Cattle & Carcass TRAINING

Fall 2020 Webinar – Part IV
December 15, 2020

USDA United States Department of Agriculture

Cattle & Carcass TRAINING

USDA Carcass Yield and Quality Standards

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USDA United States Department of Agriculture

“Third-Party System”

Provides confidence to buyers and sellers that an unbiased determination of the quality of the product has been made on which they can rely.

What is the purpose behind the shield?

- Identify differences in value and utility
- Common language between buyers and sellers
- Transmit signals of value to industry and throughout entire marketing chain
- Assist in promotion and marketing

Grade Standards Are Applied

- Nationwide
- Uniformly
- Consistently
- Accurately
- Quickly

USDA Inspection vs. Grading

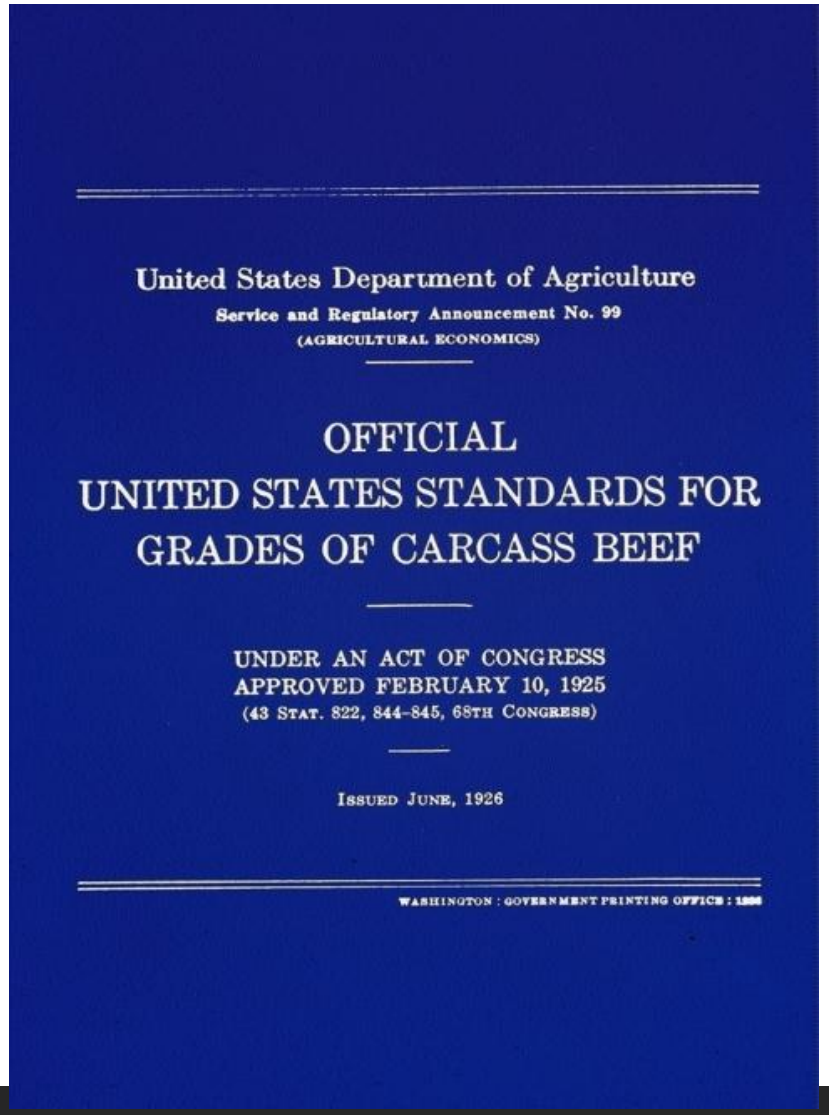
- **Meat Inspection (FSIS)**

- **Required Service**
  - In order to sell meat commercially, it must be federally inspected.
- **Funded via tax dollars**
  - depending on if Required or Voluntary service. *Species based

- **Grading (AMS)**

- **Voluntary service**
  - We allow companies to sell meat as USDA Choice, USDA Select.
  - **User – Fees Paid by Applicants**
  - USDA sends a bill to the packer requesting the service. The packer pays the USDA and that is how AMS is paid.

Development of the Standards


United States Department of Agriculture

Service and Regulatory Announcement No. 99

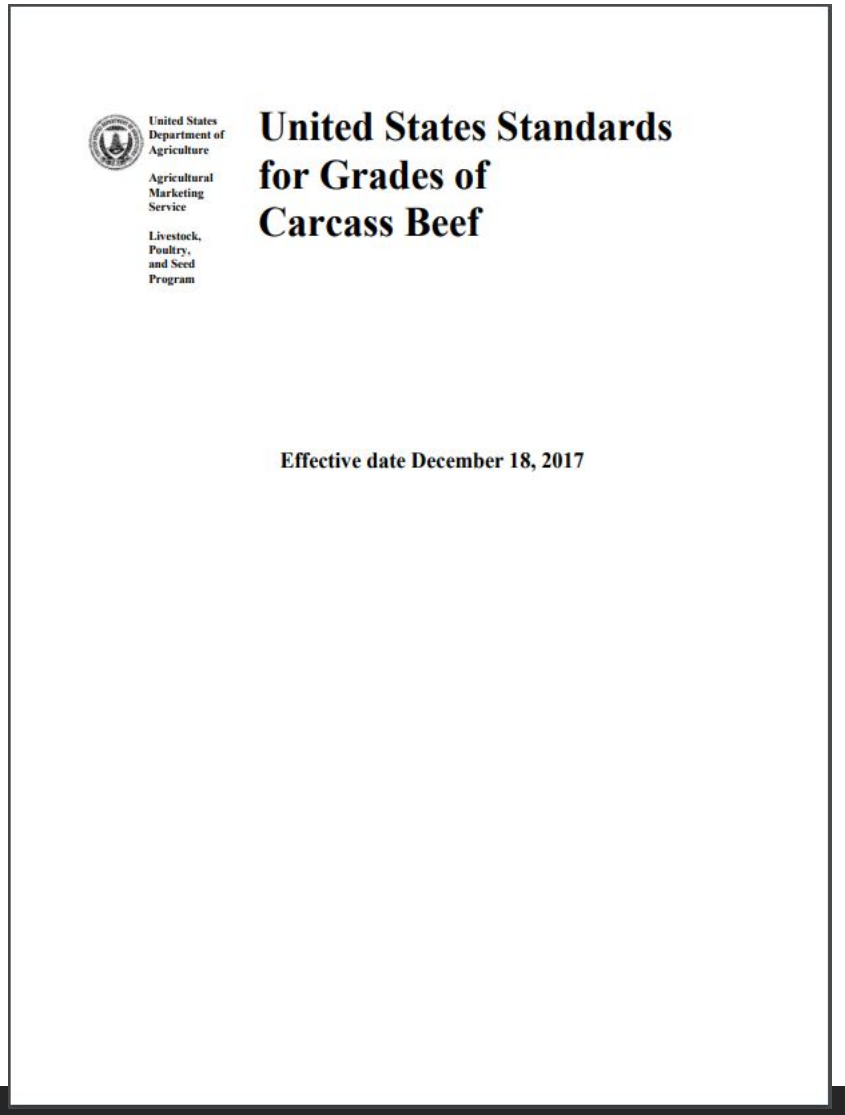
(AGRICULTURAL ECONOMICS)

OFFICIAL
UNITED STATES STANDARDS FOR
GRADES OF CARCASS BEEF

UNDER AN ACT OF CONGRESS
APPROVED FEBRUARY 10, 1925
(43 STAT. 822, 844-845, 68TH CONGRESS)

ISSUED JUNE, 1926

WASHINGTON : GOVERNMENT PRINTING OFFICE : 1926


United States Department of Agriculture

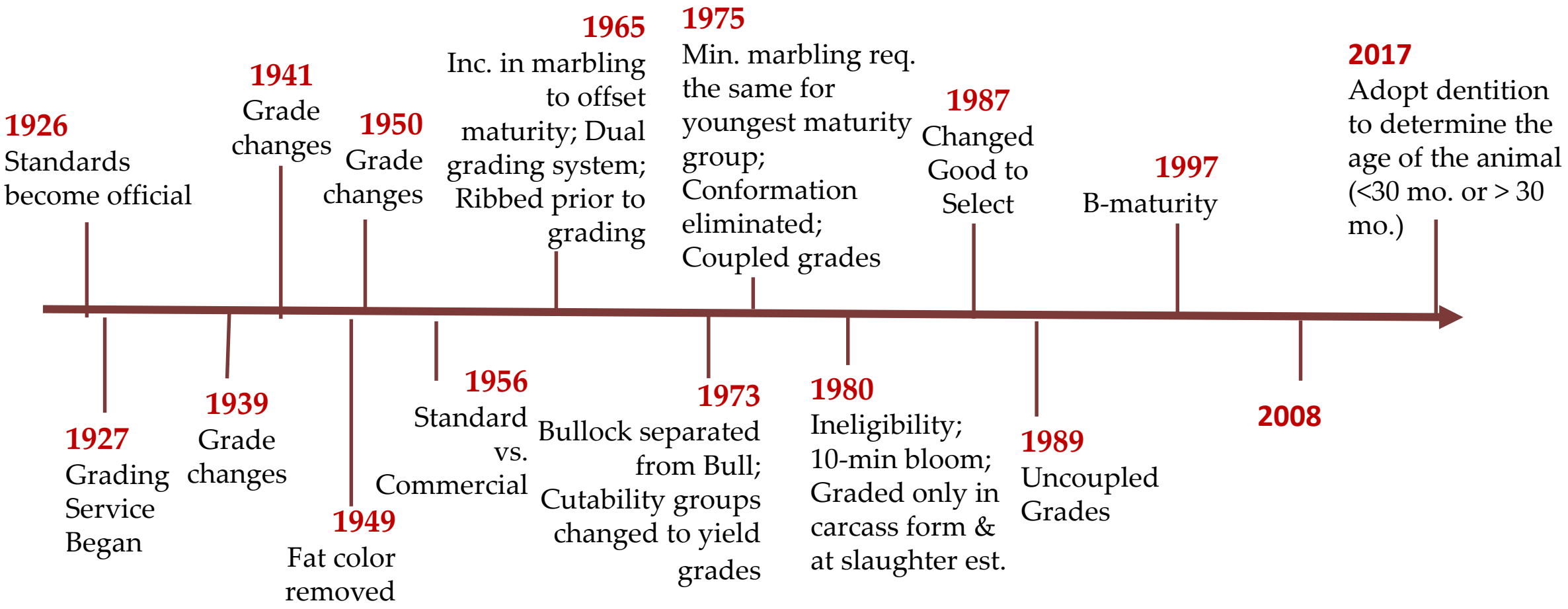
Agricultural Marketing Service

Livestock, Poultry, and Seed Program

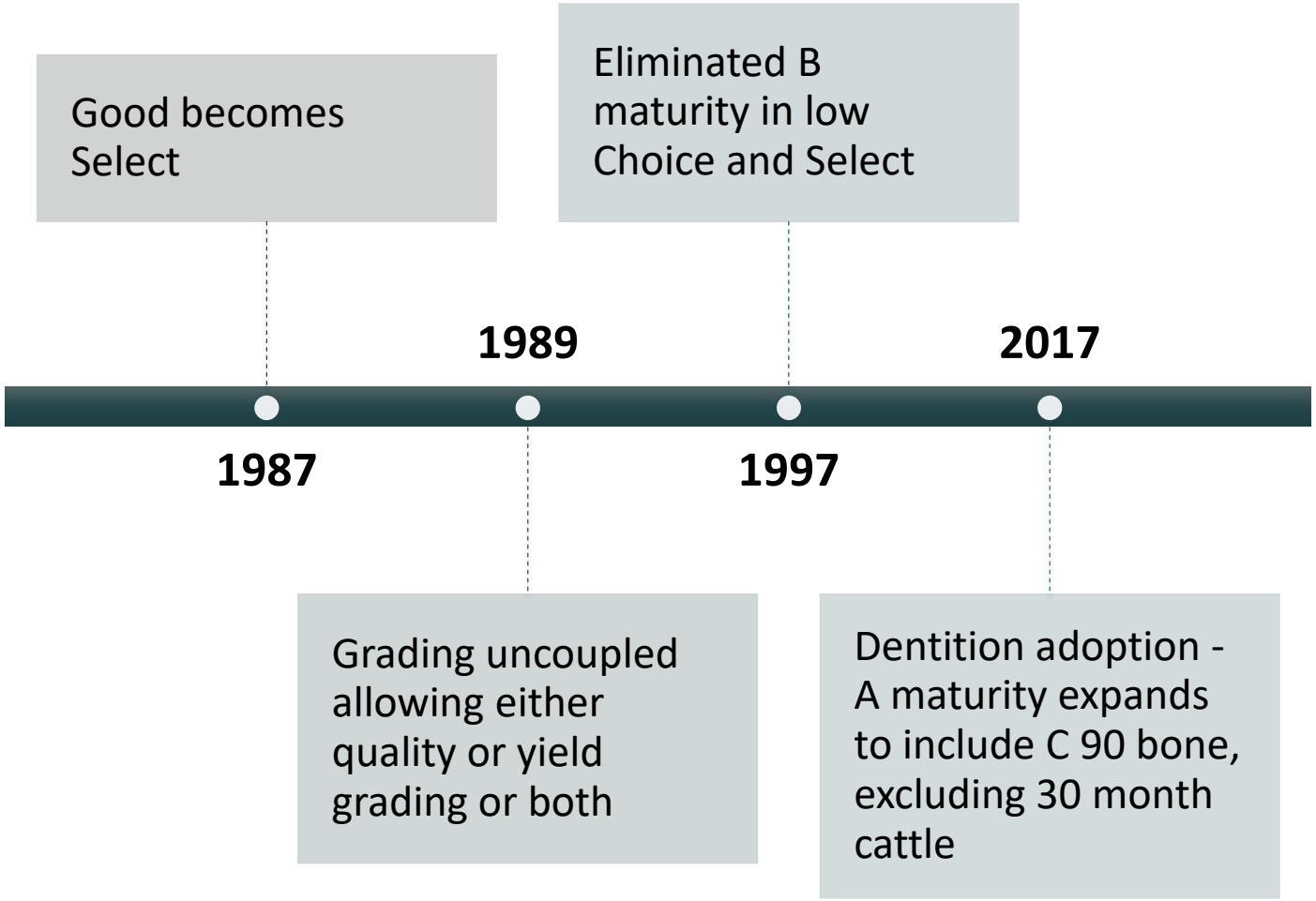
United States Standards for Grades of Carcass Beef

Effective date December 18, 2017

Historical Timeline



Major Changes

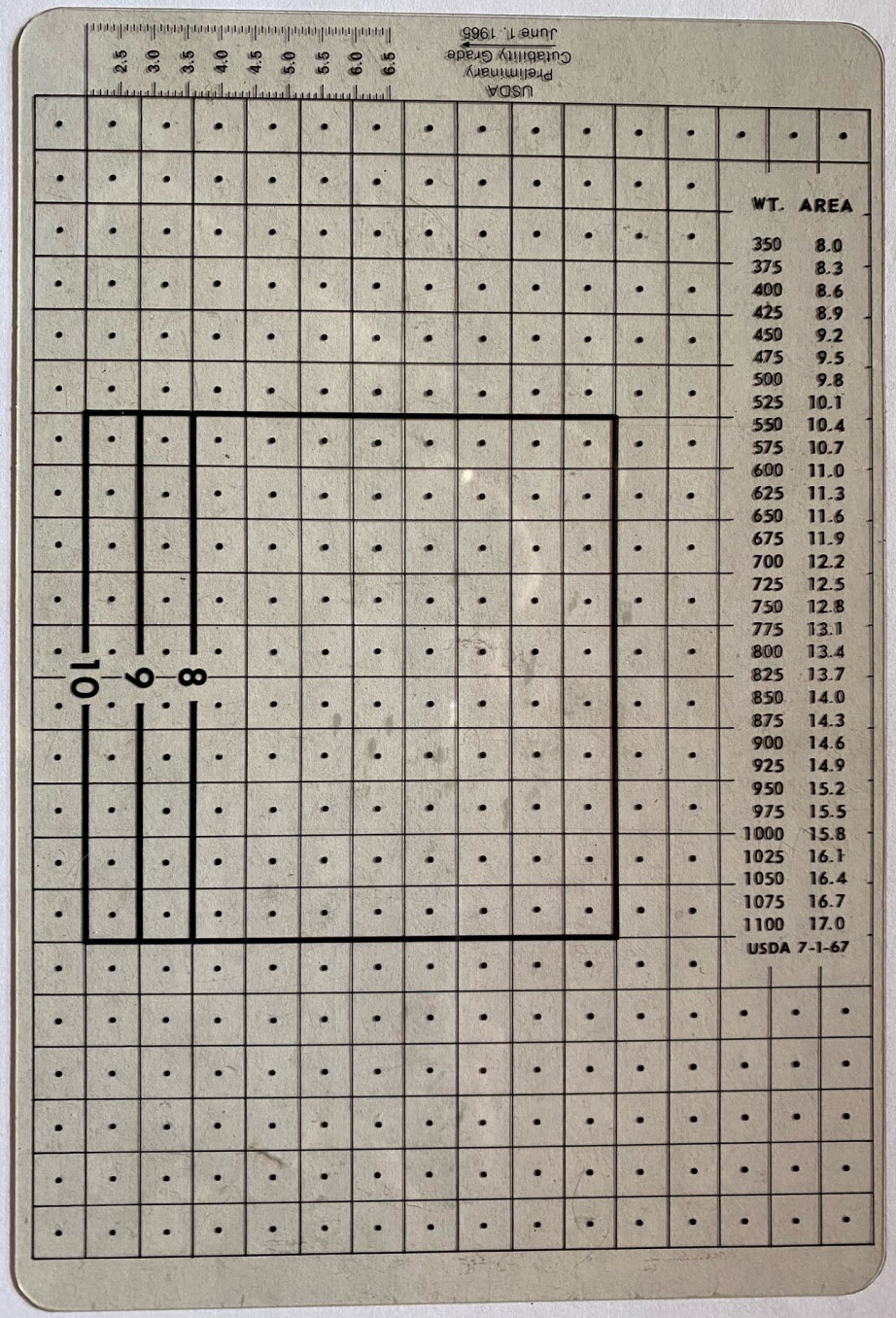


Reasons for Changes

- Scientific Evidence
- Changing Trade Practices
- New technology
- Changing Market Conditions

