

# EVALUATING AGRICULTURAL ANIMALS

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Objective 4.0

# CLASSIFY TRAITS FOR SELECTION OF ANIMALS

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Objective: 4.01

# BEEF AND SWINE EVALUATION

- Livestock producers use visual observations to:
    - Select breeding cattle or swine based on conformation, breed character, structural soundness of feet and legs, and body capacity.
    - Select market animals based on muscle, frame size, body capacity, finish and structural soundness.
-

# TERMS TO KNOW

- Anatomy-
    - The science of body structure or parts of an animal. External anatomy terms are used to classify animals.
  - Conformation-
    - The physical arrangement of bone and body tissue. It includes the skeletal structure, muscling, fat balance, straightness of the animal's lines and structural soundness.
  - Breed Character-
    - Visible in the head and general appearance of the animal.
-

# TERMS TO KNOW

- Muscle-
    - Refers to the distribution of muscle throughout the animal. Well muscled animals will show fullness through the back, loin and rump.
  - Finish-
    - Refers to the amount of fat cover on an animal.
  - Structural Soundness-
    - The arrangement of bone and muscle tissue.
    - The legs of animal should be long and straight and have adequate bone and foot to carry the animal throughout its life span.
-

# TERMS TO KNOW

- Body Capacity-
    - The depth of rib the animal displays. Typically analyzed from the side view of the animal.
  - Frame Size-
    - The length and size of the animal. Used to compare animals that are of similar age to indicate growth and breeding potential. Frame should be proportional to muscle development.
-

# WHY?

- Producers use these traits to select animals that carry desirable traits and cull (remove) animals that display poor traits and qualities.
  - Animals that display undesirable traits should not be used for breeding purposes.
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# WHY?

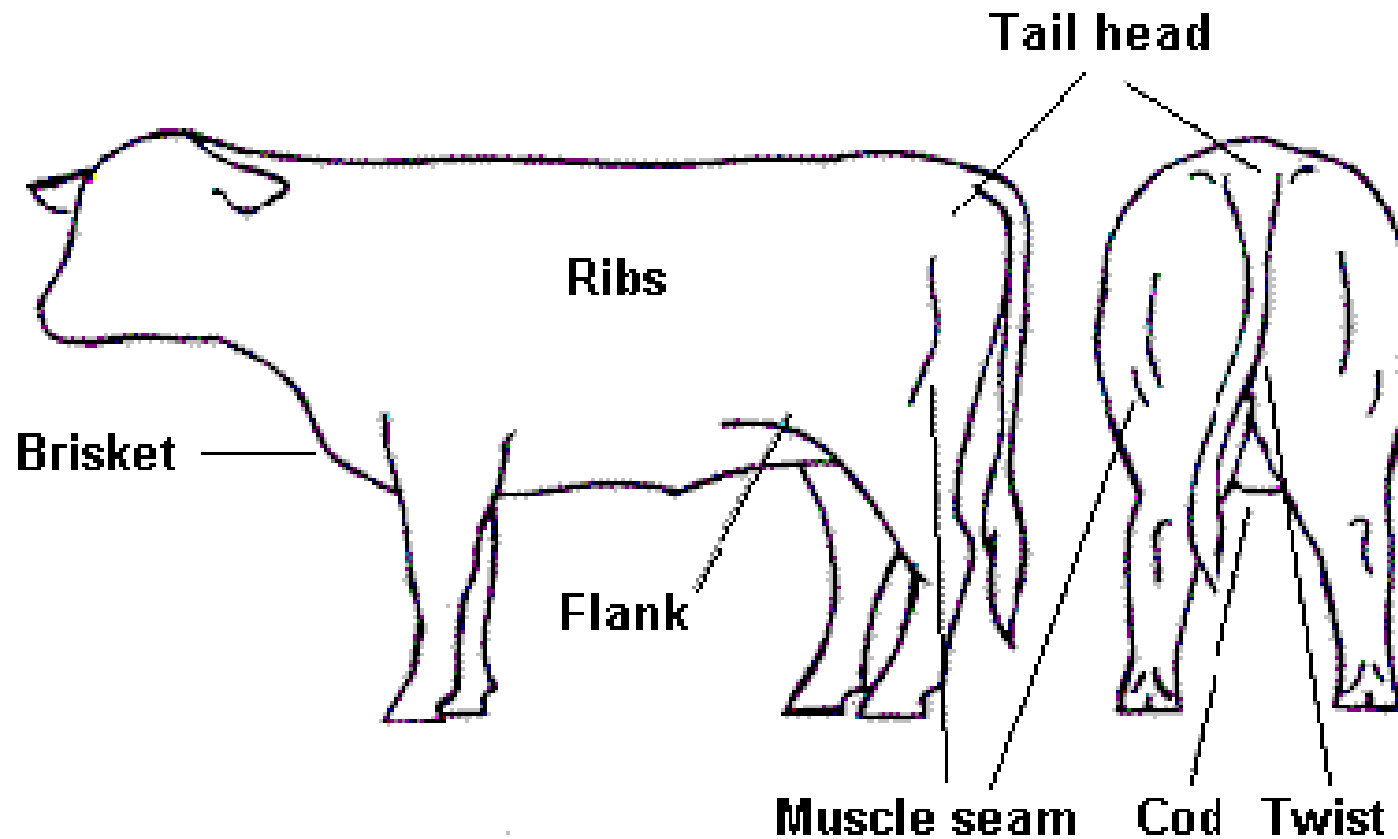
- Producers typically use additional data tools such as Average Daily Gain and Expected Progeny Differences to analyze breeding animals.



# LIVESTOCK EXTERNAL ANATOMY

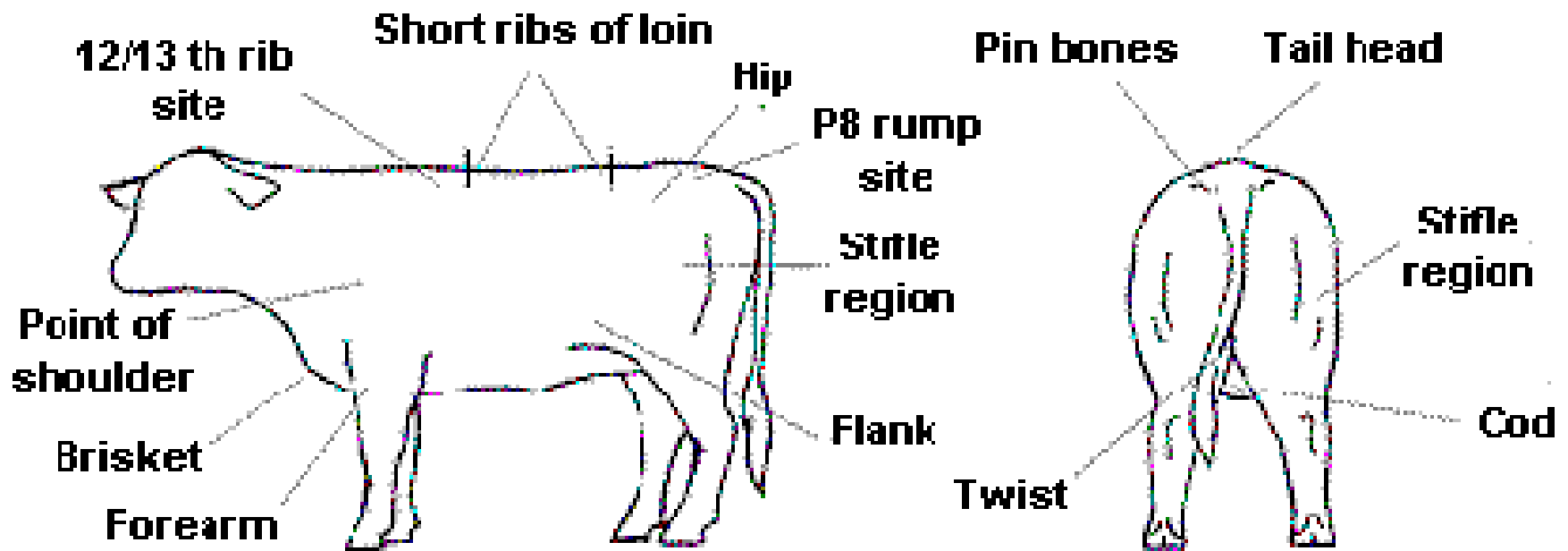
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# CATTLE PARTS



