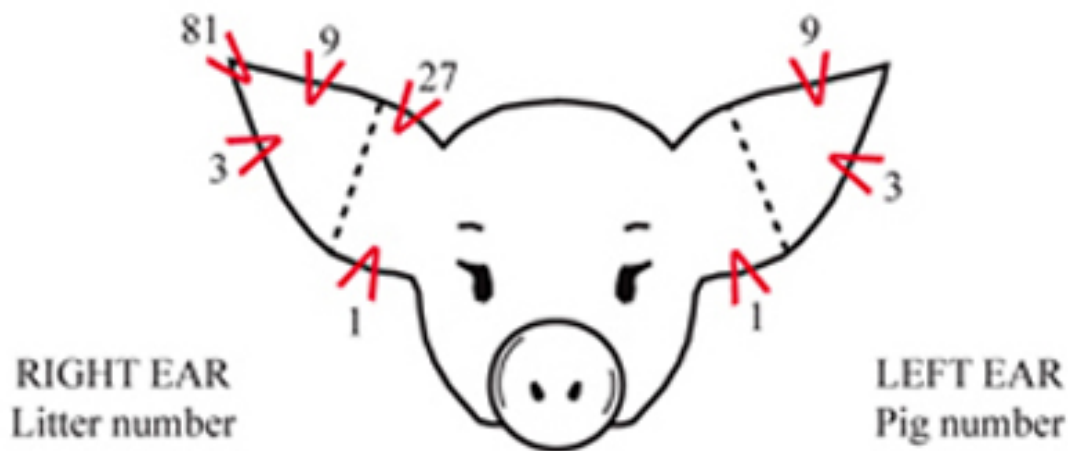
1. Condition, Finish or Covering – All are used to denote fat. The terms finish and covering are used to describe fat on market animals, while condition is used when describing breeding stock.
2. Growthiness – The characteristics of having size and weight at a certain age.
3. Balance or Symmetry – A proper proportion and blending of parts of the animal. Balance or symmetry is evaluated from a side view.
4. Ruggedness, Stoutness – The quality of being heavy or large boned. This is usually determined by the size of the cannon bone (from the knee to the ankle).
5. Quality – A general term that combines smoothness and refinement. Refinement of hair coat, freedom of wrinkles in hogs and freedom of roughness, patchiness in cattle indicates quality.
6. Scale – The size of the animal as determined by skeletal structure, independent of weight. The height, length and width of the animal.
7. Style – The general eye-appeal or attractiveness of the animal. Includes balance, structural correctness and quality.
8. Broodiness – Female breeding stock term that means she has a favorable combination of characteristics to be a good mother. Depth, capacity, prominence of teats and/or mammary system, stoutness and correctness of vulva.
9. Breed Character – Characteristics that separate breeding stock of one breed from other breeds, primarily by differences of the head: shape, length, dish of face, width of muzzle, shape of poll and ears, color markings and wool covering in sheep.
10. Trimness Freedom from fat or finish.
11. Meatiness/Muscling – Having a high proportion of muscle in the areas of the high-priced cuts. This is shown primarily by the relative width, length and fullness of the quarter, leg or ham, and by the thickness and fullness through the rib, rack or loin.
12. Type – A combination of characteristics that make an animal useful for a specific purpose. Determined by the general shape and form of an animal. Desirable types are constantly changing.
13. Tight Framed - The ability of the animal to hold itself together. Indicated by a strong top (back), tightness of shoulder and squareness of feet and leg placements.
14. Structural Soundness – The desirability or correctness of the skeletal structure, with major emphasis on straightness of top and proper feet and leg structure.
15. Femininity – Characteristics that distinguish the female from the male. Indicated by refinement of the head, neck and shoulders.
16. Masculinity – Characteristics that distinguish the male from the female. Indicated by boldness or massiveness of head and chest, thickness of the neck and development of the forequarters.