Official Grade Application

- USDA graders use aids in the correct interpretation & application of the standards
    - Marbling photographs



Official Grade Application- Ribeye Grids

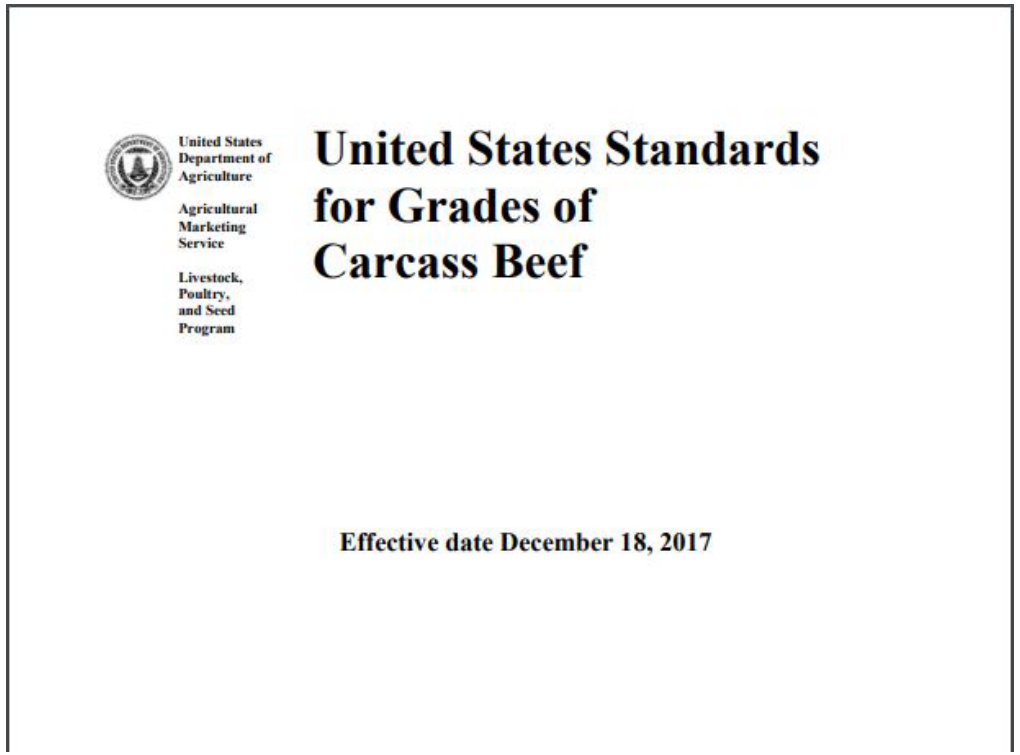
USDA graders use aids in the correct interpretation & application of the standards

Official Grade Application- PYG Rulers

USDA graders use aids in the correct interpretation & application of the standards

Official Grade Application- The Standards

USDA graders use aids in the correct interpretation & application of the standards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Agricultural Marketing Service

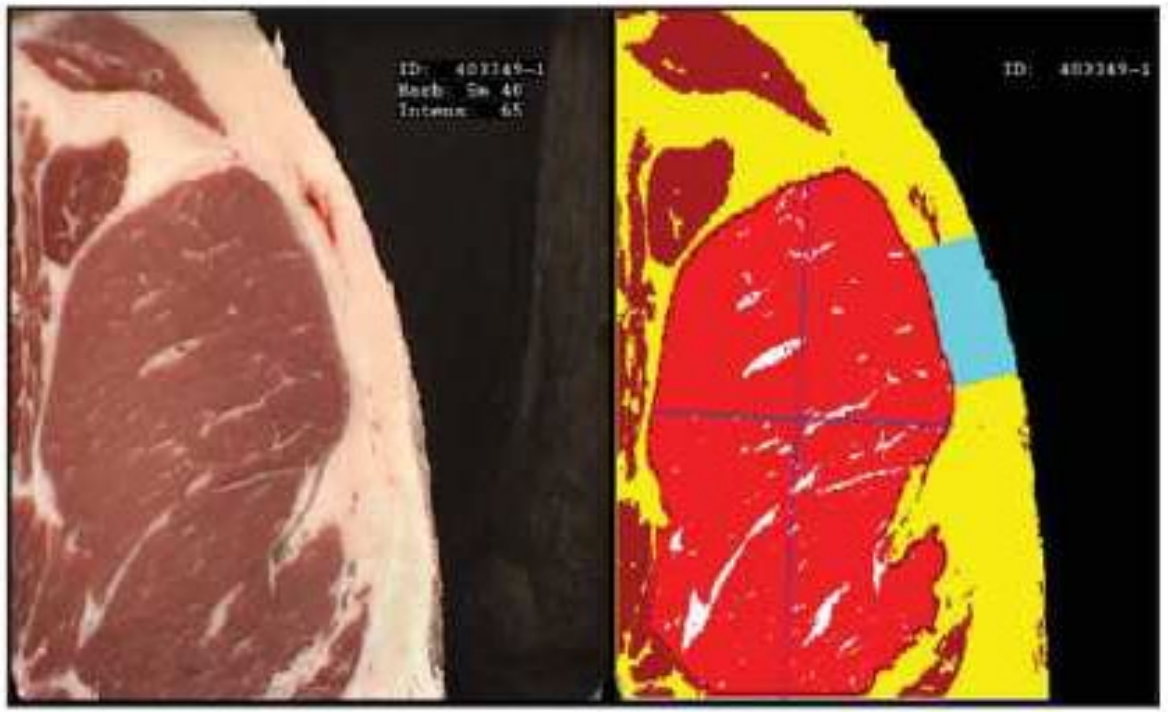
Livestock, Poultry, and Seed Program

United States Standards for Grades of Carcass Beef

Effective date December 18, 2017

Official Grade Application- Approved Instrument Systems

- USDA graders use aids in the correct interpretation & application of the standards



Camera Grading- Now & In the Future

- AMS is committed to the use of technology to enhance our services.
- By volume, about 68% of USDA-graded beef is evaluated using an approved camera.
- USDA partners with the American Meat Science Association to review validation procedures through a 3rd party beef grading committee.

Grading Consistency

- Grading correlations are held annually with grading supervisors and throughout the year with on-line graders
- Over the past several years, AMS has increased in-plant supervision and correlations with graders.

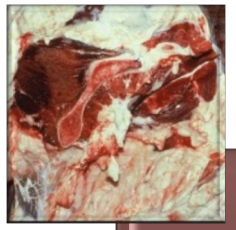
Quality Grade Determination

- Sex Classification
- Maturity evaluation based on evidences of skeletal maturity and color and texture of ribeye muscle (between 12th & 13th rib). Only if over 30 months.
- Marbling and Firmness of Ribeye Muscle (between 12th & 13th rib)

Quality Grade Determination- Sex Classification

Steers, Heifers, Cows, Bullocks, Bulls

Official Grade Designation – Sex Class



Steers & Heifers

- Prime
- Choice
- Select
- Standard
- Commercial
- Utility
- Cutter
- Canner
- YG 1-5

Cows

- Choice
- Select
- Standard
- Commercial
- Utility
- Cutter
- Canner
- YG 1-5

Bullocks

- Prime
- Choice
- Select
- Standard
- Utility
- YG 1-5
- Class identified

Quality Grade Determination - Maturity

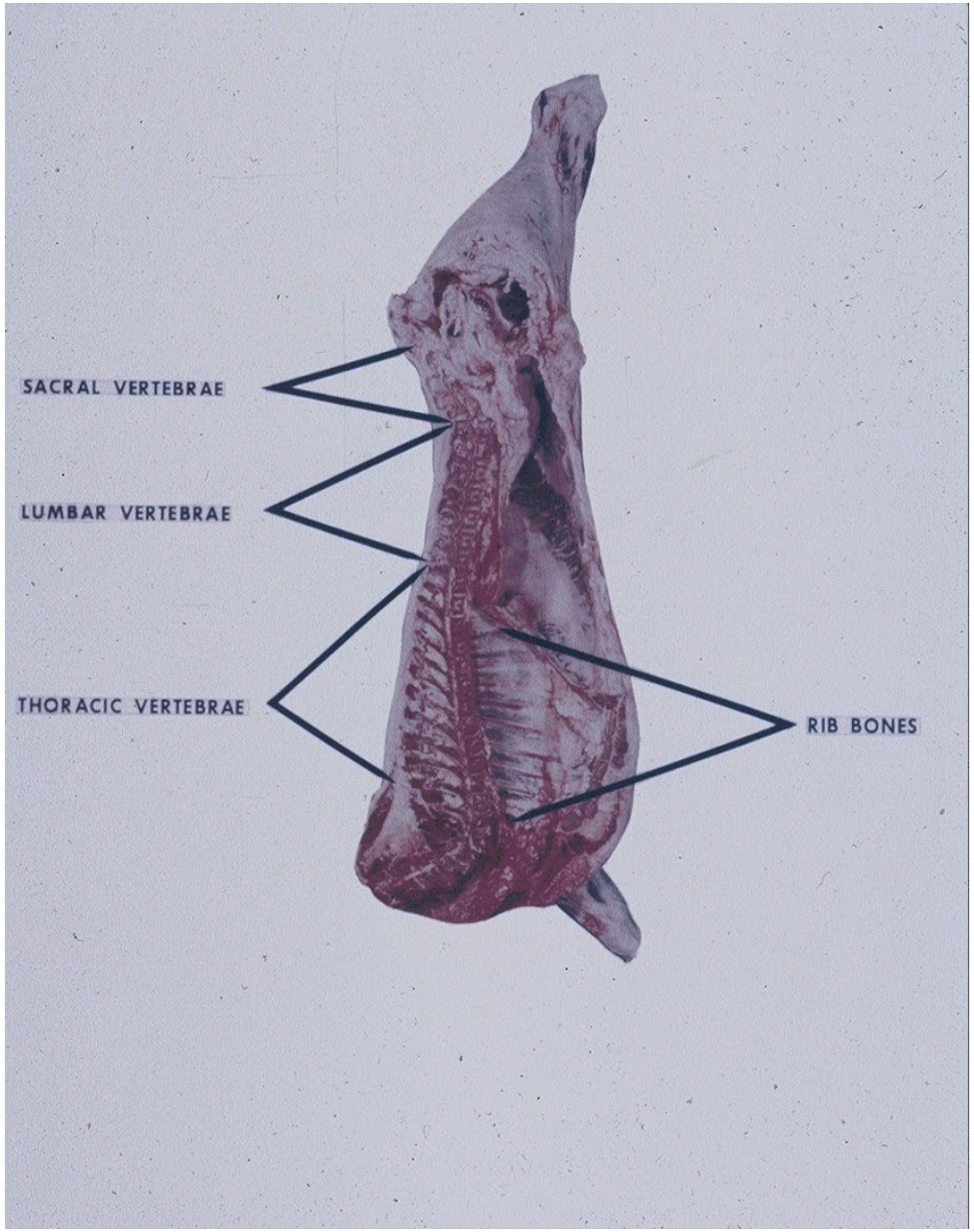
Maturity evaluation based on evidences of skeletal maturity and color and texture of ribeye muscle (between 12th & 13th rib). Only if over 30 months.

Skeletal Maturity

- Sacral Vertebrae
- Lumbar Vertebrae
- Thoracic Vertebrae
- Rib bones
- Chine Bones

- Skeletal ossification occurs from the posterior end (rear) to the anterior end (head) of the carcass

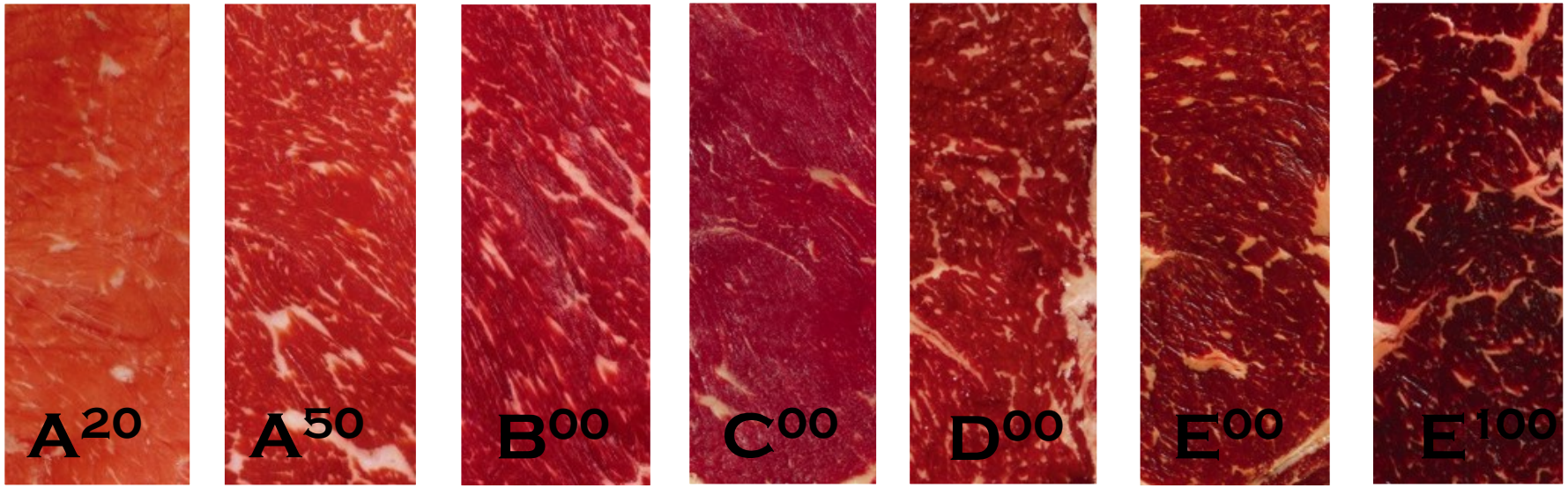
CARCASS MATURITY



Quality Grade Determination- Ribeye

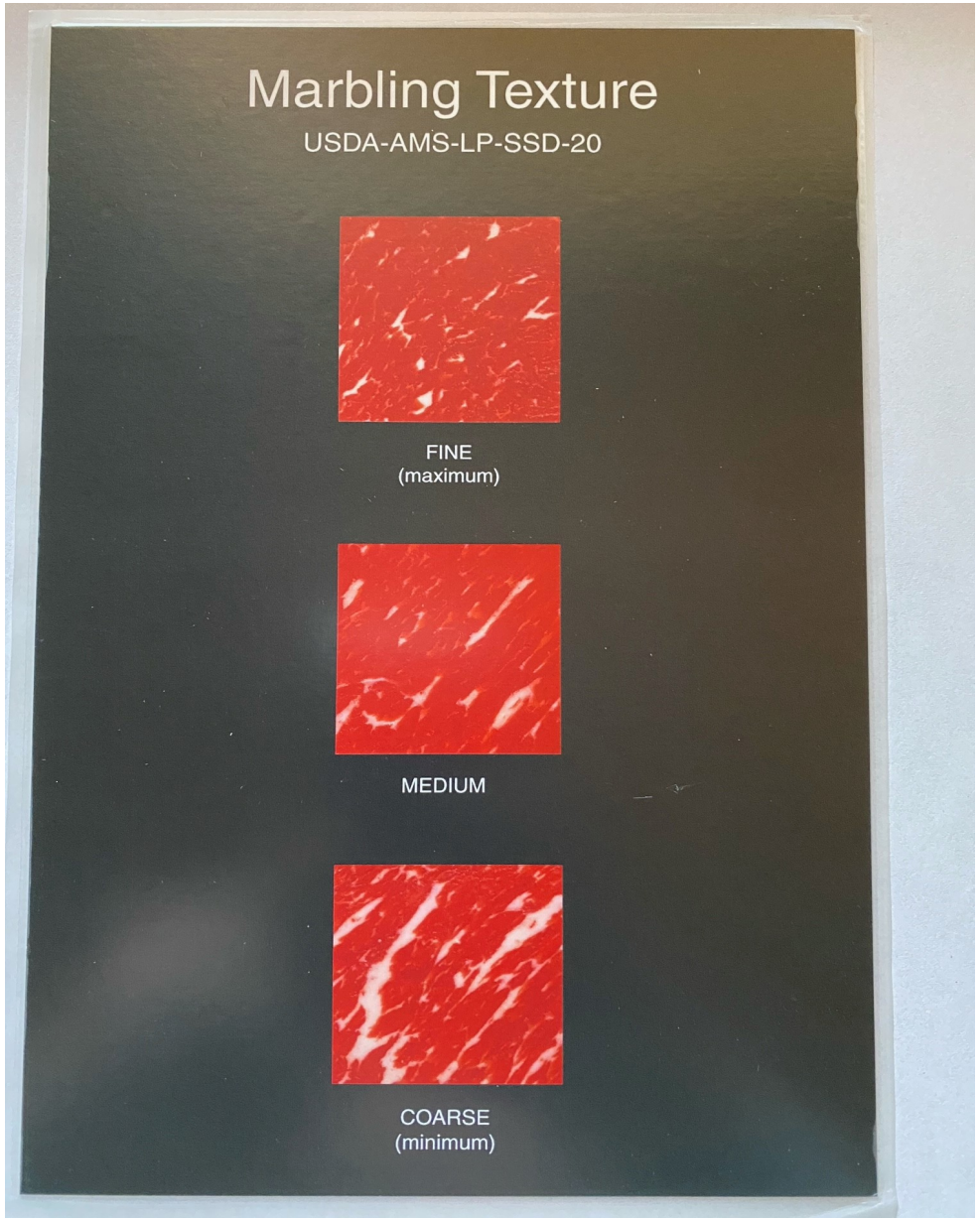
Marbling and Firmness of Ribeye Muscle (between 12th & 13th rib)