Adapted from: The Australian Feedlot Directory  
(Elders Livestock) 1994, p 19

# CATTLE PARTS

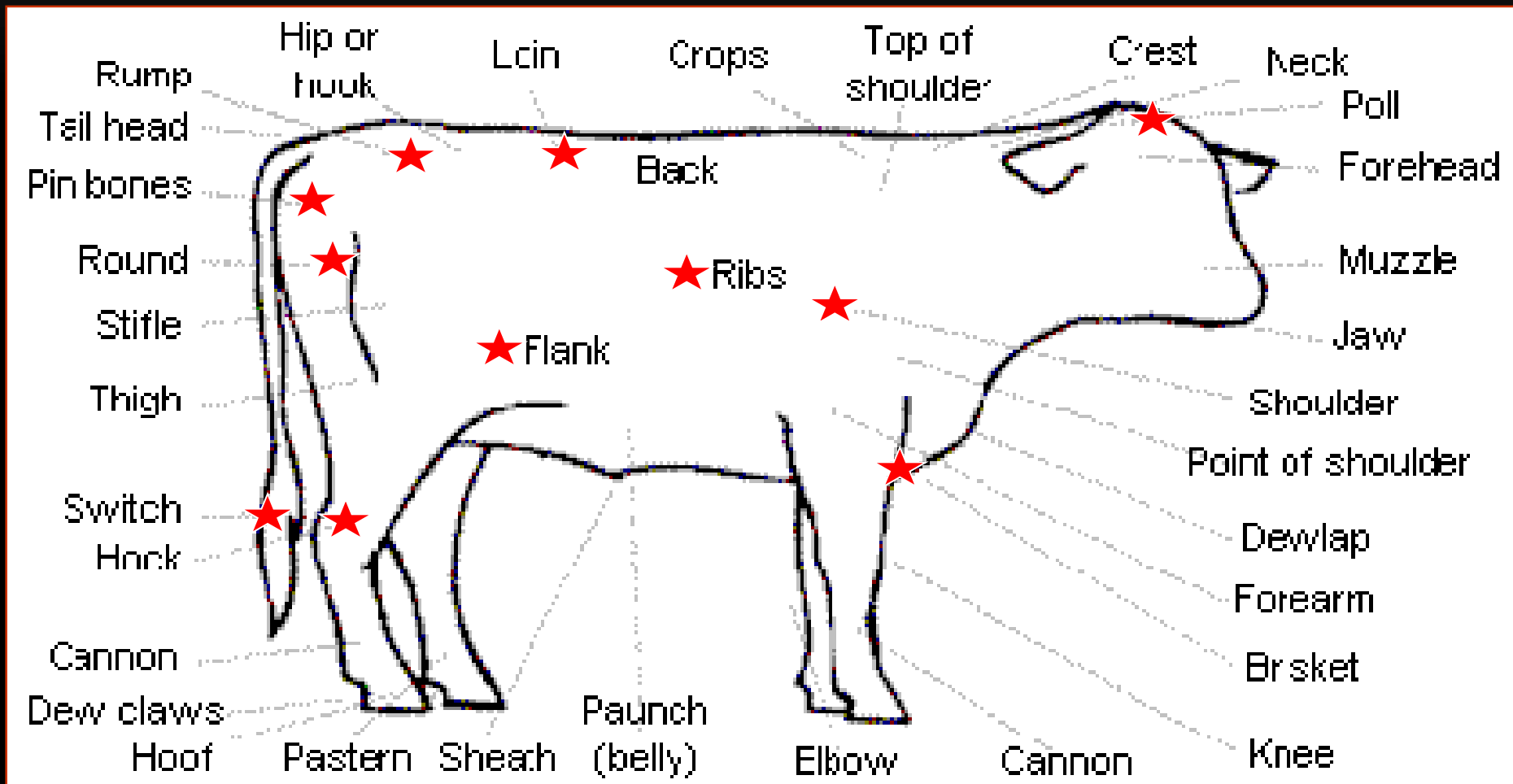


Adapted from: The Australian Feedlot Directory (Elders Livestock) 1994, p 19

# CATTLE PARTS

- In your notebook draw a diagram of a beef cow labeling 20 different parts including the 11 red stars in the class diagram

# CATTLE PARTS



# SWINE PARTS

- In your notebook draw a diagram of a swine labeling 15 different parts including red stars in the class diagram

# SWINE PARTS

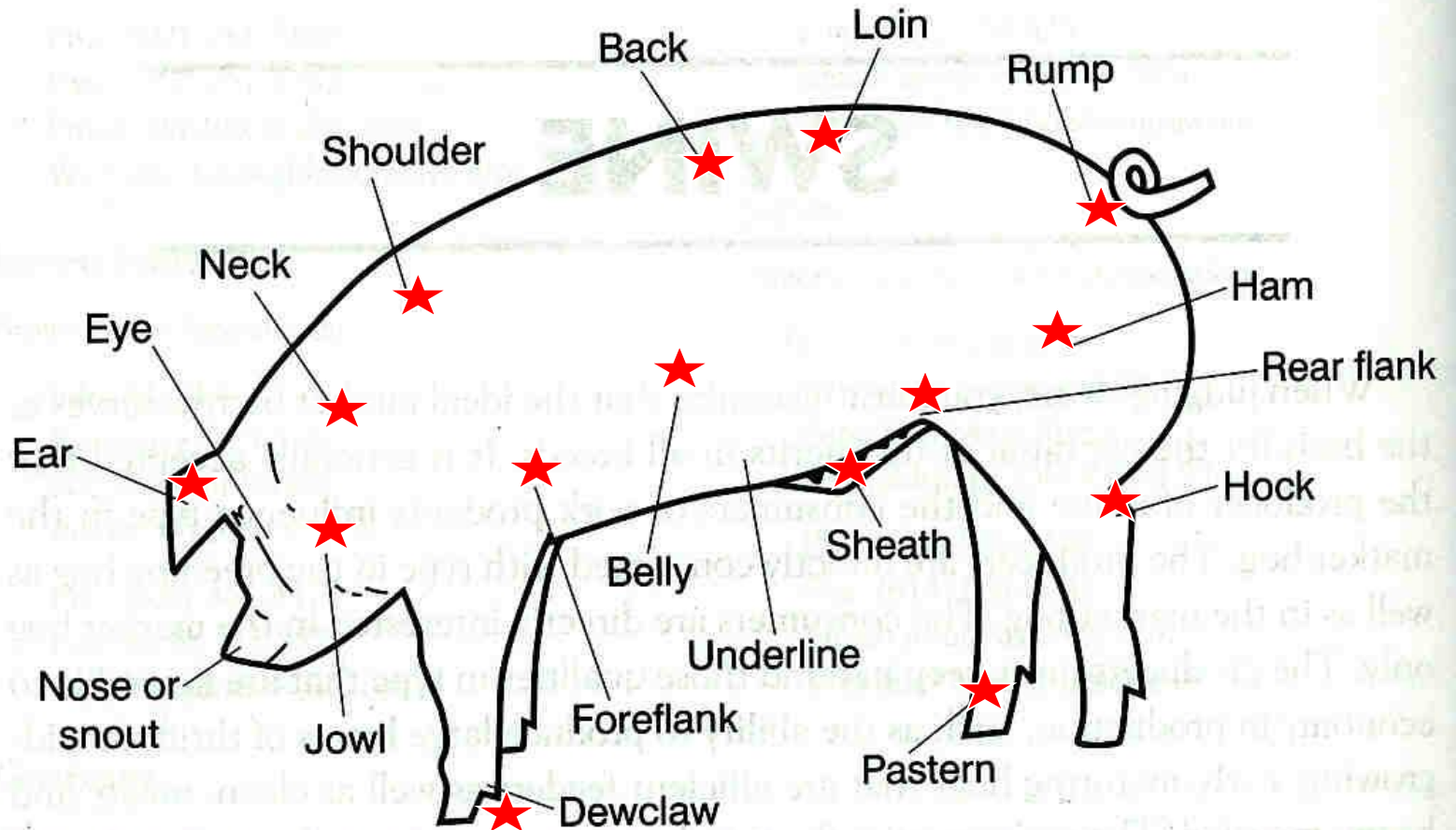


Fig. 4-1. Parts of the market hog. (Courtesy, Purdue University)