Common Nutritional Disorders

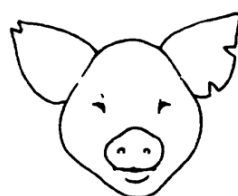
<u>Disorder</u>	<u>Chief Cause</u>
E. coli enterotoxemia	Gut edema, occurs after weaning, sudden death
Ketosis	Sudden need for extra energy
Milk fever	Sudden need for Ca (lactation)
Parakeratosis	Zn deficiency
Night blindness	Vitamin A deficiency
Goiter	Iodine deficiency
Rickets	Ca, P, or vitamin D deficiency (young animals)
Anemia	Fe, Cu, vitamin B12, or folic acid deficiency
Gossypol toxicity	Toxic level of gossypol from cottonseeds
Hypoglycemia	Low blood sugar level
Photosensitization	Some feeds or forages or accumulation of metabolites
Salt poisoning	Excess salt

EAR NOTCHING

Ear notching helps identify a pig's litter and which one of the litter it is, giving each pig a unique identity number. Notches are placed in one of five locations in the pig's right ear — to show the litter number — and in one of three locations in the left ear — to show the individual pig number. "Reading" the notches allows producers, judges, and other swine professionals to know more about the pig they're viewing. Ear notching is permanent and can be read from a distance. However; it may disfigure the animal and requires training (math skills) to read.



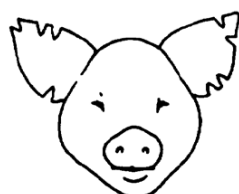
PIG NO. 47-1



PIG NO. 81-4



PIG NO. 128-5



PIG NO. 100-14

Activities

It is recommended that you complete the six activities provided in this skill-a-thon book to help prepare you for the skill-a-thon. The activities are very similar to what you should expect during the skill-a-thon and can be used for practice.

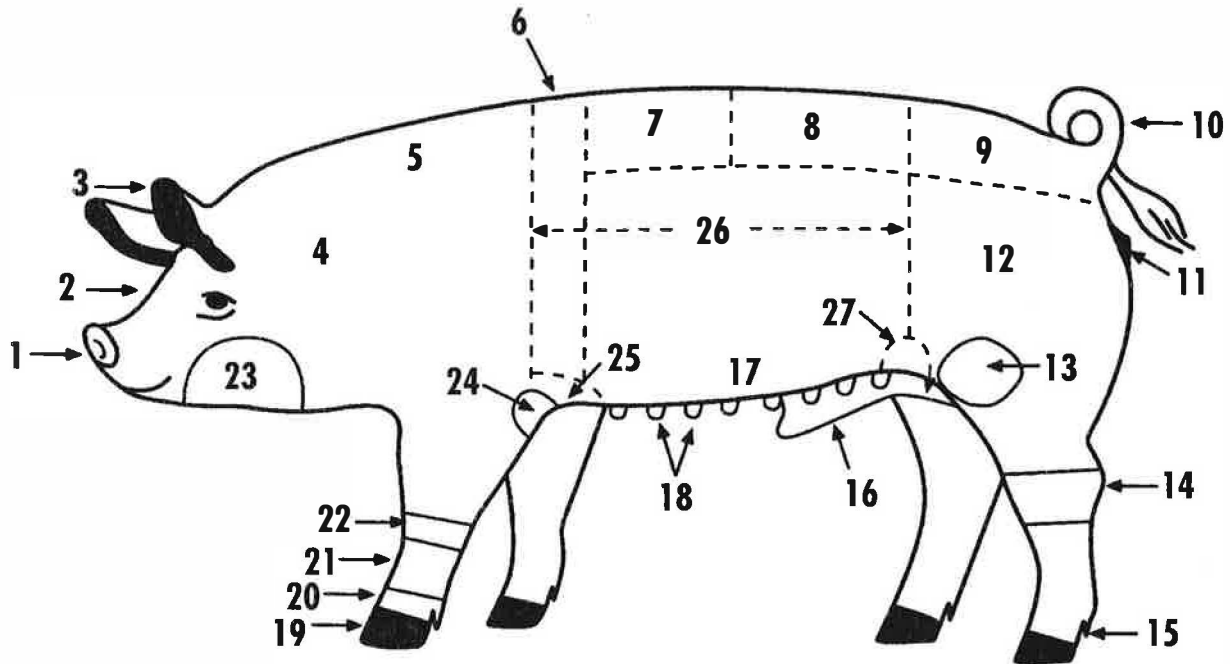
4-H Members Only: After you have completed an activity you should record it in your record book using the table on the 4-H Project Book/ Activities page. You do not need to attach the activity page you have completed in the record book. Before turning into 4-H in May have your leader sign the Activity Page showing they have seen your six (6) completed Activities.