Lean Maturity – Color, Texture, Firmness



Marbling- Texture

- Very fine
- Fine
- Tends to be fine
- Moderately fine
- Slightly coarse
- Coarse
- Very coarse



Firmness

Regardless of the extent to which marbling exceeds the minimum of a grade, a carcass must meet the minim firmness requirements for its maturity to qualify for that grade.

- Firm
- Moderately Firm
- Slightly Firm
- Slightly Soft
- Moderately Soft
- Soft
- Soft & Slightly Watery
- Soft & Watery
- Very Soft & Watery

Ribbing

- When both sides are ribbed, and the characteristics of the two ribeyes would justify different quality and/or yield grades, the final grade shall reflect the “highest” grade as determined from either side.

Marbling

- Influences
  - Chill
  - Bloom
  - Lighting

Marbling

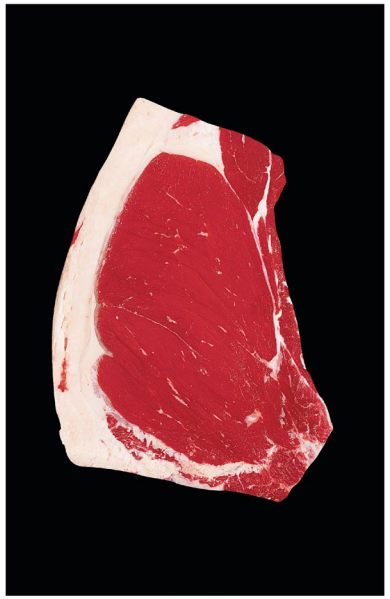
- Fat within the muscle
  - Intramuscular fat

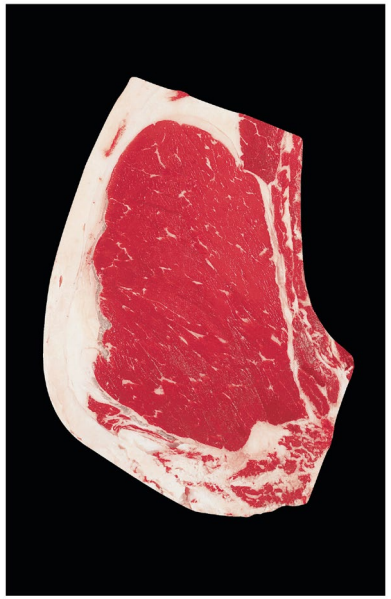
- Evaluated on the ribeye between the 12th & 13th ribs

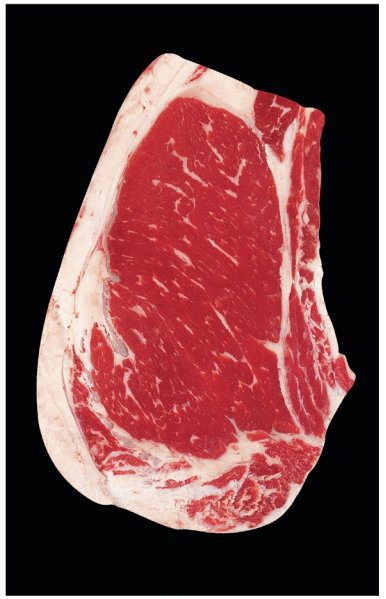
Marbling Evaluation

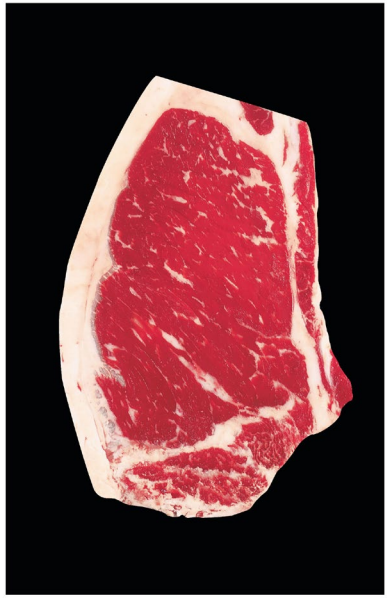
- Amount
- Texture
- Distribution

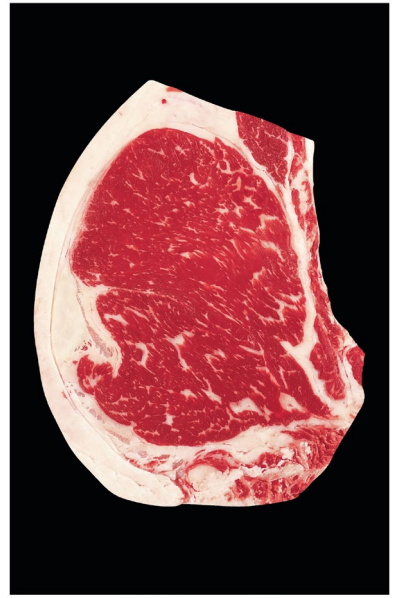
USDA Marbling Scores

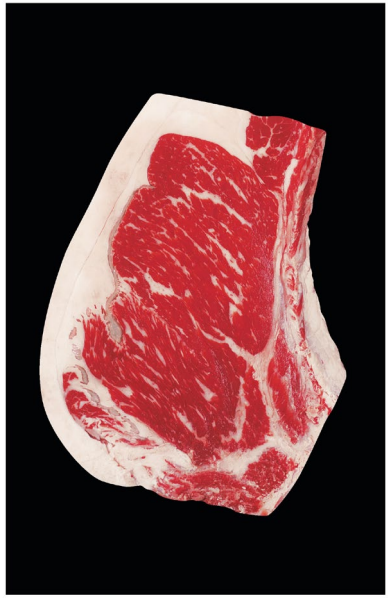

Slight (Sl^{o})


Small (Sm^{o})


Modest (Mt^{o})

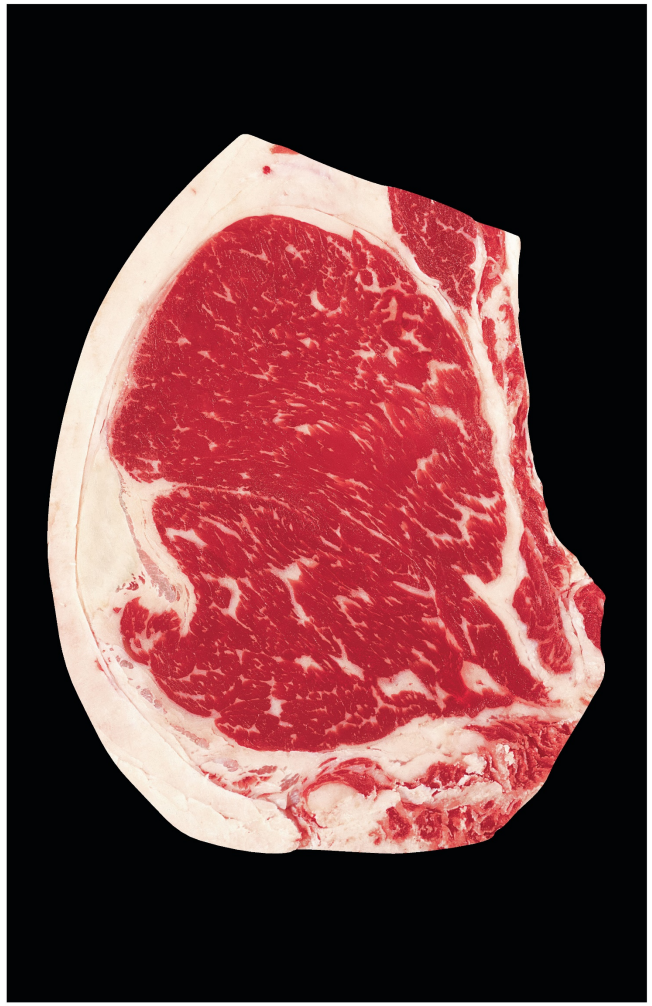

Moderate (Md^{o})


Slightly Abundant (SlA^{o})


Moderately Abundant (MdA^{o})

USDA Quality Grade – Minimum requirement

PRIME

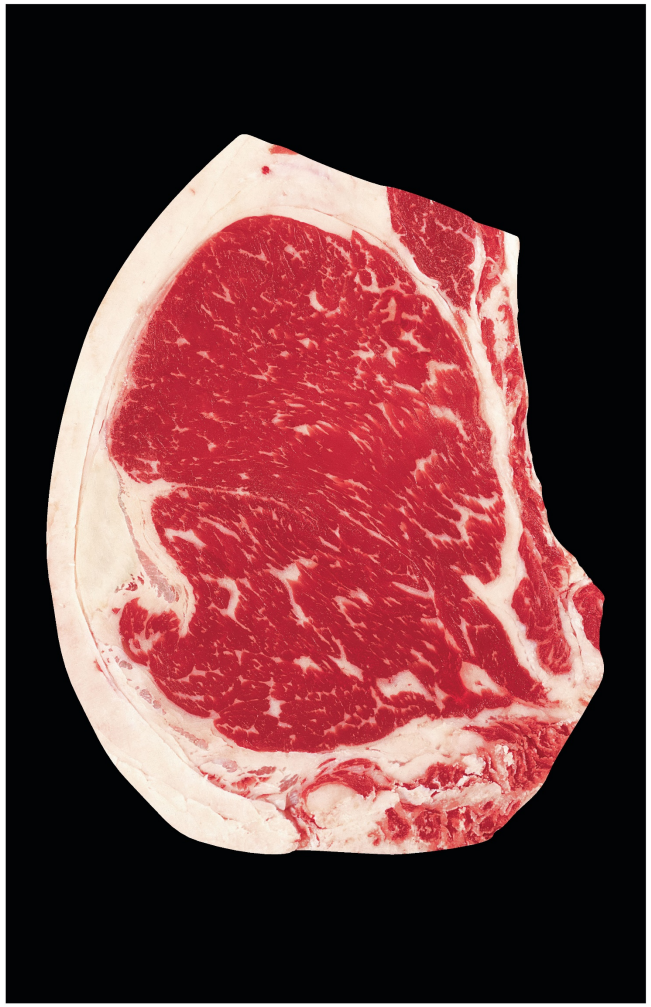


Slightly Abundant (SIA^{0})

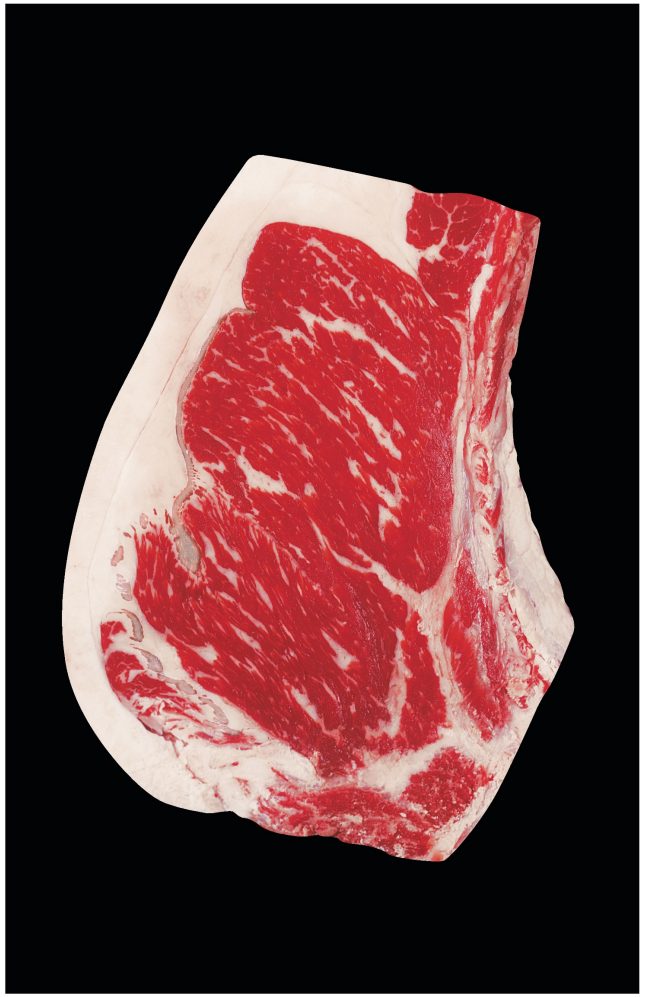
- Ribeye is light red in color
- Ribeye has fine texture
- Ribeye is moderately firm
- Ribeye has “slightly abundant” amount of marbling

USDA Quality Grade – Marbling standards

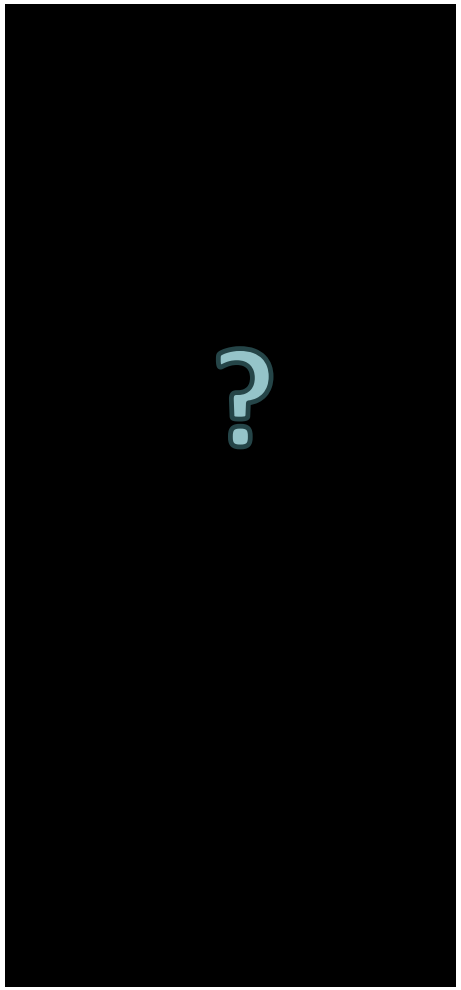
PRIME



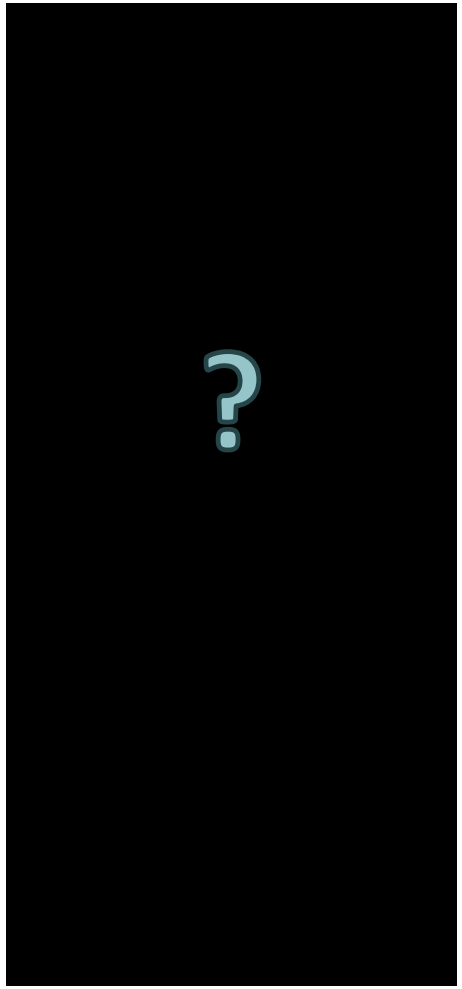
Slightly Abundant (SIA°)