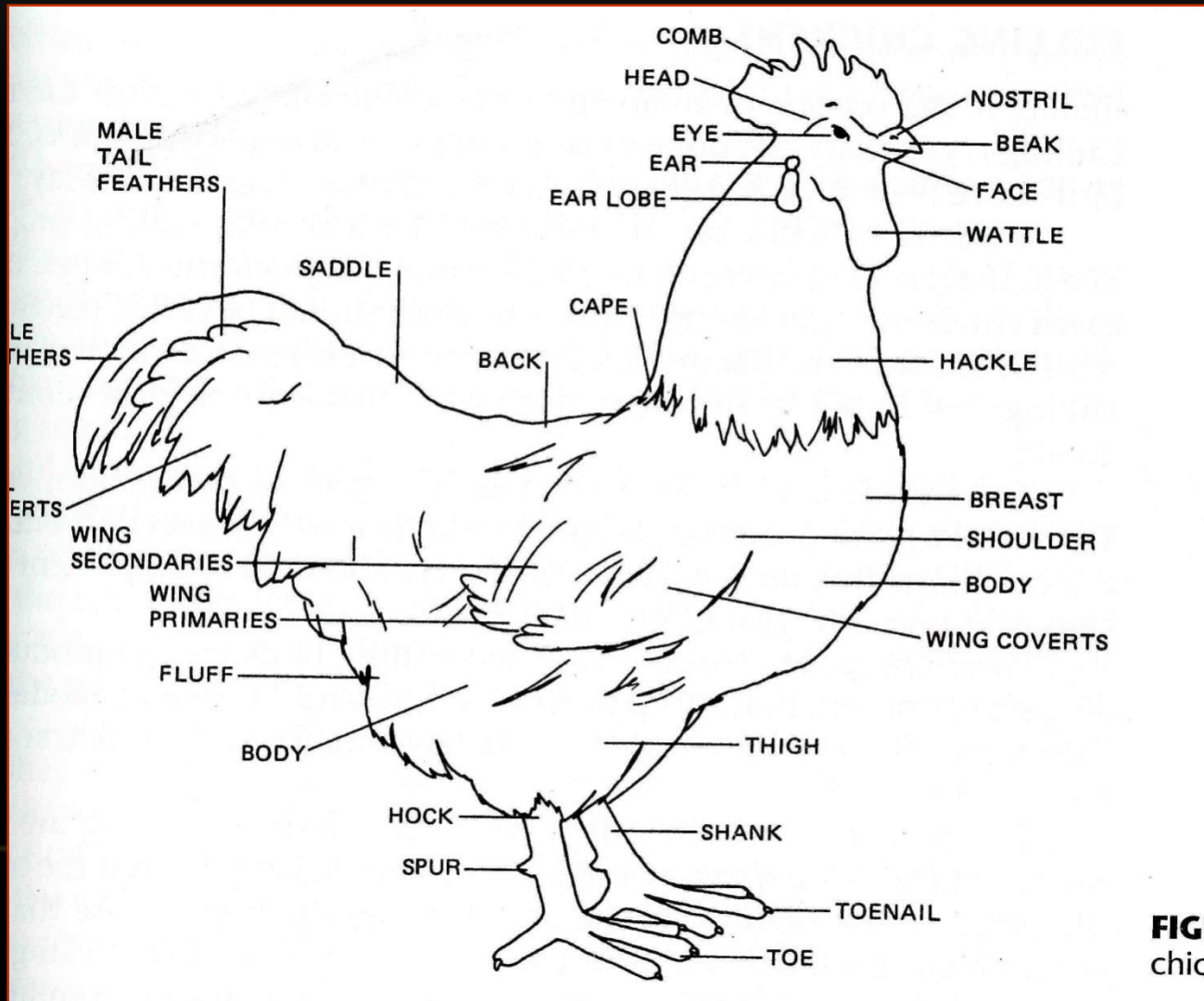
# POULTRY PARTS

Diagram a chicken in your notes labeling these parts: (use the diagram in your textbook for help)

- comb
  - wattles
  - beak
  - eye ring
  - ear lobe
  - vent
  - hock
- toes
  - breast
  - back
  - abdomen
  - body
  - shank



# POULTRY PARTS



# BROILER BREED CONFORMATION SELECTION

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# BROILER BREEDERS

- Live birds are evaluated by assessing deformities, body confirmation and breast meat quantity. These birds are classified as either keep or cull animals to improve the overall flock traits that are passed on to their offspring.
  - Producers should have the bird stand and move to accurately assess traits and characteristics the bird carries.
-

# BODY CONFORMATION

- Refers to the bird's structure and includes factors such as: width across the shoulder, length of the back, depth of body, spring of rib and width of keel.

# BREAST MEAT QUANTITY

- Closely related to body conformation.
- Refers to amount of meat the bird carries. Producers measure the length, width, depth and how the muscle is carried on the bird.
  - When evaluating birds, raise the bird and ask the animal to walk in order to evaluate legs, feet and toes.

# LIVE BIRD DEFORMITIES

- Traits that will cause the bird to be culled from the flock to prevent undesirable traits being passed down.
    - Crooked Toes
    - Leg and Foot Abnormalities
    - Crossed Beak
    - Severely Crooked Back
-

# CROOKED TOE



# LEG/FOOT ABNORMALITY





# CROSSED BEAK



# CROOKED BACK



# UNDERSTANDING QUALITY FEATURES OF BEEF, PORK, AND POULTRY

Objective: 4.02



# QUALITY STANDARDS

- The United States Department of Agriculture sets forth quality features for beef, pork and poultry.
  - The quality features are classified into grades as determined by the USDA.
  - Grades indicate quality NOT sanitation.
-

# BEEF QUALITY GRADES

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# BEEF CATTLE CLASSES

- Age classes
    - Calves
      - less than one year of age
    - Cattle
      - One year or older
    - Veal calves
      - Less than three months old
-

# BEEF CATTLE CLASSES

- Age classes continued
    - Slaughter calves
      - 3 months to one year old
    - Feeder calves
      - 6 months to one year old
-

# BEEF CATTLE CLASSES

- Sex Classes
    - Steer
      - Male castrated before sexual maturity
    - Heifer
      - Has not had a calf or matured
    - Cow
    - Bull
    - Stag
      - Male castrated after sexual maturity
-



# FEEDER CATTLE GRADES

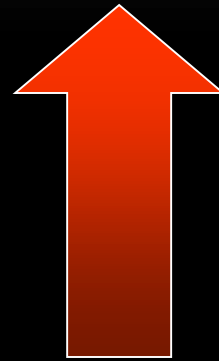
- Feeder Cattle Grades
    - Determined by:
      - Frame size
      - Muscle thickness
      - Thriftiness
  - Slaughter Cattle Grades
    - Both quality and yield grades
-

# USDA FEEDER STEER & HEIFER GRADES

- USDA No. 1.
- USDA No. 2.
- USDA No. 3.
  - Each USDA grade also has a large, medium and small frame category.

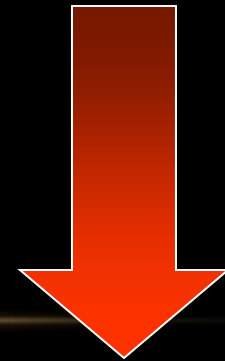
# SLAUGHTER CATTLE GRADES

- Quality Grades
  - Prime
  - Choice
  - Select
  - Standard
  - Commercial
  - Utility
  - Cutter
  - Canner



**High Quality**

**Low Quality**



# BEEF CATTLE GRADES

- Yield Grades
    - Yield Grade 1
    - Yield Grade 2
    - Yield Grade 3
    - Yield Grade 4
    - Yield Grade 5
-

# FEEDER STEER & HEIFER GRADES

- Animals are divided into three groups- calves, yearlings and older feeders based on their age and weight.
  - Feeder animals weigh between 350 to 1,000lbs.
  - Feeder cattle grades are the basis for reporting market prices for cattle.
-

# FACTORS USED TO DETERMINE GRADE

- Thriftiness- the apparent health of the animal and its potential to fatten and grow normally.
  - Frame Size- the size of the animal's skeleton (height & body length).
    1. Large- tall and long bodied for their age.
    2. Medium- slightly large in size for their age.
    3. Small- shorter bodied and not as tall as medium frame cattle.
-

# FACTORS USED TO DETERMINE GRADE

- Thickness- development of muscle in relation the size of the skeleton.
    - **US No. 1-** slightly thick throughout, moderate width between legs.
    - **US No. 2-** narrow throughout, legs set close together, back and loin have sunken appearance.
    - **US No. 3-** less thickness and width between legs than No. 2.
-

# FEEDER CATTLE GRADE EXAMPLES

- **Large Frame No. 1-** animal that is taller in size compared to others and displays thick muscling throughout body.
- **Medium Frame No. 2-** same frame size as No. 2, but less muscling as compared to No. 1. Loin and back have a sunken appearance.



# FEEDER CATTLE GRADE EXAMPLES

- **Small Frame No. 3-** same frame size as No. 2, but less thickness and width than No. 2
  - **Inferior-** feeder cattle that are unthrifty and not expected to grow or fatten normally. Usually indicative of disease, parasites, etc
-

# QUALITY GRADES

## 1. Quality Grades

- Determined by the class or kind of animal (steer, heifer, cow, bull), age or maturity, firmness and marbling of the carcass.



# QUALITY GRADES

- Prime
  - Choice
  - Select
  - Standard and Commercial
  - Utility, Cutter, and Canner
-

# QUALITY GRADES

- Prime grade
  - Produced from young, well-fed beef cattle. It has abundant marbling and is generally sold in restaurants and hotels
- Choice grade
  - High quality, but has less marbling than Prime



# QUALITY GRADES

- Select grade
  - Very uniform in quality and normally leaner than the higher grades
  - Fairly tender, but, because it has less marbling, it may lack some of the juiciness and flavor of the higher grades



# QUALITY GRADES

- Standard and Commercial grades
    - Frequently are sold as non-graded or as "store brand" meat
  - Utility, Cutter, and Canner grades
    - Are seldom, if ever, sold at retail but are used instead to make ground beef and processed products
-

# QUALITY GRADES

- There is no Prime grade for slaughter cows
  - Prime grades have maximum marbling
  - Low choice or higher grades are the most desirable
  - About 80% of grain fed beef is graded as choice
-

# MATURITY

- A - 9 to 30 Months
  - B - 30 to 42 Months
  - C - 42 to 72 Months
  - D - 72 to 96 Months
  - E - More Than 96 Months
-



# RELATIONSHIP BETWEEN MARBLING, MATURITY, AND CARCASS QUALITY GRADE<sup>1</sup>

Degrees of Marbling	Maturity				
	A	B	C	D	E
Slightly Abundant	<b>PRIME</b>				
Moderate			<b>COMMERCIAL</b>		
Modest	<b>CHOICE</b>				
Small					
Slight	<b>SELECT</b>		<b>UTILITY</b>		
Traces					
Practically Devoid	<b>STANDARD</b>			<b>CUTTER</b>	

# WHAT DO YOU THINK?

Which cow do you think is the best?



**A**



**B**

# WHAT DO YOU THINK?

Which pig do you think is the best?