SENIOR HOG PARTS

ACTIVITY #1



Write in the name that corresponds to the correct part of the animal.



- | | | |
|----------|-----------|-----------|
| 1. _____ | 10. _____ | 19. _____ |
| 2. _____ | 11. _____ | 20. _____ |
| 3. _____ | 12. _____ | 21. _____ |
| 4. _____ | 13. _____ | 22. _____ |
| 5. _____ | 14. _____ | 23. _____ |
| 6. _____ | 15. _____ | 24. _____ |
| 7. _____ | 16. _____ | 25. _____ |
| 8. _____ | 17. _____ | 26. _____ |
| 9. _____ | 18. _____ | 27. _____ |

References: Market Hog 4-H Handbook #135R; Beef, Sheep, and Swine Selection and Evaluation 4-H Book #103R; Swine Livestock Learning Laboratory Kit
Prepared By: Jodi Black, State Extension Associate, 4-H/Animal Sciences; Andrea Auker, Animal Sciences Student

SENIOR MARKET HOG BREEDS

ACTIVITY #2

Use your knowledge of swine breeds and the characteristics of each to fill in the blank with the correct breed for each animal below.

1. _____: My genetics are a cross between red hogs in New York and red hogs in New Jersey.
2. _____: I am known as the “mother” breed because I produce large litters and I am a good mother.
3. _____: I have black and white spotted bodies and droopy ears.
4. _____: I have a black body with a white belt around my shoulders and front legs.
5. _____: I have a sound skeleton; dish snouts; and short, erect ears. I came from England.
6. _____: I have a very long, white body and very large floppy ears.
7. _____: My breed was developed in Pennsylvania. I have a white body and medium-sized, droopy ears.
8. _____: I have a black body and six white points. My four legs, tail, and nose.

SENIOR HOG DIGESTIVE FUNCTION

ACTIVITY #3

Write the correct number and name in the line to match the function description of each part of the digestive tract.

1. Lg. Intestine
2. Sm. Intestine
3. Esophagus
4. Mouth

_____ Muscular tube that transports food from the mouth to the stomach

_____ Lips, tongue and teeth used in grasping, chewing and salivation.

_____ Pancreatic and intestinal juices break down proteins and carbohydrates while bile from the liver breaks down fats. The first section (duodenum) is involved in digestion, and the next two sections (jejunum & ileum) are actively involved in nutrient absorption.

_____ Three sections: cecum, colon, and rectum. The cecum has little function in swine. The colon is the site for water resorption and storage reservoir of undigested material which passes out of the rectum as feces.