Moderately Abundant (MdA°)



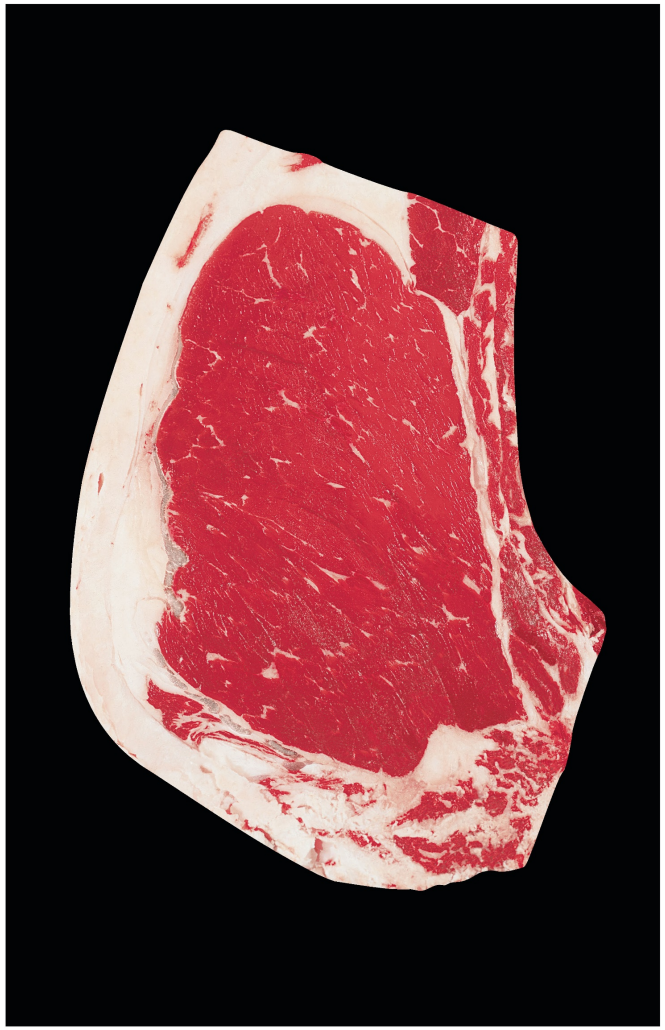
Abundant



Very Abundant

USDA Quality Grade – Minimum requirement

CHOICE

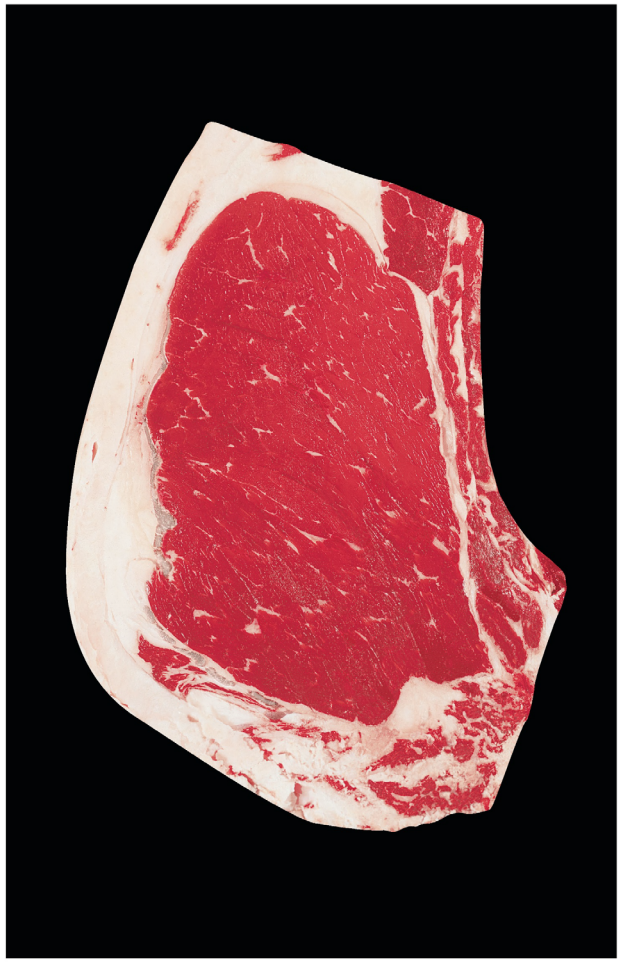


Small (Sm°)

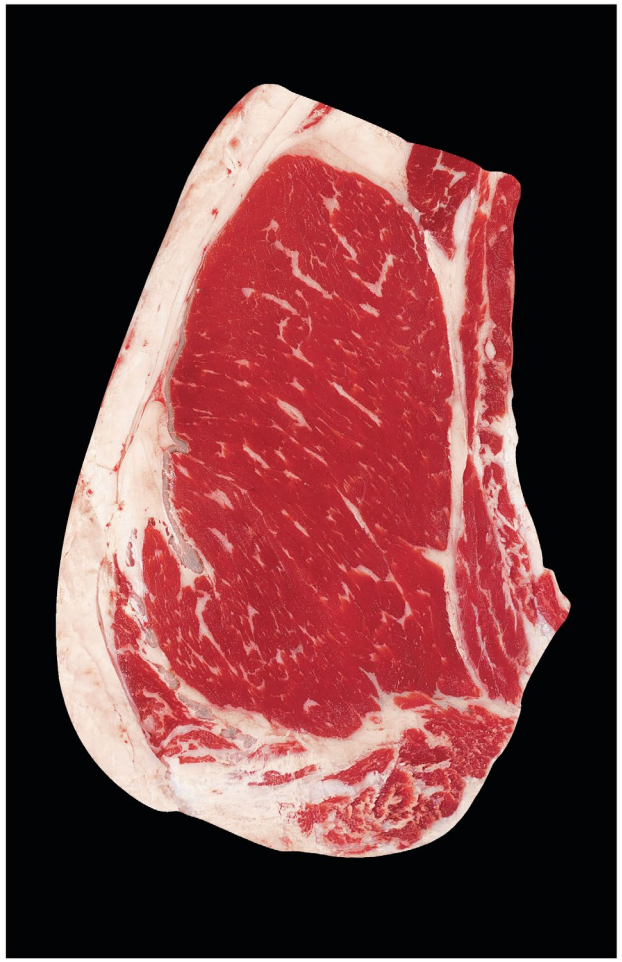
- Ribeye is moderately light red in color
- Ribeye has fine texture
- Ribeye is slightly soft
- Ribeye has “small” amount marbling

USDA Quality Grade – Marbling standards

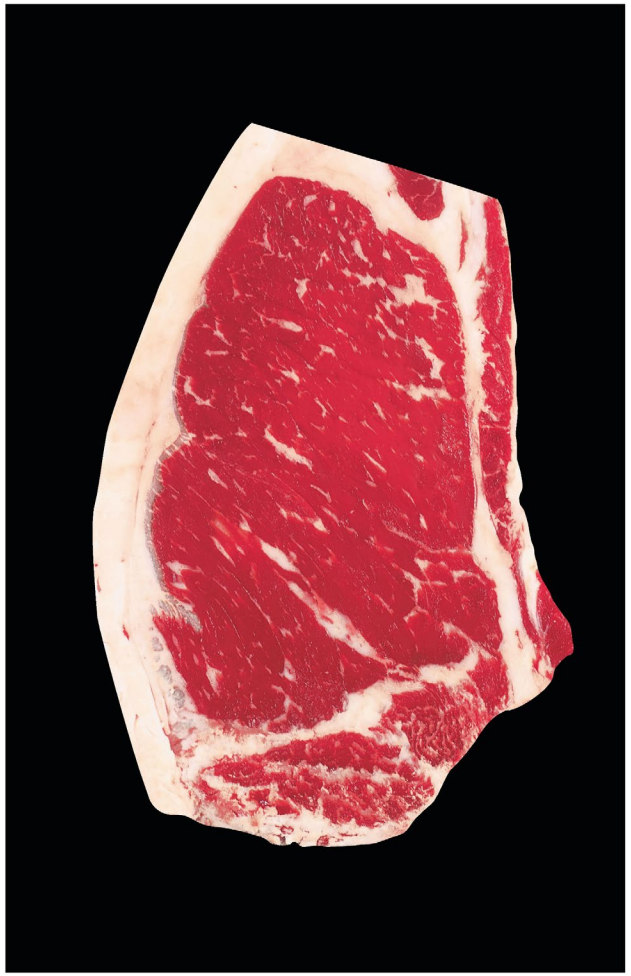
CHOICE



Small (Sm^{o})



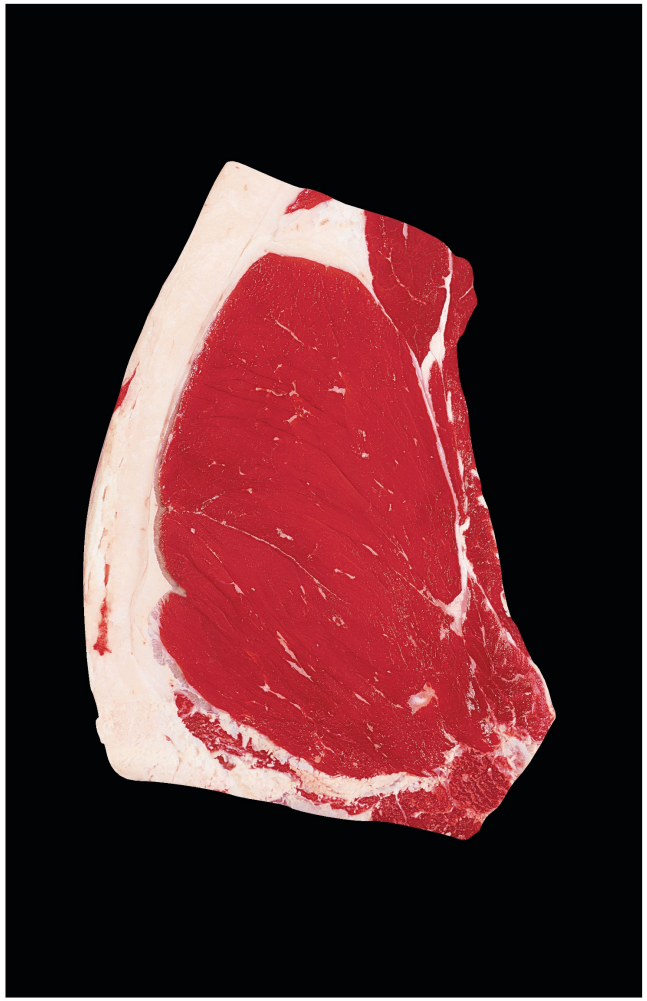
Modest (Mt^{o})



Moderate (Md^{o})

USDA Quality Grade – Minimum requirement

SELECT

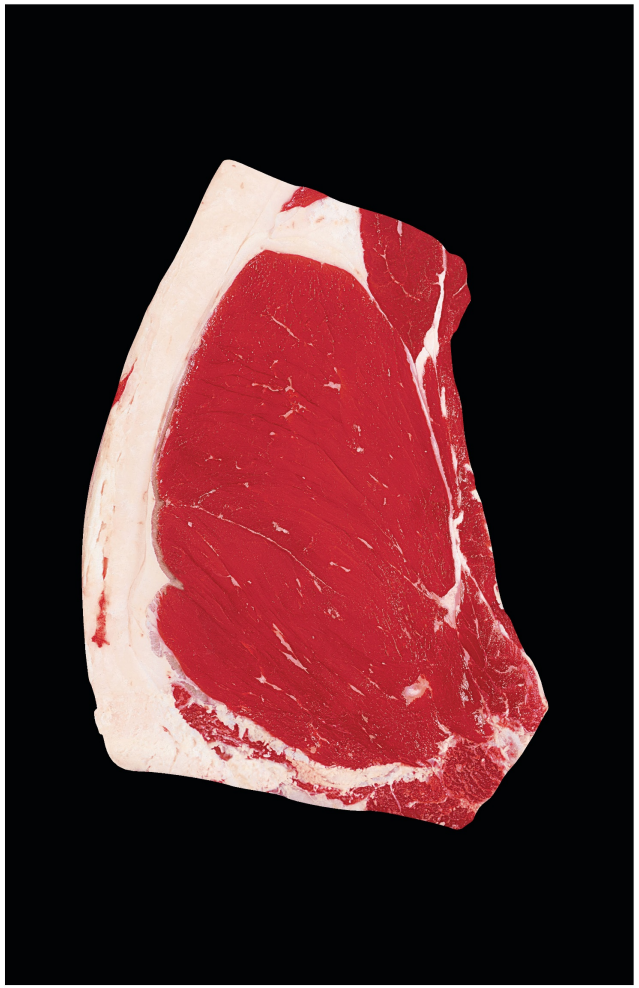


Slight (Sl°)

- Ribeye is slightly light red in color
- Ribeye has fine texture
- Ribeye is moderately soft
- Ribeye has “slight” amount marbling

USDA Quality Grade – Marbling standards

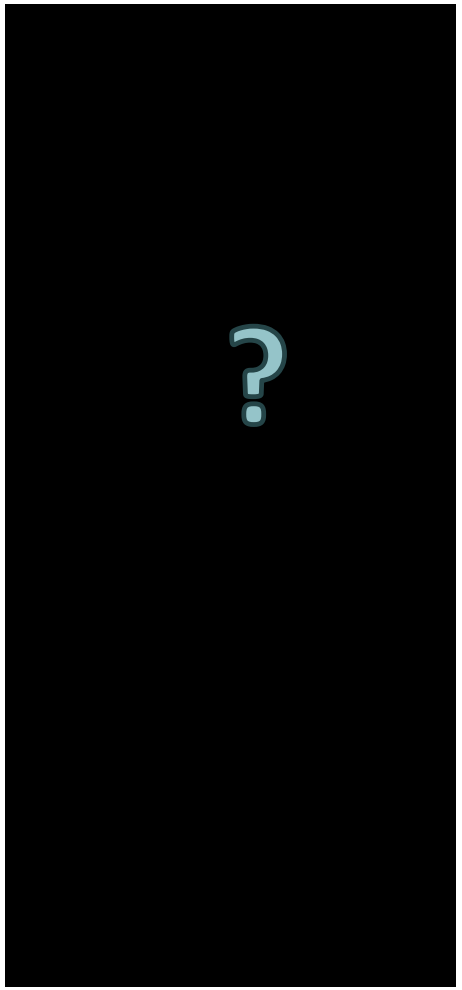
SELECT



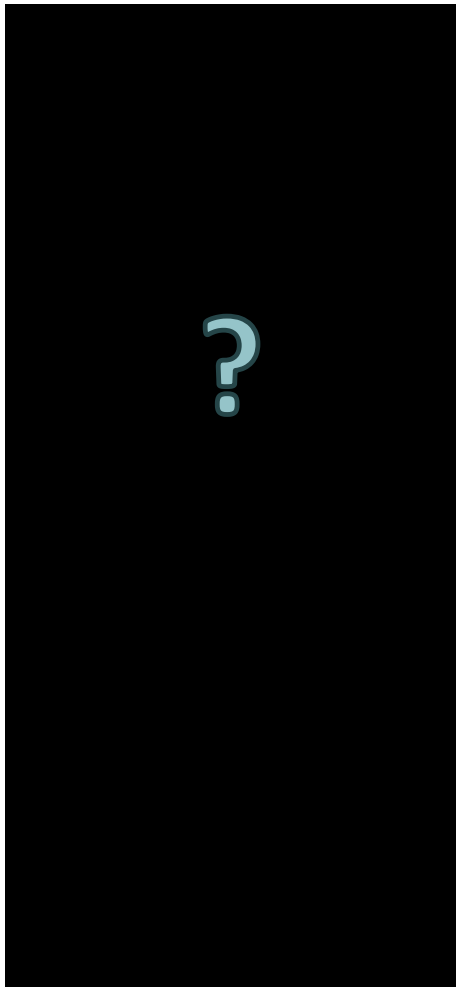
Slight (Sl⁰)