**A**



**B**

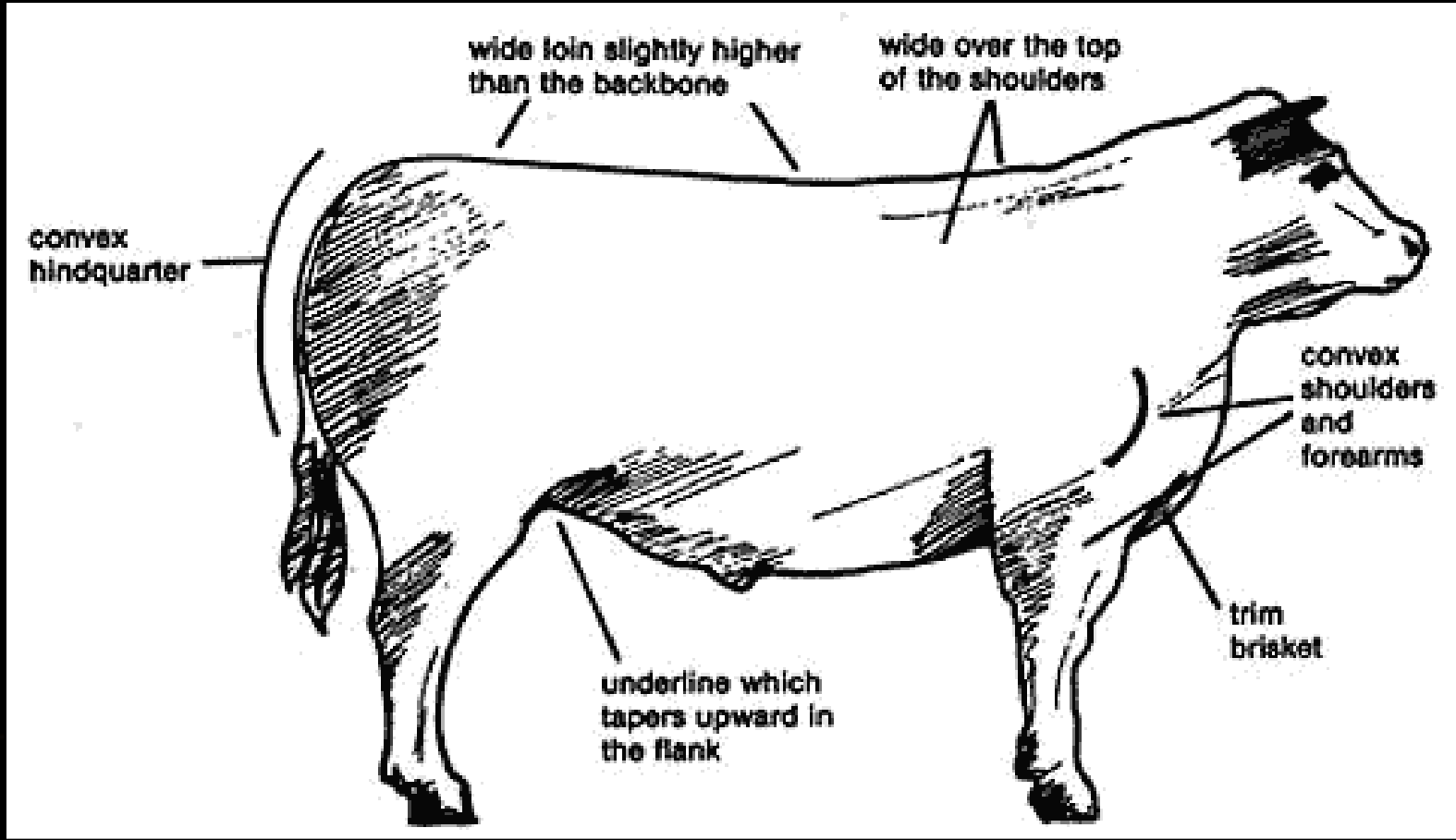
# WHAT IS CUTABILITY?

- The term 'cutability' describes the proportion of an animal which is saleable meat.
    - Dressing percentage
      - Percentage of the live animal which forms its carcass
    - Saleable meat yield or retail yield
      - Percentage of the carcass which is saleable meat.
-

# WHAT IS CUTABILITY?

- No two animals are the same
  - Cutability varies widely between individual animals
  - This variation affects financial returns to producers, wholesalers and retailers.
-

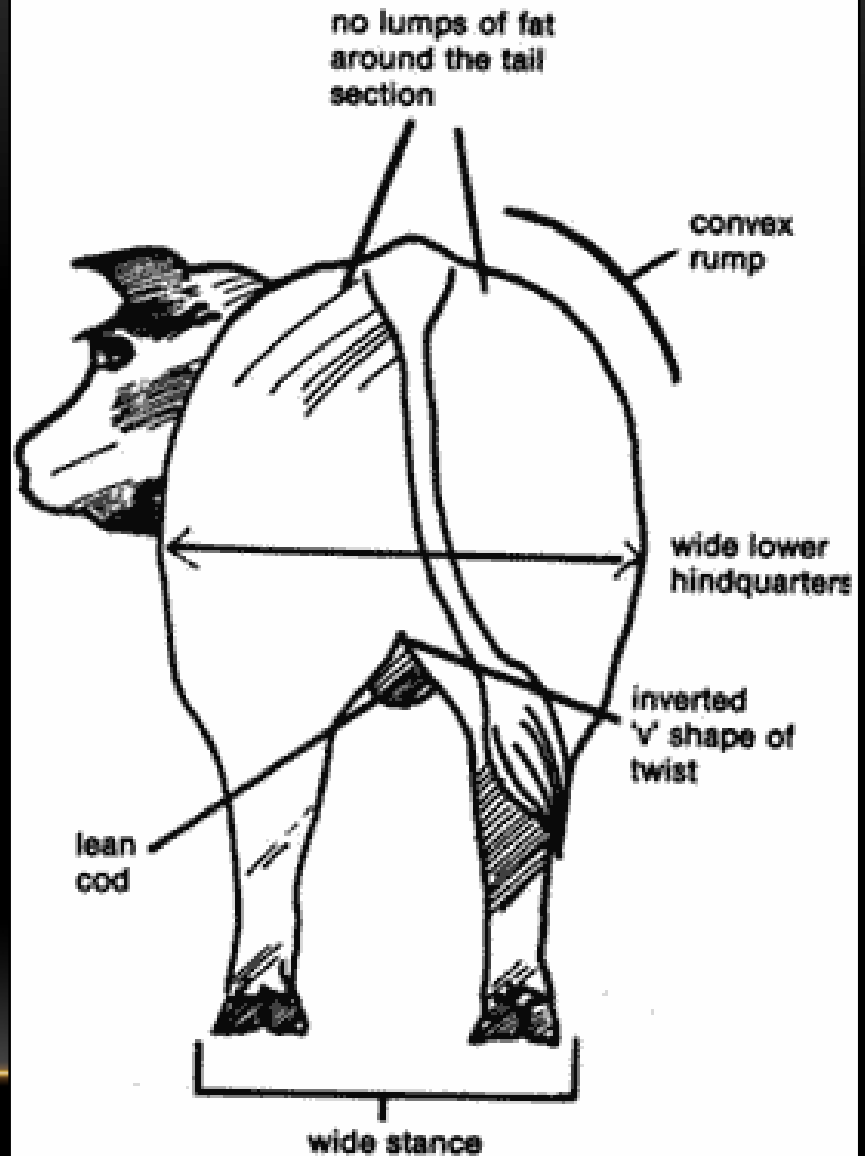
# HIGH CUTABILITY



# HIGH CUTABILITY

- Wide stance
- Convex shoulders and hindquarters
- Trim brisket
- Wide over the shoulders
- Convex rump

Diagram 2



# LOW CUTABILITY

- Animals with low cutability do not look muscular, indicating a low ratio of muscle to bone.
    - a narrow stance, especially through the lower hindquarters;
    - a prominent gut that is the widest point of the animal when it is viewed from behind;
    - flat forearms and shoulders;
    - narrow, poorly developed loins sloping down from the backbone.
-



# LOW CUTABILITY

- Animals that are overfat and have an uneven distribution of fat have:
  - lumpy deposits of fat in the brisket flank and tailhead
  - a smooth appearance;
  - a level underline;
  - a deep body;
  - flatness over the top of the rump;
  - a smooth tail setting;
  - a soft, spongy feel



WHICH WILL YIELD MORE MEAT?



# YIELD GRADES (BEEF)

- Percentage of the carcass that is boneless, closely trimmed retail cuts from the round, loin rib, and chuck
  - Numbered 1 to 5
    - Yield 1
      - Best muscling with least amount of fat
    - Yield 5
      - Worst grade with the less muscle and more fat waste
-

# YIELD GRADES (BEEF)

The terms "yield" and "yield grade" should not be confused.

"Yield" alone means dressing percentage (carcass weight divided by live weight multiplied by 100), and is not directly related to yield grades or cutability.