SENIOR MARKET HOG DIGESTIVE TRACT

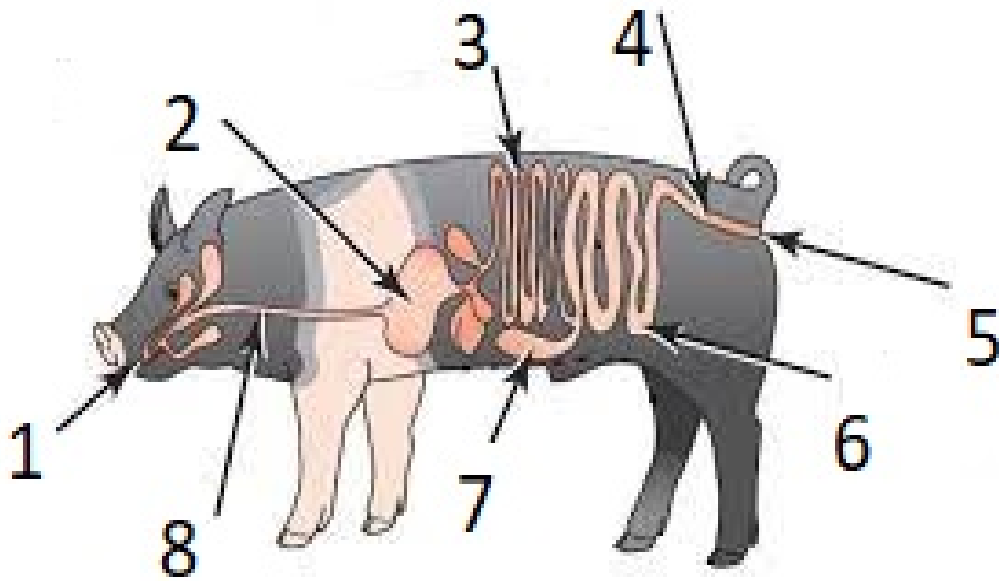
ACTIVITY #4

DIGESTIVE TRACT ACTIVITY

Enter the correct organ by the number below.

LARGE INTESTINE
MOUTH
RECTUM
ANUS

SMALL INTESTINE
ESOPHAGUS
STOMACH
CECUM



1. _____

5. _____

2. _____

6. _____

3. _____

7. _____

4. _____

8. _____

SENIOR MARKET HOG FEED LABEL ACTIVITY #5

PLACE NUMBER BY THE PROPER LABEL DESCRIPTION

- _____ Feeding Directions
- _____ Ingredients
- _____ Net Weight
- _____ Manufactured by
- _____ Guaranteed Analysis
- _____ Drug Additives
- _____ Product Name
and Brand Name
- _____ Crude Fiber
- _____ Crude Protein
- _____ Caution
- _____ Crude Fat

1. _____

2. _____
(for ruminants only)

Medicated

Feed for 28 days as an aid in the maintenance of weight gains in the presence of respiratory diseases such as shipping fever.

3. _____ Use only as directed.
Discontinue use 14 days prior to slaughter.

4. _____
Chlortetracycline 7.6 grams/ton

5. _____

6. _____ not less than 12%
This includes not more than 1.00% equivalent crude protein from non-protein nitrogen

7. _____, not less than 2.0%

8. _____, not more than 19%

9. _____ Grain Products, roughage products, plant protein products, processed grain by-products, forage products, molasses products, calcium carbonate, salt, vitamin E supplement, vitamin A supplement, ferrous sulfate, potassium iodide, manganese oxide copper chloride, cobalt glucoheptonate, vitamin D3 supplement, sodium selenite.

RUMINANT MEAT AND BONE MEAL FREE

10. _____: Feed
at the rate of 12 pounds per head
per day.

11. _____:
The Best Feed Company
P.O. Box 00000
Small Town, USA

**SENIOR HOG COMMON NUTRITIONAL DISORDER
ACTIVITY #6**

Write in the **Name** that corresponds with the cause of the common nutritional disorder.

Name:	
Cause:	Low blood sugar level

Name:	
Cause:	Vitamin A deficiency

Name:	
Cause:	Sudden need for extra energy

Name:	
Cause:	Excess salt

Name:	
Cause:	Zn deficiency

Name:	
Cause:	Toxic level of gossypol from cottonseeds

Name:	
Cause:	Sudden need for Ca (lactation)

Name:	
Cause:	Gut edema, occurs after weaning, sudden death

Name:	
Cause:	Fe, Cu, vitamin B12, or folic acid deficiency

Name:	
Cause:	Ca, P, or vitamin D deficiency (young animals)

Name:	
Cause:	Some feeds or forages or accumulation of metabolites

Name:	
Cause:	Iodine deficiency