USDA Quality Grade – Marbling standards

STANDARD



Traces



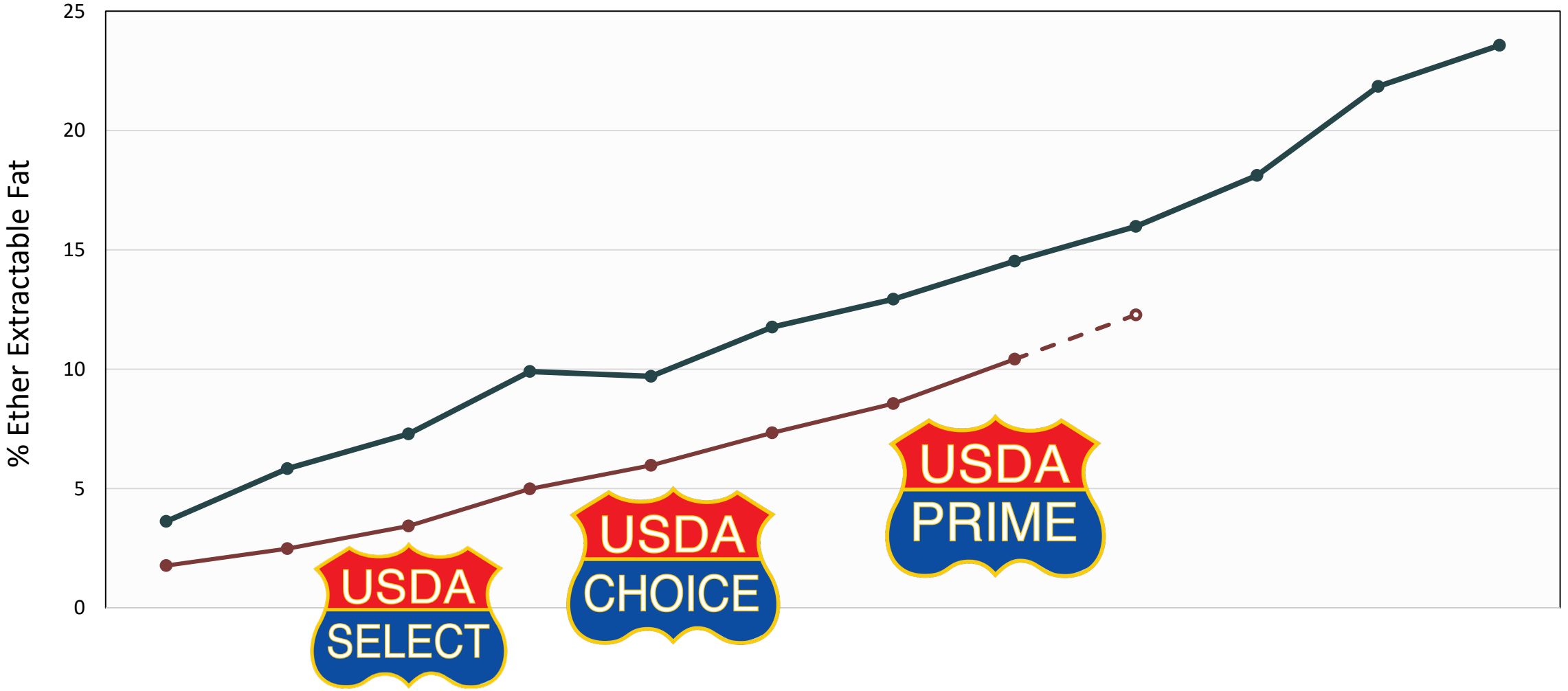
Practically Devoid

Comparison of USDA and Japanese Grading Sytems[1]

USDA Quality Grade	USDA Marbling Score	Japanese BMS	Japanese Quality Grade
Prime^{+}	Abundant	9 – 12	5
Prime^{o}	Moderately Abundant	8	5
Prime^{-}	Slightly Abundant	7	4
Choice^{+}	Moderate	6	4
Choice^{o}	Modest	5	4
Choice^{-}	Small	4	3
Select	Slight	3	3
Standard	Traces & Practically Devoid	1 & 2	1 & 2

[1]Cameron et al., 1994. Meat Science 38:361-364

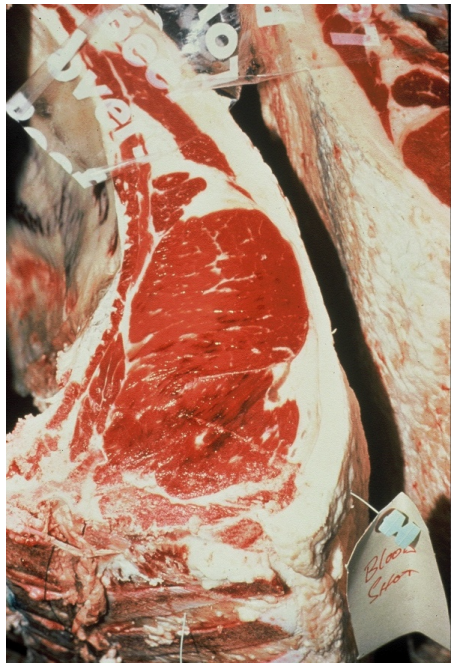
Fat Percentage Comparison between USDA Marbling Scores and Japanese Beef Marbling Standards*



*Predicted values for Japanese Beef Marbling Standards for Intramuscular Fat at the 12th Rib based on 6th Rib measurements (Zembayashi & Lunt. Meat Science 40 (1995) 211-216)

Conditions or Defects Preventing or Lowering a Grade

- **Blood splash**
  - Carcasses can have a “small” amount of blood splash & still grade. The “small” amount is based on the “Slight” marbling card.

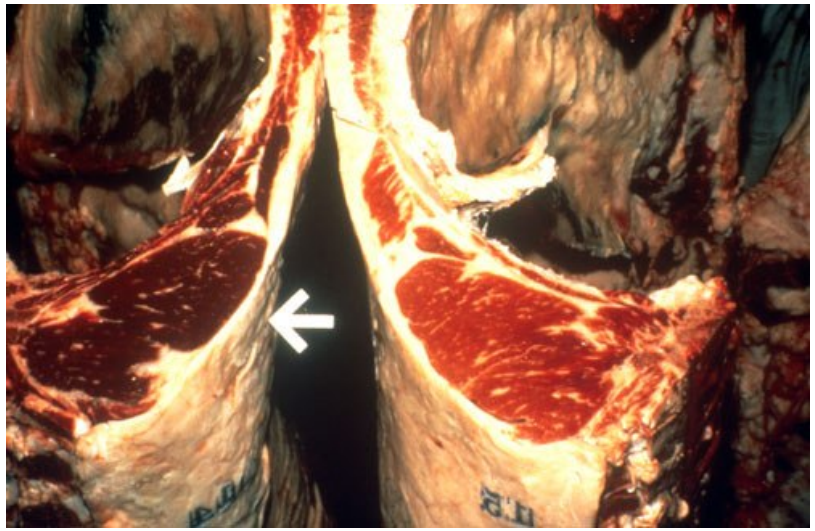


- **Calloused lean**
  - The maximum amount of calloused to still grade is a small amount (less than ½ inch)

Conditions or Defects Preventing or Lowering a Grade (cont.)

- **Dark Cutters**
  - Dark Cutting characteristics are determined in percentage, from 10 to 100%.
  - Dark Cutting beef affects overall quality grade

- **For PRIME, CHOICE, SELECT grades**
- Up to 1 full grade discount
  - Prime becomes Choice
  - Choice becomes Select,
  - Select becomes Standard



Before we begin our Quality Grade exercise…

- In December 2017, the standards were revised and A maturity is now considered up to D 0 bone **without** balancing skeletal and lean maturities. It is based strictly off the skeletal maturity.

- If the carcass is identified as older than 30 months, then the grader will “balance” the skeletal maturity and lean maturity to get a final maturity score and ultimate quality grade
  - Remember, > 30 month of age cattle are identified on the kill floor by dental indentations, and will be marked as such for grading. (For example: 3 on rounds, ribbon through feather bones, ink in the chine bones etc.)

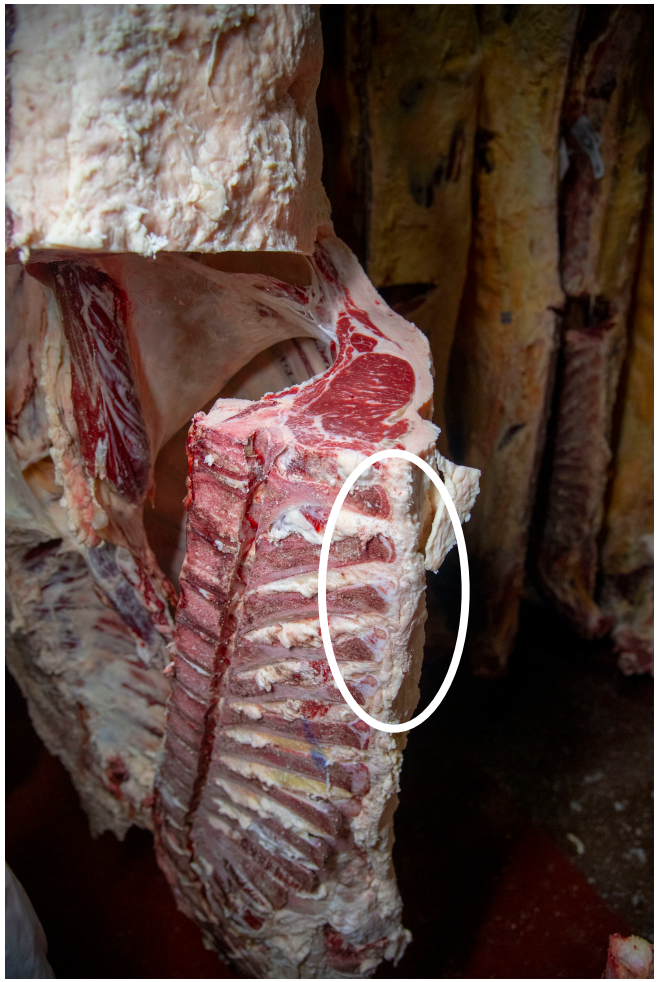
- In short, there are grading standards for regular cattle, and standards for 30 month cattle.

Balancing Skeletal & Lean Maturities
> 30 month of age

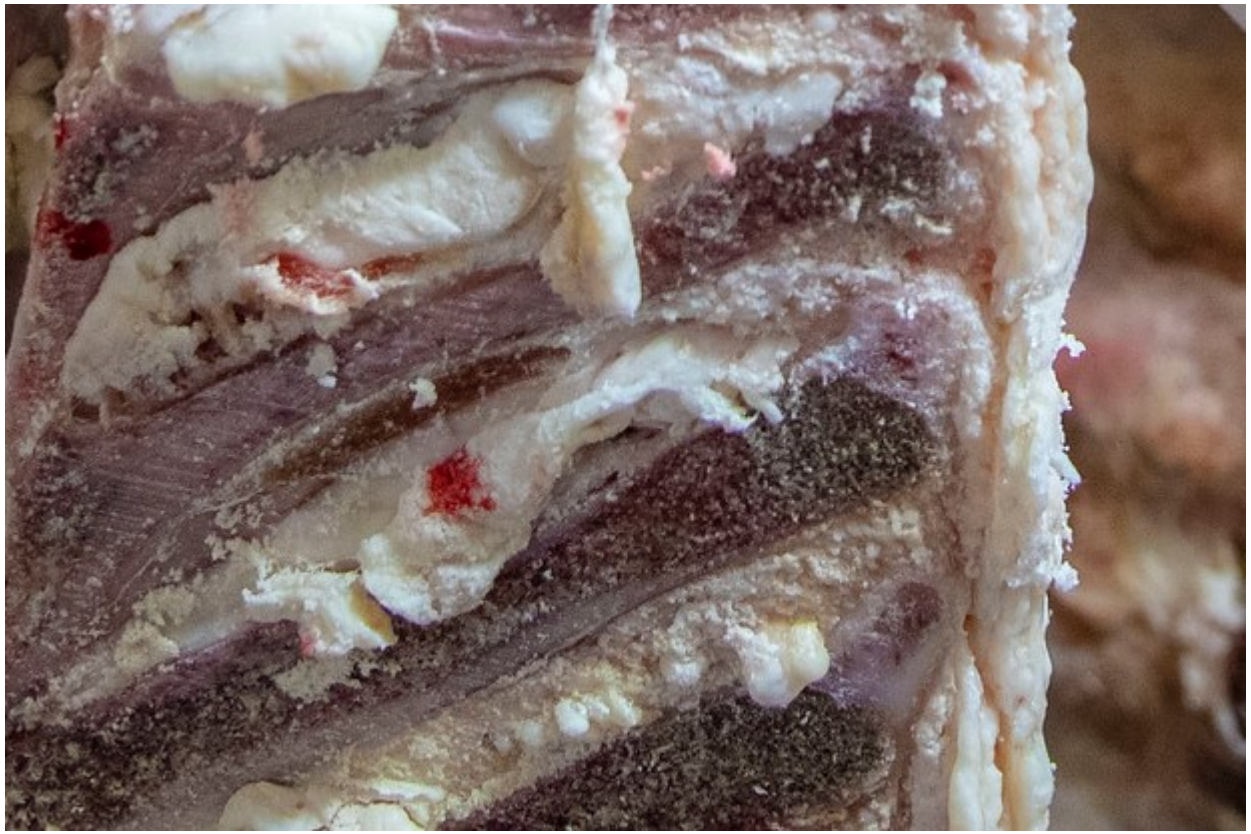
When skeletal maturity (bone) differs from lean maturity, slightly more emphasis is placed on the skeletal evidences.

In no case can the overall maturity be more than one full maturity group different than indicated by the skeletal differences.

Example of thoracic buttons and ossification to bone



Example of thoracic buttons and ossification to bone (cont.)



Camera Grading: Upgrading & Downgrading

- If a grader calls marbling 20 degrees higher or lower than the camera, the grade should be adjusted.

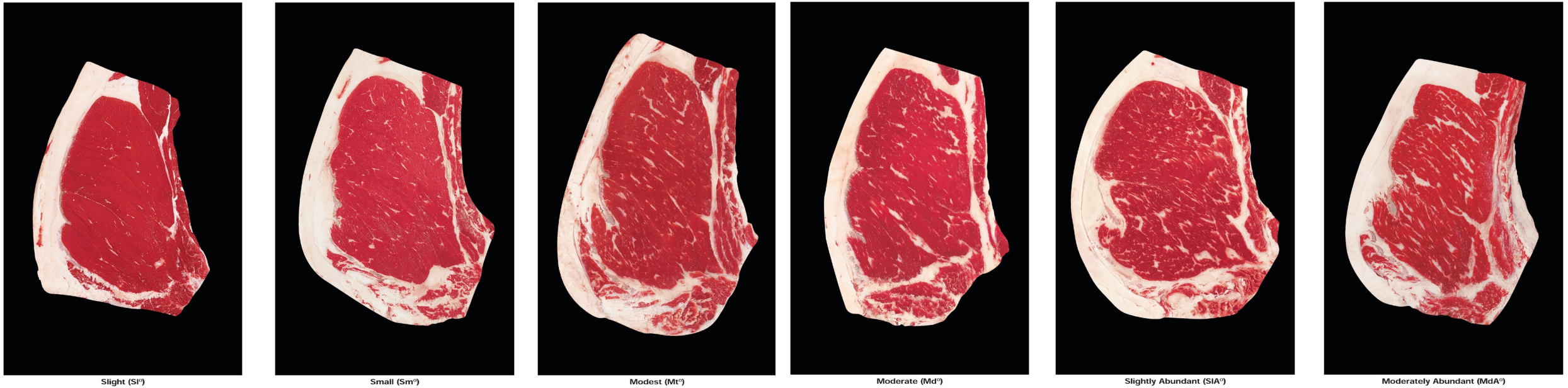
CAMERA CALL: SIDE 1	CAMERA CALL: SIDE 2	GRADER CALL	UPGRADE, DOWNGRADE, NO CHANGE
370 (Slight 70)	380 (Slight 80)	400 (Small 0)	UPGRADE: CHOICE
530 (Modest 30)	500 (Modest 0)	480 (Small 80)	Downgrade from G1 to Choice or stays Choice
690 (Moderate 90)	690 (Moderate 90)	700 (SLAB 0)	NO CHANGE: CHOICE
410 (Small 10)	400 (Small 0)	Slight 80	DOWNGRADE: SELECT

Quality Evaluation Exercise

Which component of the yield grade has the greatest influence on final yield grade?