# YIELD GRADES (BEEF)

## Relationship of Yield Grades and Cutability

Yield Grade- % Boneless, Closely Trimmed Retail Cuts  
From the Round, Loin, Rib and Chuck

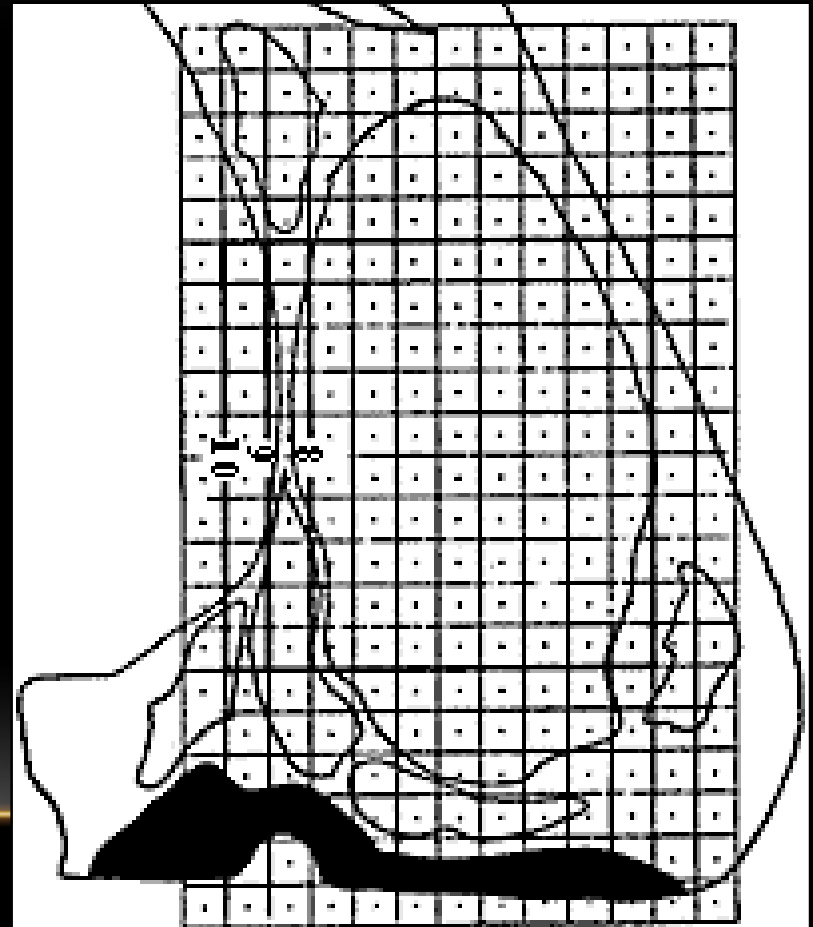
1	52.6 - 54.6
2	50.3 - 52.3
3	48.0 - 50.0
4	45.7 - 47.7
5	43.3 - 45.4

# YIELD GRADES (BEEF)

1. Adjusted fat thickness- External fat is measured at the 12th rib
  2. Percentage of Kidney, Pelvic and Heart Fat (KPH)- A subjective estimate of fat
  3. Rib Eye Area
  4. Hot Carcass Weight
-

# YIELD GRADES (BEEF)

USDA yield grades estimate the quantity of edible meat from the major wholesale cuts--round, loin, rib and chuck



# YIELD GRADES (BEEF)

YIELD GRADE 1 —



YIELD GRADE 2 —



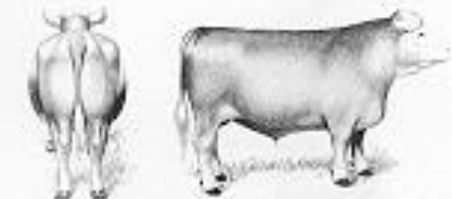
YIELD GRADE 3 —



YIELD GRADE 4 —



YIELD GRADE 5 —





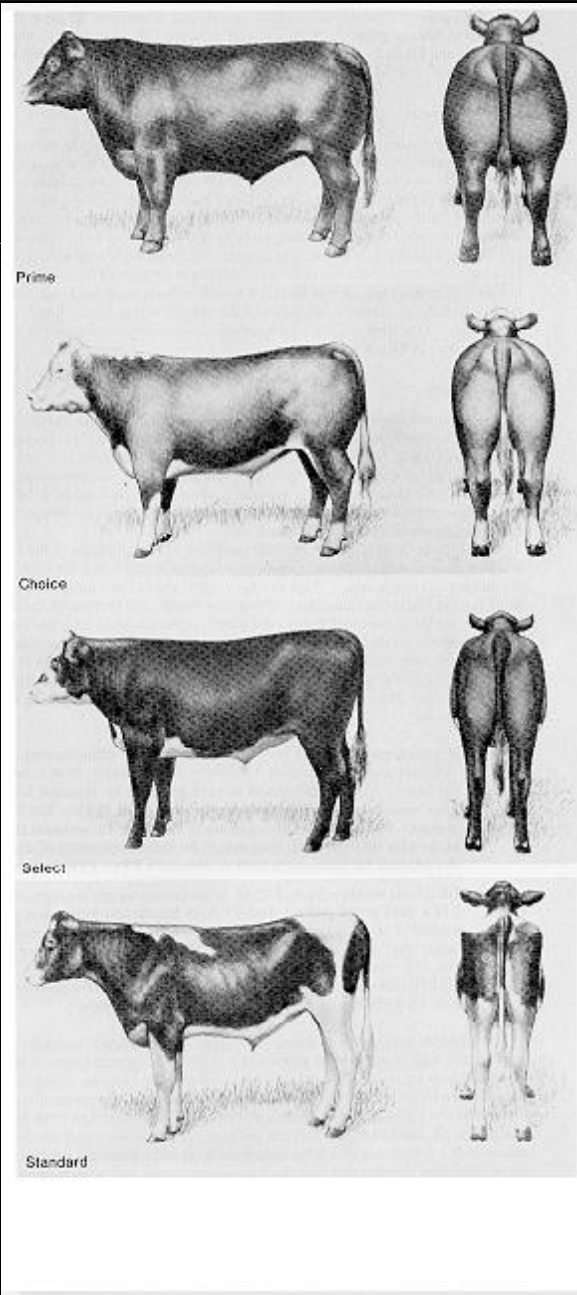
# EXAMPLES OF QUALITY GRADE (BEEF)

**Prime**

**Choice**

**Select**

**Standard**



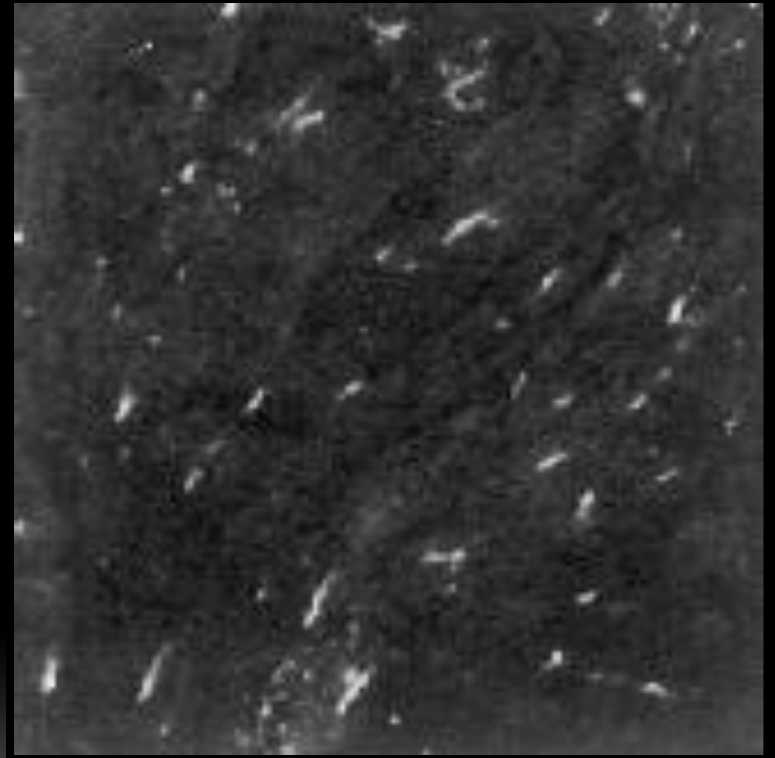
# MARBLING

- Intermingling of fat with muscle fibers
  - Observed in the ribeye muscle between the 12<sup>th</sup> and 13<sup>th</sup> rib
  - Adequate marbling must be present for tenderness and high quality grades
  - The fat should not be soft and oily
-