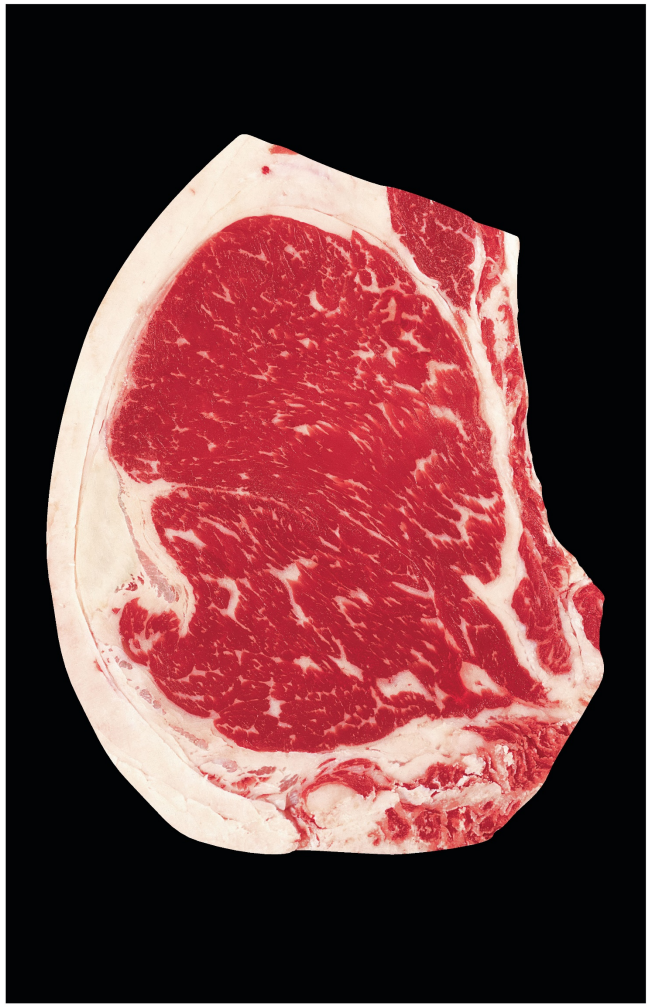
A	**Carcass Weight**
B	**Lean Color**
C	**Subcutaneous Fat (backfat)**
D	**Intramuscular Fat (marbling)**

USDA Marbling Standards

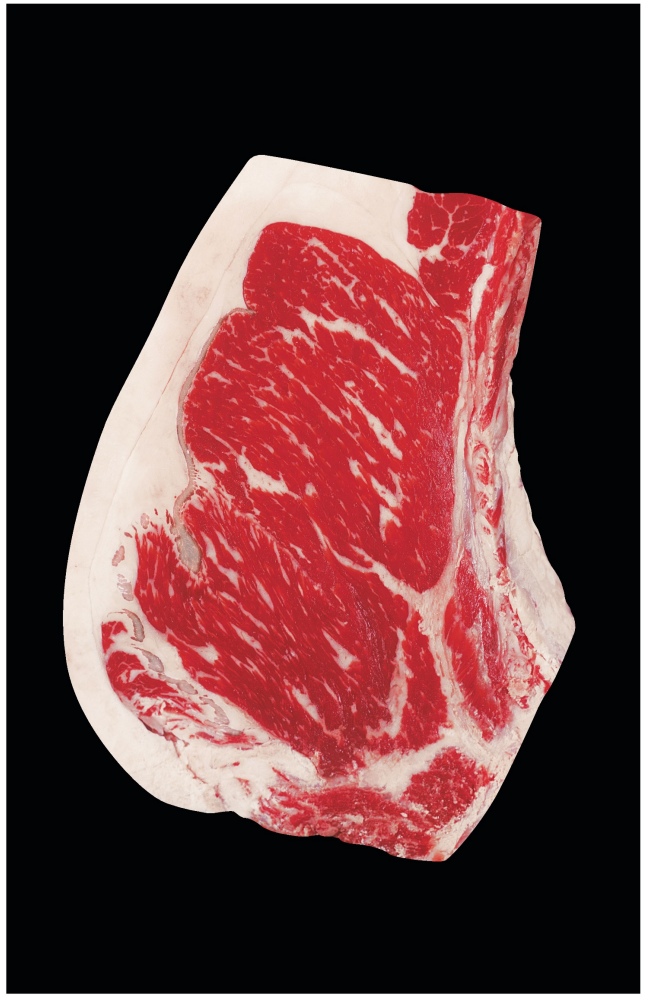


0 – 100 degrees

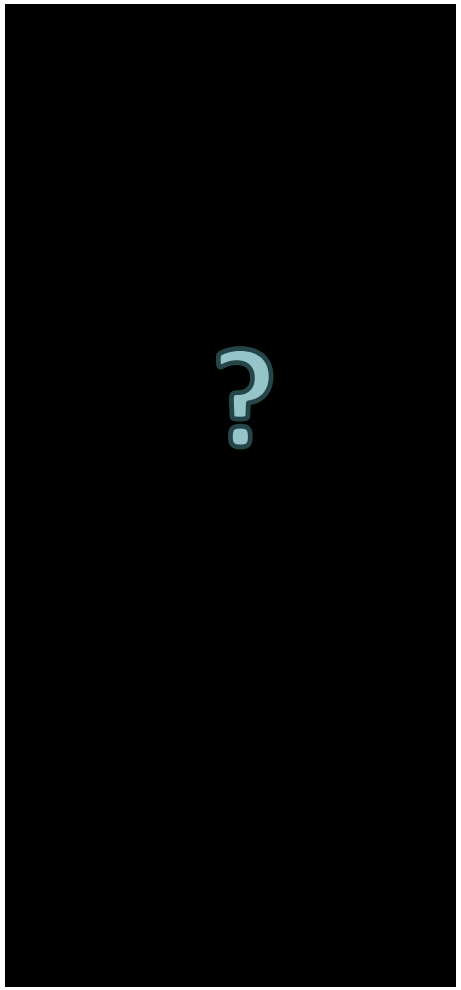
USDA Quality Grade – Marbling standards
PRIME – Slightly Abundant, Moderately Abundant



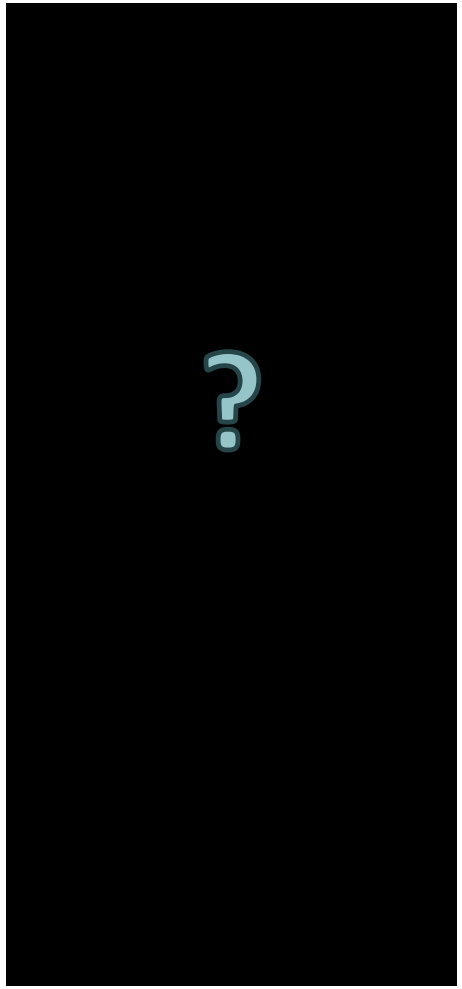
Slightly Abundant (SIA°)



Moderately Abundant (MdA°)

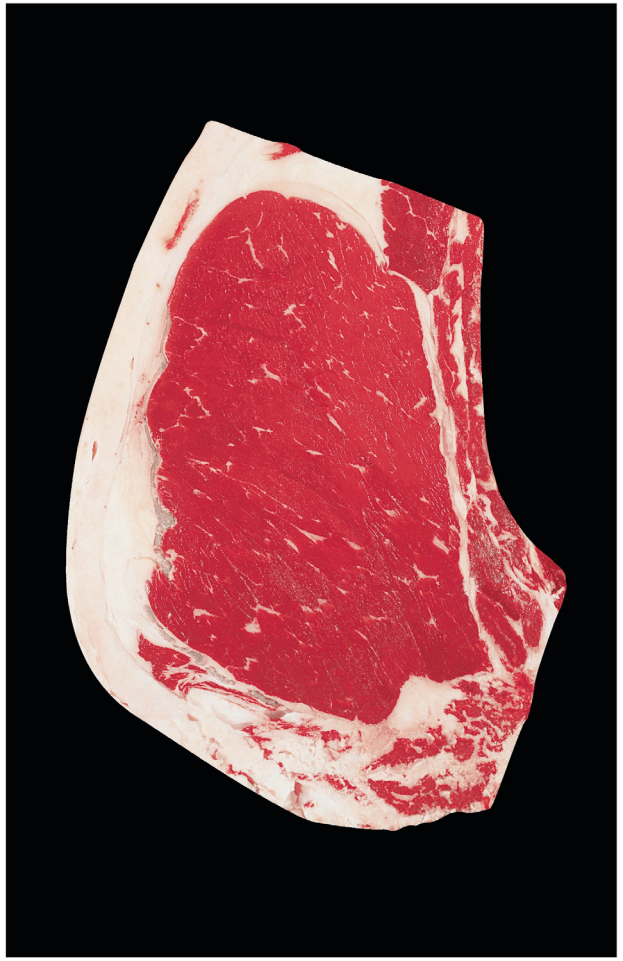


Abundant

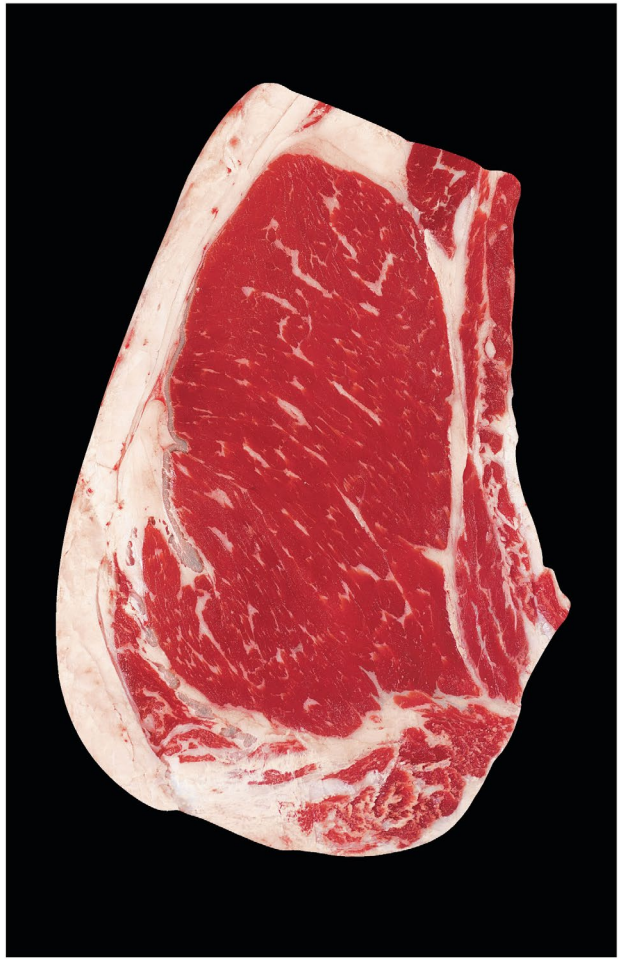


Very Abundant

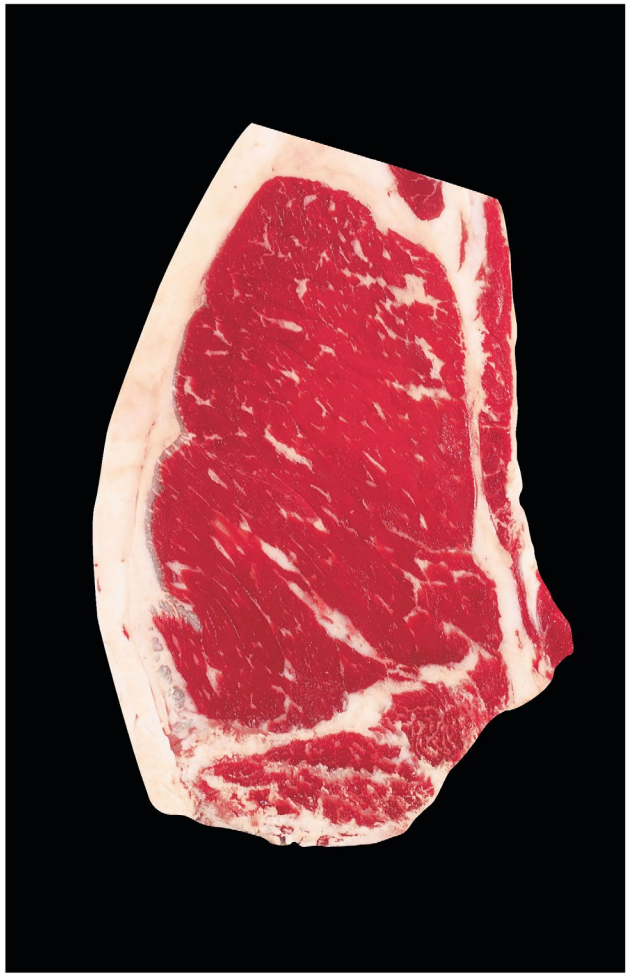
USDA Quality Grade – Marbling standards
CHOICE- Small, Modest, Moderate



Small (Sm^{o})



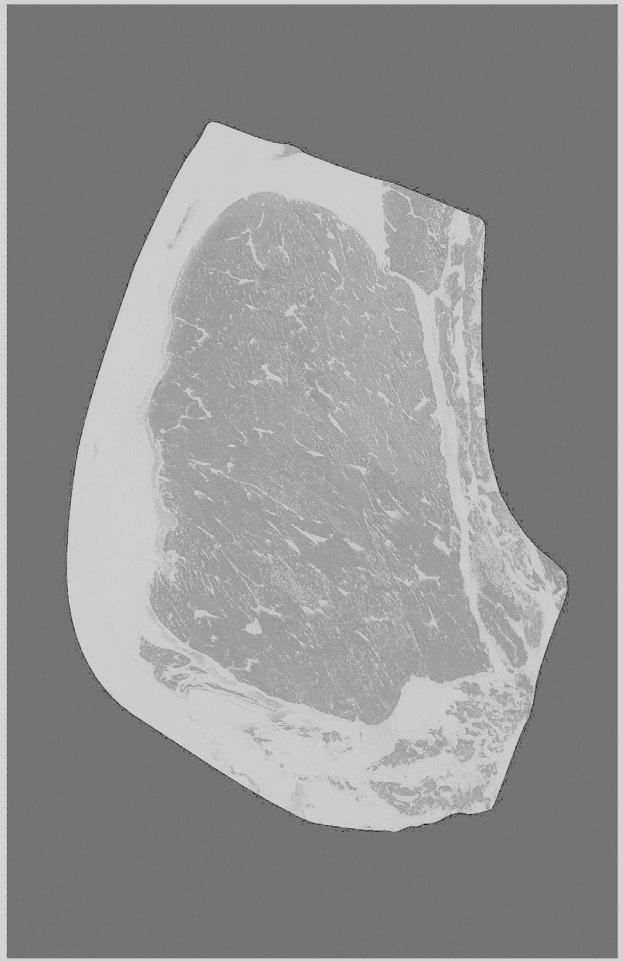
Modest (Mt^{o})



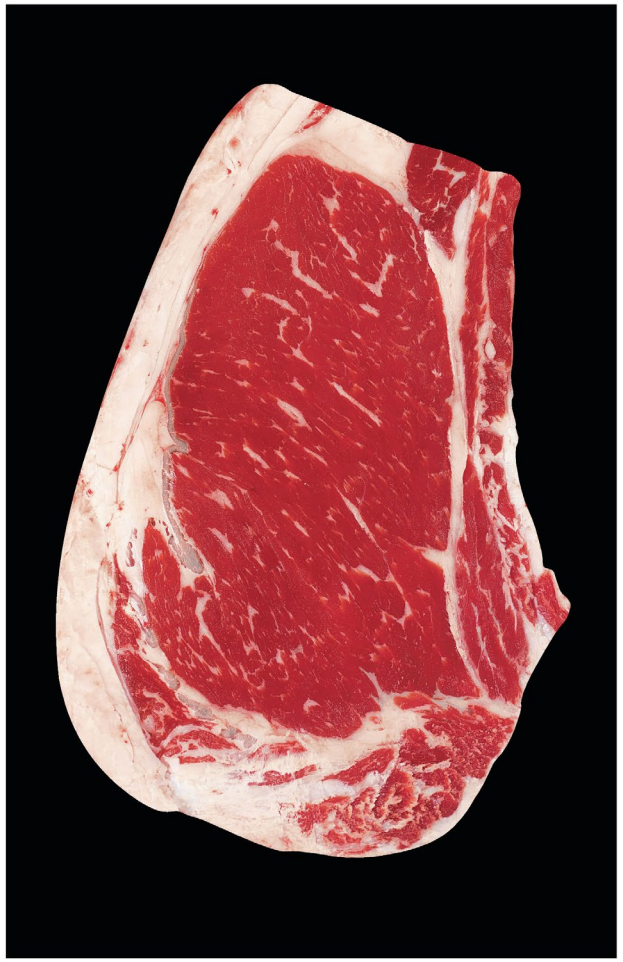
Moderate (Md^{o})

USDA Quality Grade – Marbling standards

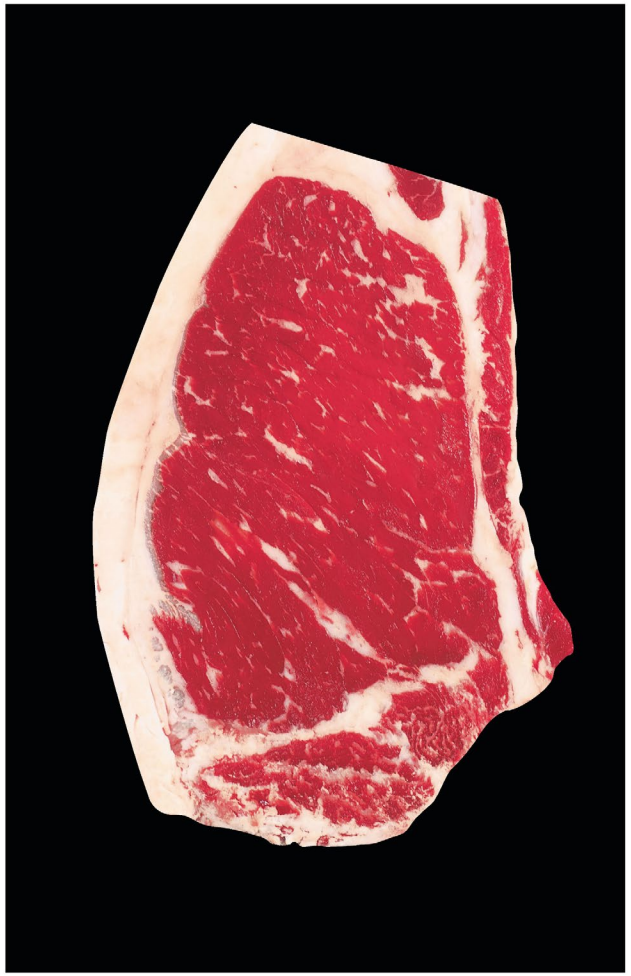
PREMIUM CHOICE or upper 2/3



Small (Sm^{o})

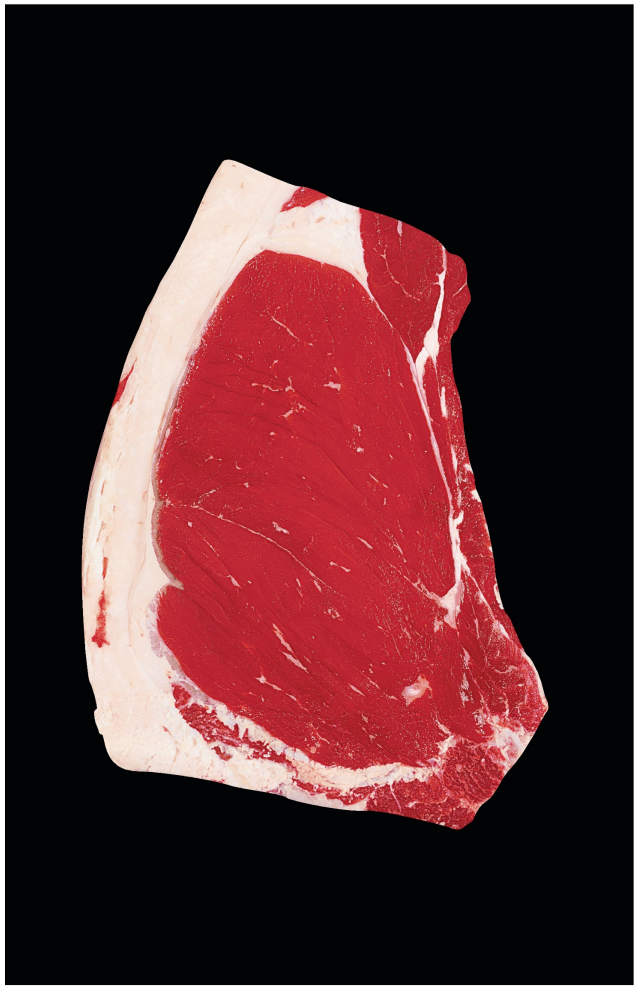


Modest (Mt^{o})



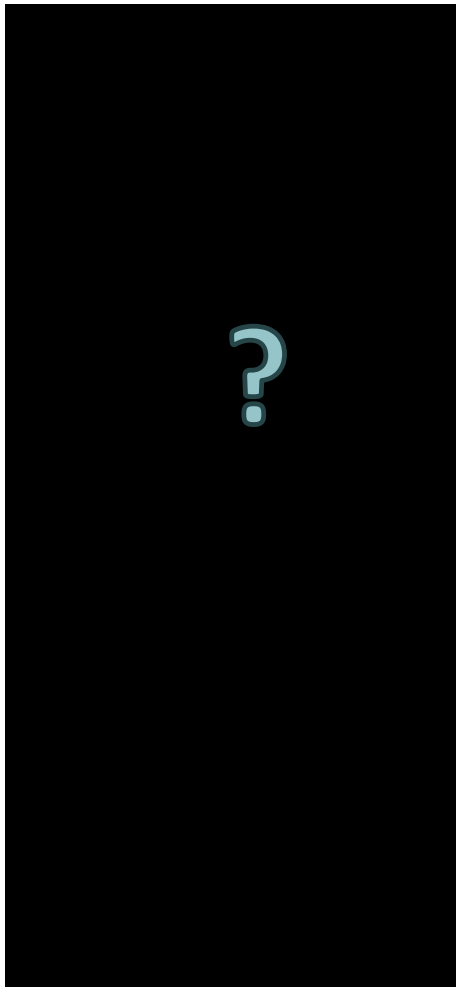
Moderate (Md^{o})

USDA Quality Grade – Marbling standards
SELECT- Slight

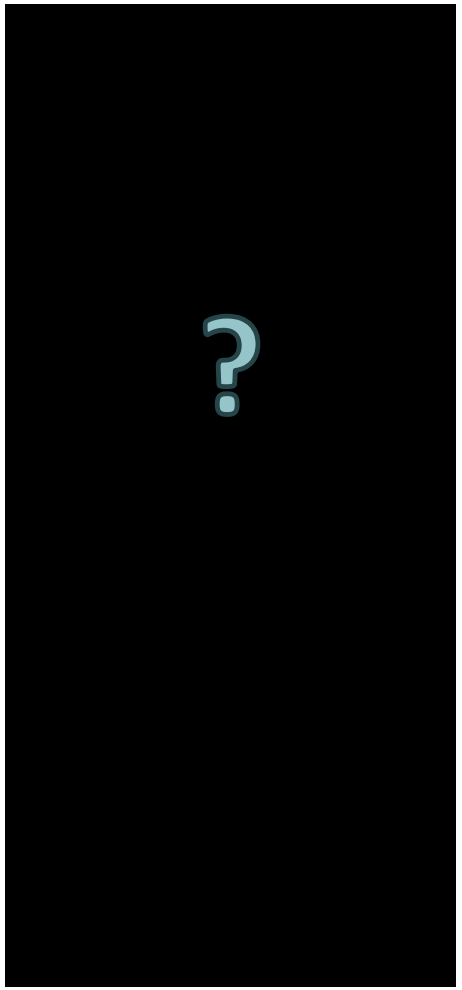


Slight (SI^{o})

USDA Quality Grade – Marbling standards
STANDARD- Traces, Practically Devoid



Traces



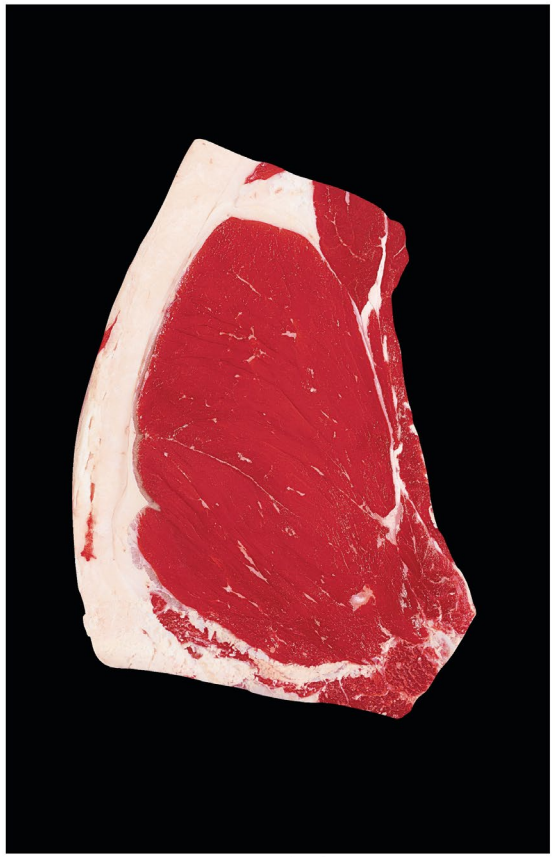
Practically Devoid

Training Time...

* 5 ribeyes

* Marbling call and USDA grade call

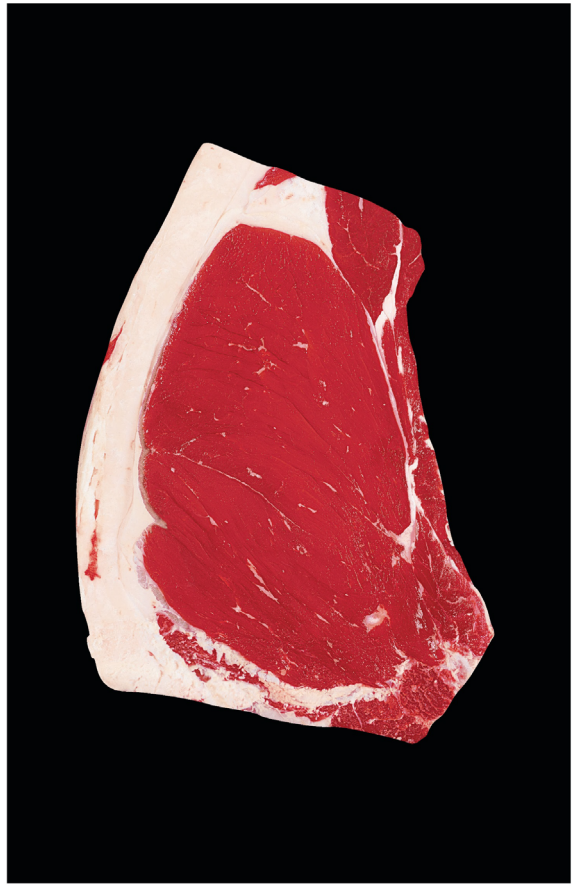
Training #1



Slight (Sl⁰)

Slight 10
– Low Select -

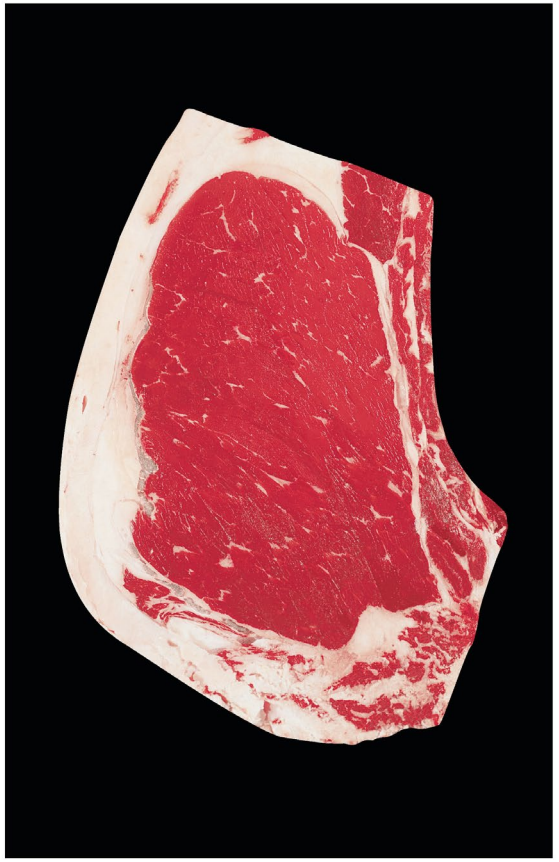
Training #2



Slight (Sl⁰)

Slight 50
– High Select -

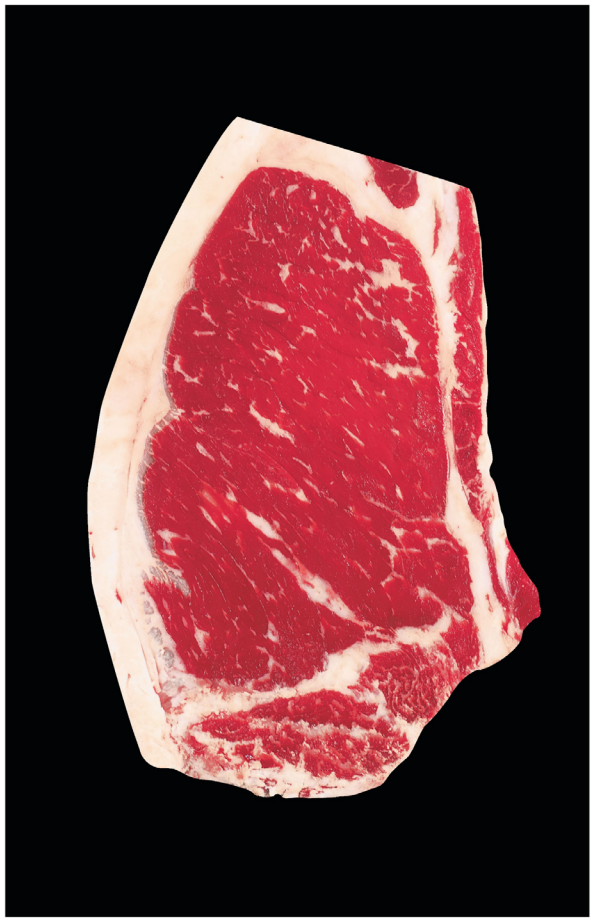
Training #3



Small (Sm°)

Small 80
– Low Choice -

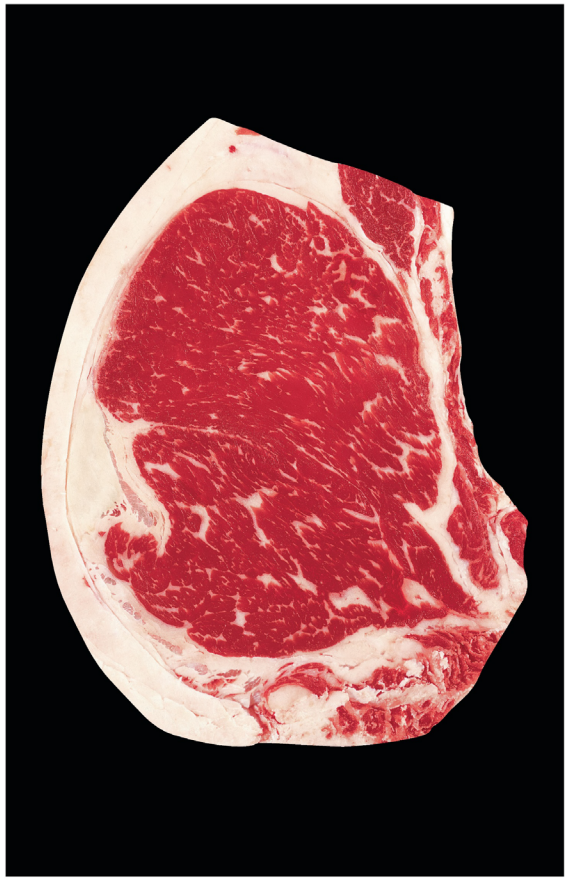
Training #4



Moderate (Md°)

Moderate 80
– High Choice -

Training #5



Slightly Abundant (SIA°)

Slightly Abund. 10
– Low Prime -

READY???

* 15 ribeyes
* 10 seconds for each one
* Just call the final Quality Grade of Prime, Choice, Select

Here we go!!!

These 15 carcasses were from the 2020 American Royal Meat Judging contest put on by AMSA

How did you do???