# MARBLING (BEEF)



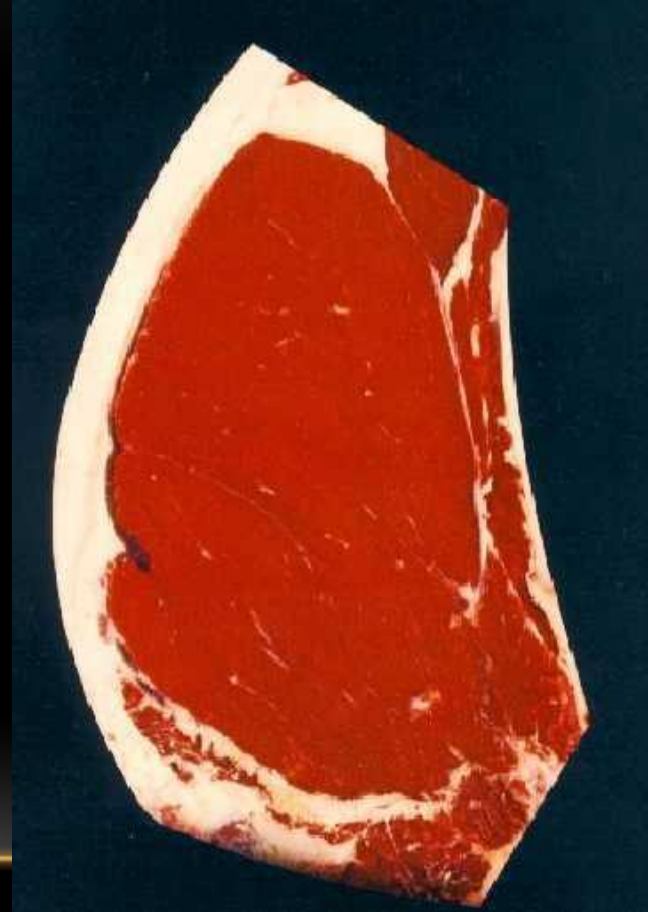
**Very Abundant**



**Slight**

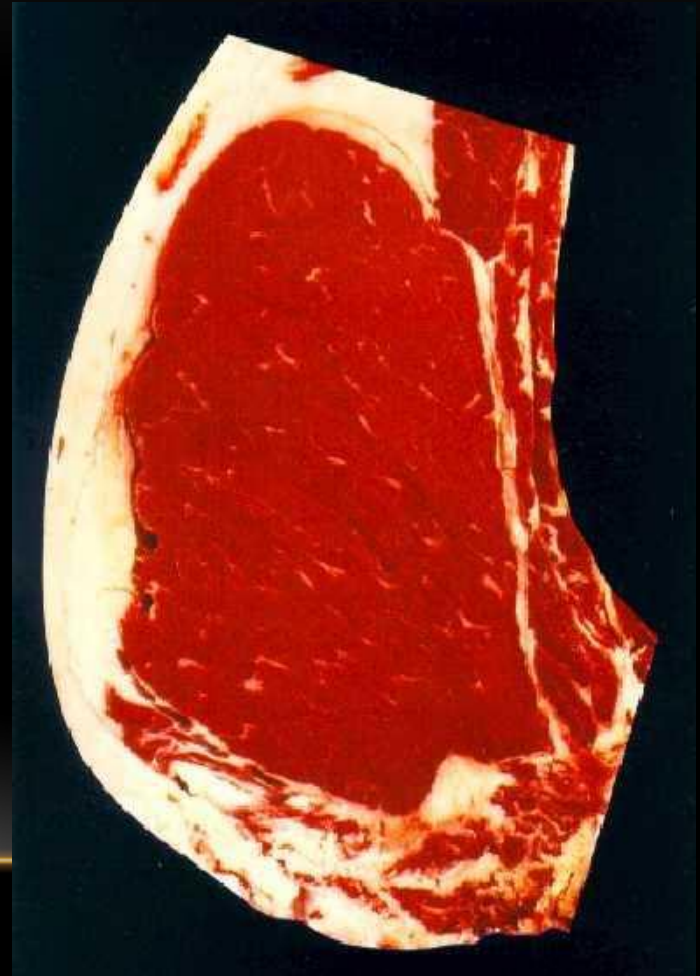
# MARBLING (BEEF)

Slight  
Marbling



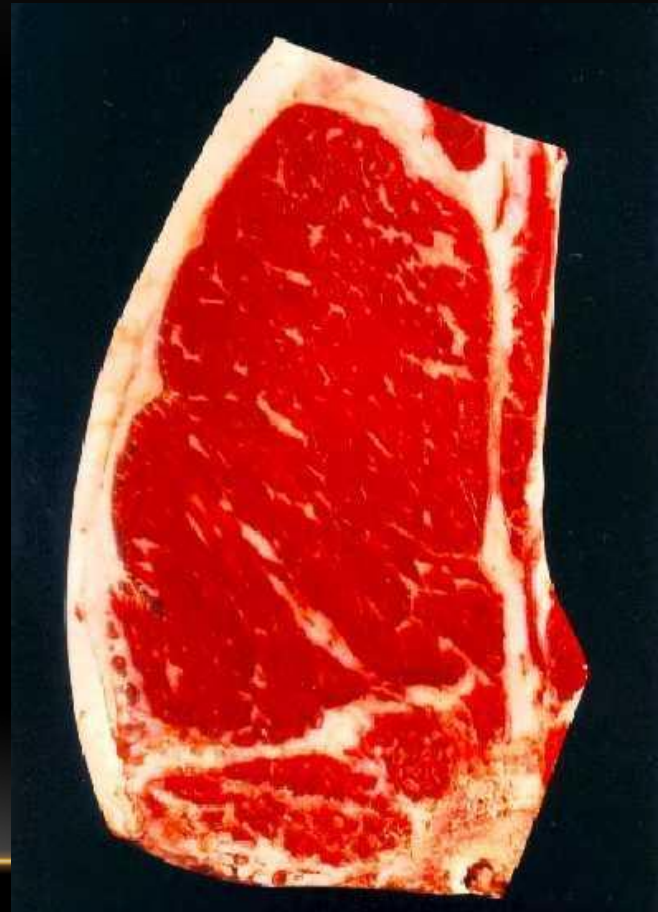
# MARBLING (BEEF)

Small  
Marbling



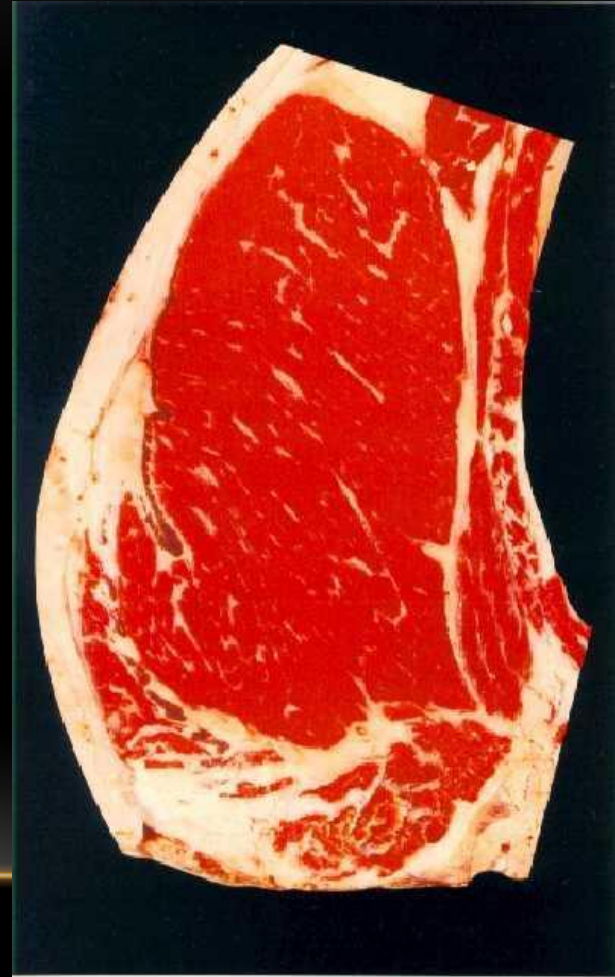
# MARBLING (BEEF)

Modest  
Marbling



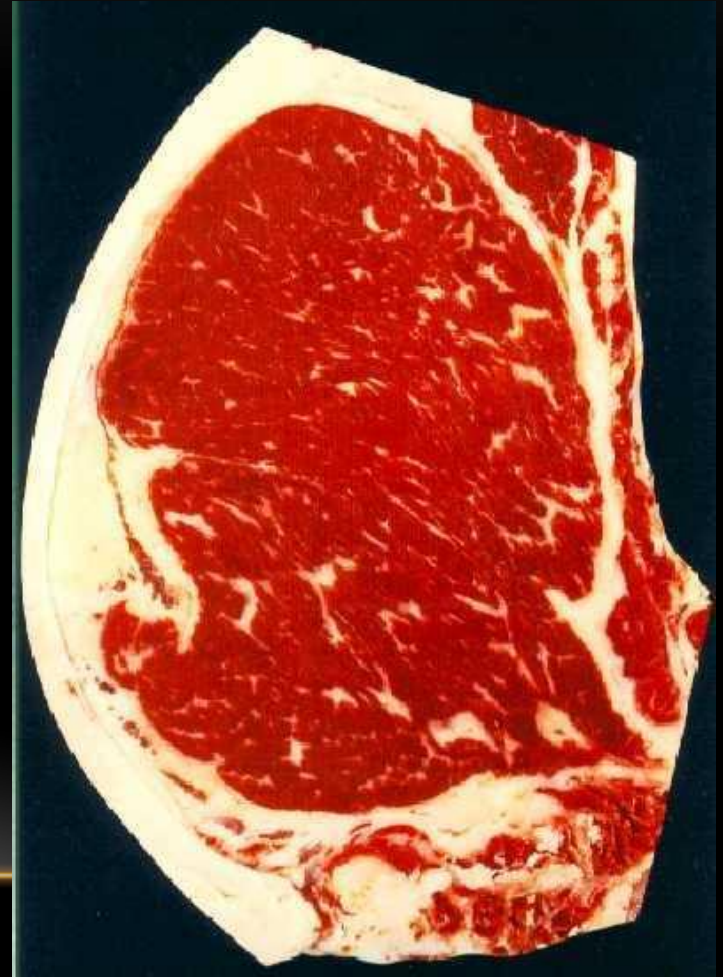
# MARBLING (BEEF)

Moderate  
Marbling



# MARBLING (BEEF)

Slightly  
Abundant  
Marbling





# SWINE QUALITY GRADES

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# SWINE CLASSES

- Use Classes
    - Slaughter
      - To be killed and sold as meat
    - Feeder
      - To be feed to heavier weights before slaughter
-

# SWINE CLASSES

- Sex Classes
    - Barrow
      - Male castrated before sexual maturity
    - Gilt
      - Young female that has not had pigs
    - Sow
    - Boar
    - Stag
-

# FEEDER PIG GRADES (SAMPLE)

- USDA No. 1 Feeder Pig – Large frame, thick muscle, legs set wide apart and ham is wider than loin.
  - USDA No. 3 Feeder Pig – Slightly smaller than frame with thick muscling. Ham and Loin are about the same width. Back is flat.
  - USDA Utility Feeder Pig – Unthrifty, diseased, poor care, skin wrinkles, head appears larger than body.
-

# GRADING MEAT

## Swine

- 1. Quality grade is determined by quality of lean meat and yield.
  - 2. Quality of lean is determined by firmness of lean, firmness of fat, and distribution of external finish (fat).
  - 3. Yield is evaluated by thickness of backfat and degree of muscling.
  - 4. Thick muscling helps offset backfat thickness
-

# GRADING MEAT

## Swine (continued)

- 5. US No. 1 Hog must have at least average muscling
  - 6. US No. 1 Should yield 60.4% or higher
  - 7. Grade is determined by the percent of carcass weight made up of ham, loin, boston butt, and picnic shoulder
  - 8. Backfat and degree of muscling are used to evaluate live hogs for yield.
-

# SLAUGHTER BARROWS AND GUILTS

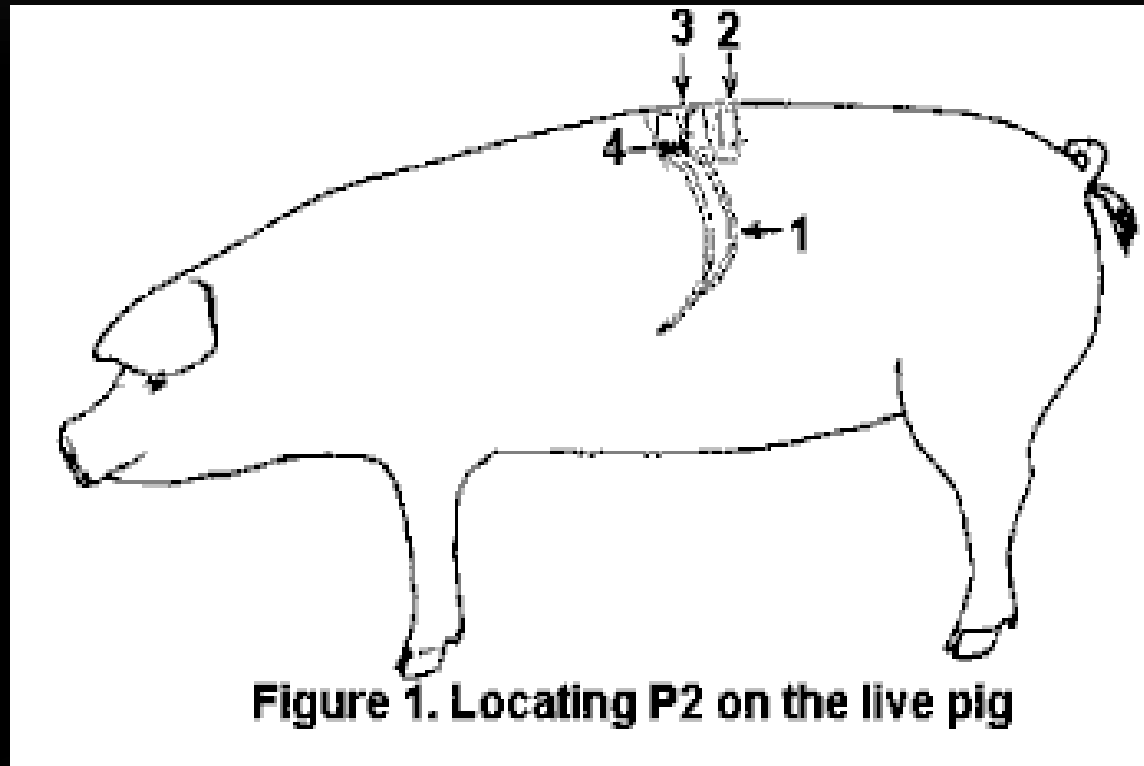
- USDA grades:
    - U.S. No. 1
    - U.S. No. 2
    - U.S. No. 3
    - U.S. No. 4
    - U.S. Utility
-

# CALCULATING GRADES

- The estimated backfat thickness over the last rib and the muscling score are used to determine the USDA slaughter barrow and gilt grade.
  - Degrees of Muscling are Thick, Average, Thin
    - Thick Muscle Score = 3.0
    - Average Muscle Score = 2.0
    - Thin Muscle Score = 1.0



# BACKFAT



# CALCULATING GRADES

- The formula used to calculate slaughter barrow and gilt grades is:
  - $\text{Grade} = (4.0 \times \text{backfat}) - (1.0 \times \text{muscling score})$

# POULTRY CARCASS EVALUATION

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# WHY GRADE POULTRY CARCASSES?

- To insure quality before it is sold
- Prevent the selling of an unwholesome product

Did you know?

- Grading is voluntary and paid for by the meat packer?



# GRADING POULTRY CARCASSES

- USDA Grades indicate quality not sanitation
  - Ready-to-cook means that certain parts have been removed
    - head
    - feet and feathers
    - blood
    - viscera (soft internal organs)
-

# WHAT ARE THE GRADES?

- Poultry Carcass Grades:
    - Grade A
      - Sold in stores
    - Grade B
      - Often not a grade sold in stores
    - Grade C
      - Usually used for processing into other food products
-

# EVALUATION FACTORS

Poultry carcasses are graded on the following factors:

- confirmation
  - fleshing
  - fat covering
  - **exposed flesh**
  - discoloration
  - **disjointed and broken bones**
  - **missing parts**
  - freezing defects
-

# OTHER EVALUATION FACTORS

- Confirmations
    - normal breastbone, back, leg and wings
  - Fleshing
    - well fleshed or muscled is ideal
  - Fat covering
    - well covered is ideal
-



# EVALUATION FACTORS

- Exposed Flesh  
(2 pound to 6 pound birds)
    - Grade A
      - Breast and leg can not have over 1/4 inch
      - Other parts can have a maximum of 1 and 1/2 inches
-

# EVALUATION FACTORS

- Exposed Flesh (continued)
    - Grade B
      - No more than 1/3 of the total flesh of each particular part can be exposed
      - Meat yield cannot be affected (i.e. no cuts into the meat)
    - Grade C
      - No limit
-

# EVALUATION FACTORS

- Disjointed and broken bones  
(2 pound to 6 pound birds)
    - Grade A
      - 1 disjointed and no broken
    - Grade B
      - 2 disjointed and no broken or 1 disjointed and 1 broken non-protruding
-

# EVALUATION FACTORS

- Disjointed and broken bones  
(continued)
  - Grade C
    - No limit
    - Protruding bones automatic Grade C

# EVALUATION FACTORS

- Missing Parts  
(2 pound to 6 pound birds)
  - Grade A
    - Wing tips and tail (removal of the preen gland)
  - Grade B
    - Wing tips to the 2nd wing joint
    - Back area not wider than base of tail and extending half way between the base of tail and hip joints

# EVALUATION FACTORS

- Missing Parts

(continued)

- Grade C

- Wing tips, wings and tail

- Back area not wider than the base of tail extending to area between the hip joints

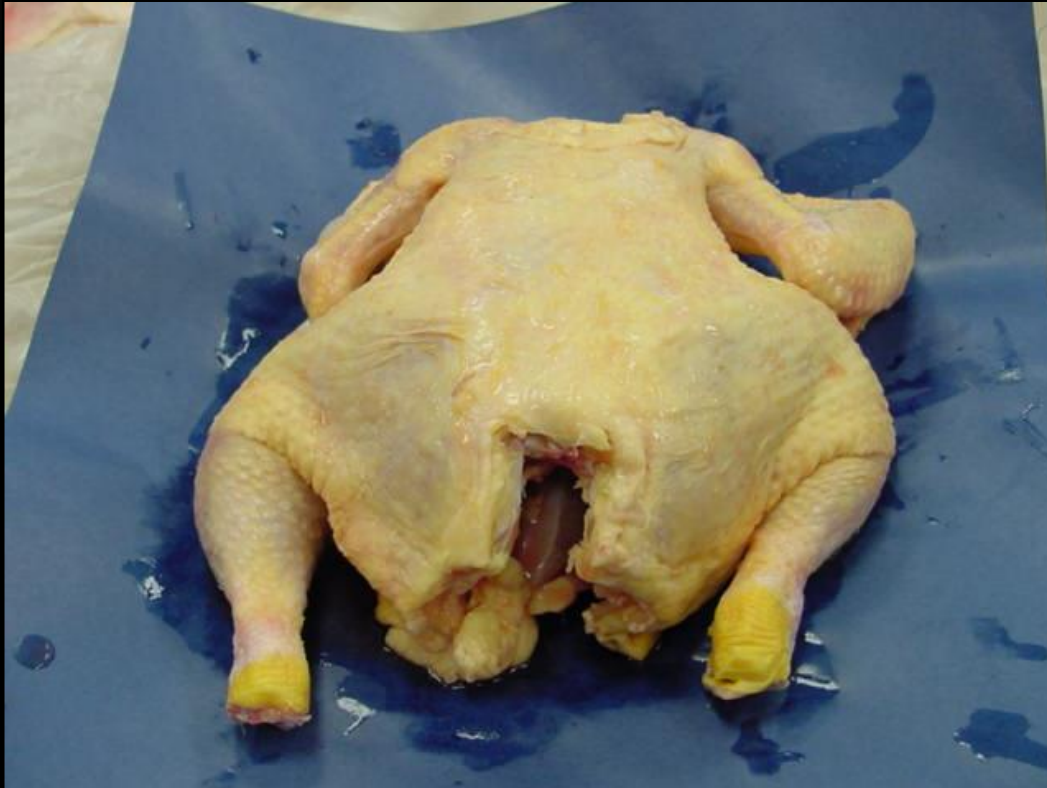
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WHAT GRADE IS THIS?



Grade A  
No  
Defects

# WHAT GRADE IS THIS?



**B Grade**

Back is cut  
out halfway  
between the  
base of the  
tail and the  
hip joints



# WHAT GRADE IS THIS?



C Grade.

More than  
1/3 of flesh  
exposed on  
breast

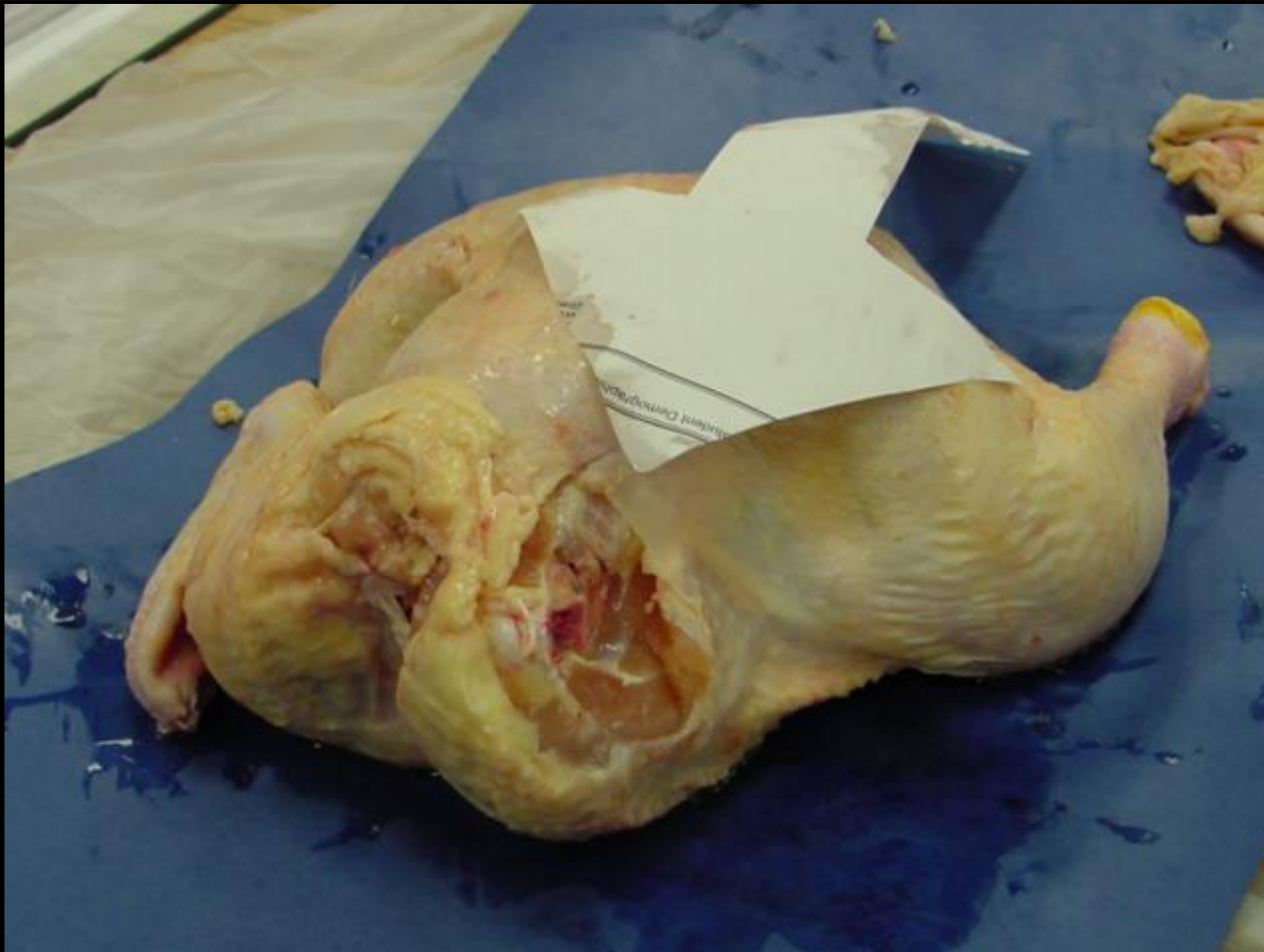
# WHAT GRADE IS THIS?



**B Grade.**

**Parts of  
wing  
removed  
beyond the  
second  
joint**

# WHAT GRADE IS THIS?



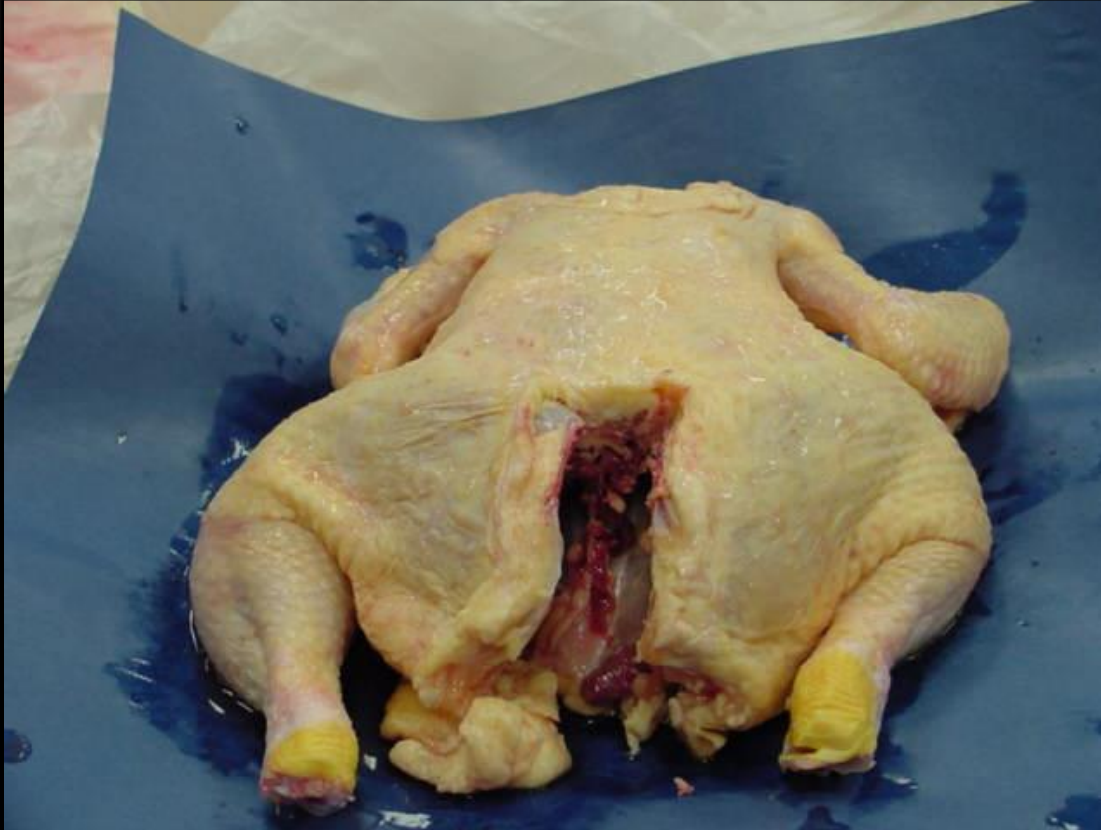
C  
Grade.  
Entire  
wing  
remove  
d

# WHAT GRADE IS THIS?



C Grade.  
Over 1/3  
of the  
drumstick  
flesh is  
exposed

# WHAT GRADE IS THIS?



C Grade

Trimmed  
more than  
halfway  
between  
base of  
tail and  
hip joints

# WHAT GRADE IS THIS?



C grade  
Protruding broken  
bone in  
wing tip