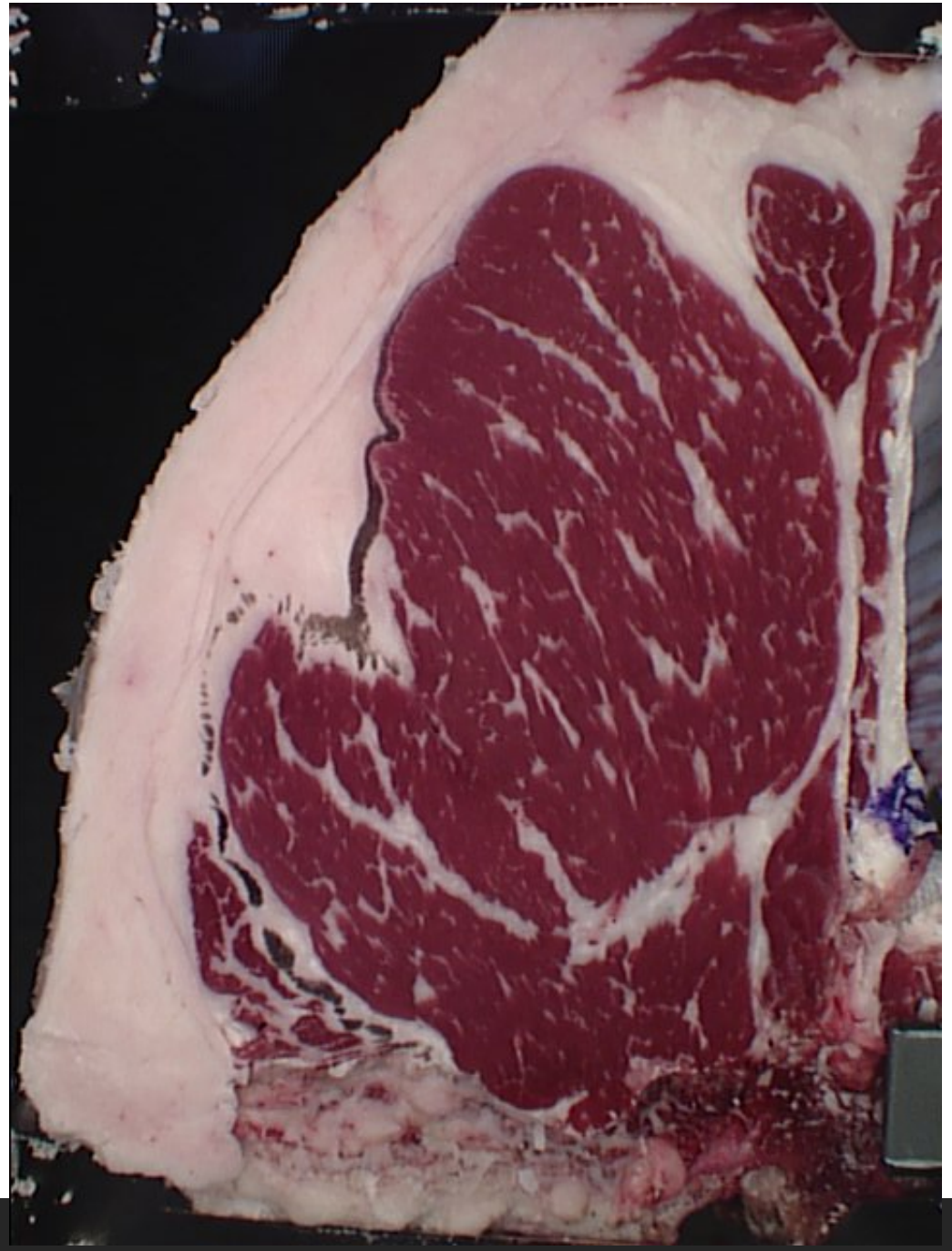
Scoring:

*10 points for correct

*5 points for one grade off

*0 point for more than one grade off

Total of 150 points



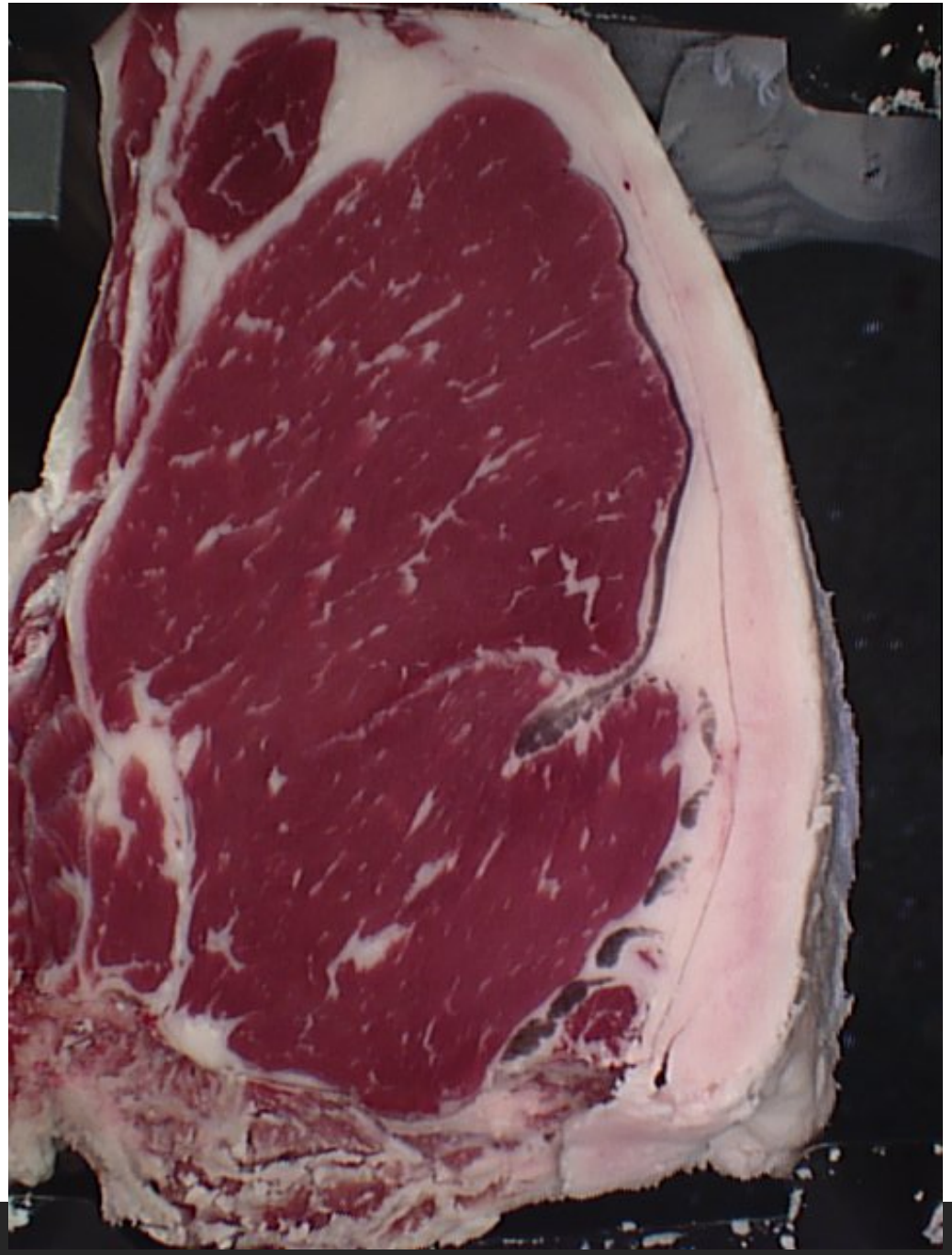
Choice

High Choice Md 40

1

Choice

Average Choice Mt 30 # 2



Choice

Average Choice Mt 10 # 3

Select

Low Select Sl 40 # 4

Choice

Average Choice Mt 40 # 5

Choice

High Choice Md 70 # 6

Choice

Average Choice Mt 50

7

Prime

Low Prime Slab 10

8

Choice

High Choice Md 60

9

Choice

Average Choice Mt 40

10

Choice

High Choice Md 80 # 11

Choice

Low Choice Sm 80

12

Select

High Select Sl 50 # 13

Select

Low Select Sl 30 # 14

Select

Low Select Sl 10

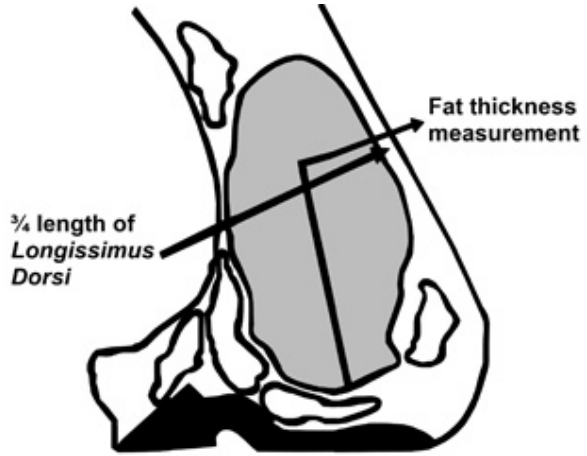
15

Calculating Yield Grades

Yield Grade Factors

- Thickness of fat over the ribeye (backfat)
- Ribeye area
- Hot Carcass Weight
- Percentage of kidney, pelvic, heart fat (KPH)

Yield Grade Factors- Thickness of fat over the ribeye (backfat)



Yield Grade Factors- Ribeye Area

Yield Grade Factors- Hot Carcass Weight

Yield Grade Factors - Percentage of kidney, pelvic, heart fat (KPH)

Yield Grade Factors- Percentage of kidney, pelvic, heart fat (KPH)

Yield Grade Factors- Percentage of KPH

Pelvic

Yield Grade Factors- Percentage KPH

Heart

Yield Grade Determination

Yield Grade Equation

Short – Cut Method

Yield Grade Equation – Long version

2.50

+ (2.50 x adjusted fat thickness, inches)

+ (0.20 x percent kidney, pelvic and heart fat)

+ (0.0038 x hot carcass weight, pounds)

– (0.32 x ribeye area, square inches)

Short Cut Method:
Preliminary Yield Grade (PYG)

The PYG is determined based on the thickness of fat over the ribeye muscle. A carcass with no fat opposite to ribeye has a PYG of 2.00. For each .1 inch of fat add .25 to the PYG

The measurement is adjusted, either up or down, if necessary, to reflect unusual amounts of fat on other parts of the carcass.

Adjustments are made in tenths.

If the back fat measures…	The PYG will be…
0.00	2.0
.20	2.5
.40	3.0
.60	3.5
.80	4.0
1.0	4.5
1.2	5.0
1.4	5.5
1.6	6.0

Short Cut Method:
REA/HCW Adjustment

Adjustments are made to the adjusted preliminary yield grade for variations in actual REA from the REA/HCW chart.

Difference multiplied by 0.3

A larger than normal REA = SUBTRACT

A smaller than normal REA = ADD

Adjustments are made in tenths.

Hot Carcass Weight	Ribeye Area
500	**9.8**
600	11.0
700	12.2
800	13.4
900	**14.6**
1000	15.8
1100	17.0

Short Cut Method:
KPH Fat Adjustment

Adjustments are made to the adjusted PYG for variations in the % KPH from normal (3.5%)

For every 0.5% LESS than 3.5%, a tenth is subtracted

For every 0.5% MORE than 3.5, a tenth is added

KPH	Adjustment
6.0%	+ 0.5
5.5%	+ 0.4
5.0%	+ 0.3
4.5%	+ 0.2
4.0%	+ 0.1
3.5% (normal)	----------
3.0%	- 0.1
2.5%	- 0.2
2.0%	- 0.3
1.5%	- 0.4
1.0%	- 0.5
0.5%	- 0.6

Short Cut Method:
Fractional Parts

All adjustments to the PYG are made in tenths.

For grading purposes, the final yield grade is a whole number. All fractional parts are dropped.

For carcass evaluation purposes, fractions may be reported.

Yield Grade Determination- Yield Grade Short cut method

- Start with estimating the PYG – Ex. .4 inches = PYG of 3.0
- Get HCW – Know the REQUIRED REA needed for that weight
  - Ex. An 800 pound carcass needs a 13.4 sq. inch REA
- Estimate ACTUAL REA (sq. inches) and multiply the difference by .3
  - Ex. Actual REA is 15.4, so 15.4-13.4 = 2.0 sq. inches
  - 2.0 x .3 = .6
  - Subtract this value from the PYG so 3.0 - .6 = 2.4 (we subtract because the ACTUAL carcass REA is MORE than REQUIRED, so it has more muscle and will result in a lower numerical YG that results in a higher cutability)

Yield Grade Determination…

Yield Grade Equation – Short cut method

- Now estimate the % of KPH, based on the HCW
  - Ex. KPH estimated at 3.0 % (would be an actual weight of 24 pounds)
  - Subtract .1 from the value you have calculated so far (we subtract because the % KPH is less than the baseline of 3.5 (no plus or minus) so it has less fat and thus will result in a lower numerical YG that results in a higher cutability)
  - 3.0 - .6 = 2.4 - .1 = 2.3

- So 2.3 is the final CALCULATED yield grade with YG 2 being the actual YG applied

Yield Grade Example 1

HCW	PYG	REA REQ.	Act. REA	KPH	KPH ADJ.	FYG
639	2.6	11.4	12.4	2.0	-0.3	2.0

1. PYG of 2.6
2. A 639# carcass needs an 11.4” ribeye
   12.4 – 11.4 = 1 x 0.3 = 0.3
   Because the actual ribeye is bigger than the required ribeye size, we subtract.
3. KPH is 2.0% and according to the KPH chart, the adjustment for 2.0% = -0.3

PYG: 2.6
REA : -0.3
KPH : -0.3
_____

2.0

Yield Grade Example 2

HCW	PYG	REA REQ.	Act. REA	KPH	KPH ADJ.	FYG
815	2.7	13.5	13.1	2.5	-0.2	2.6

1. PYG of 2.7
2. A 815# carcass needs a 13.5” ribeye.
   13.5 – 13.1 = 0.4 x 0.3 = 0.12
   Because the actual ribeye size is smaller than the required ribeye size, we add
3. KPH % is 2.5 and according to the KPH chart, the adjustment for 2.5% = -0.2

PYG: 2.7
REA : +0.1
KPH : -0.2
_____

2.6

USDA United States Department of Agriculture

Yield Grade Evaluation Exercise

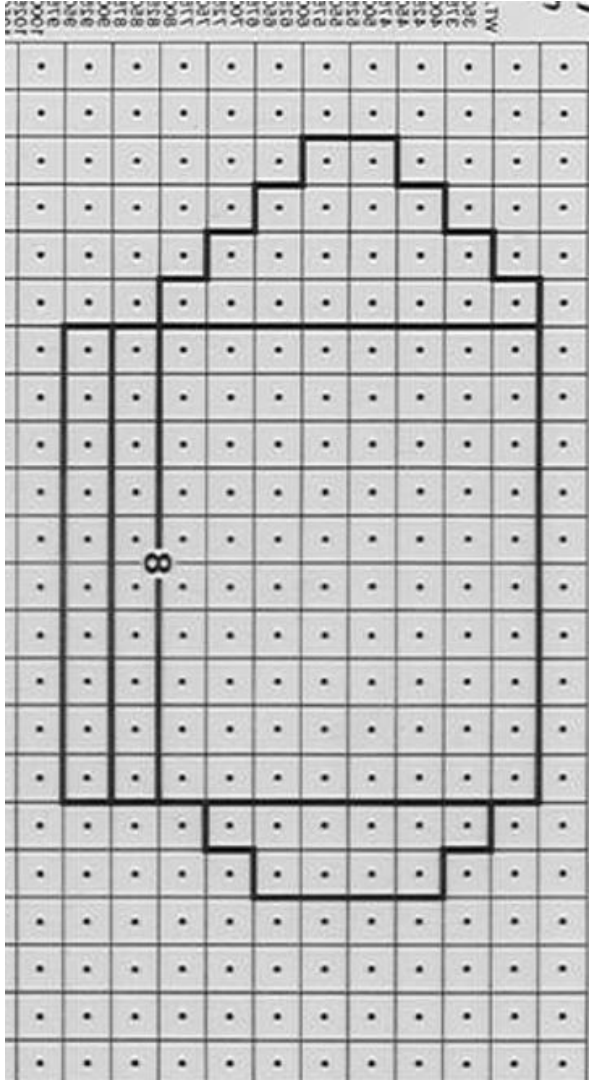
Which component of the yield grade calculation has the greatest influence on final yield grade?

A	Estimated % kidney-pelvic-heart fat (KPH)
B	12th rib fat thickness (PYG)
C	Hot carcass weight (HCW)
D	Ribeye area (REA)

Training Time Again…

* 5 ribeyes

* USDA Yield Grade call

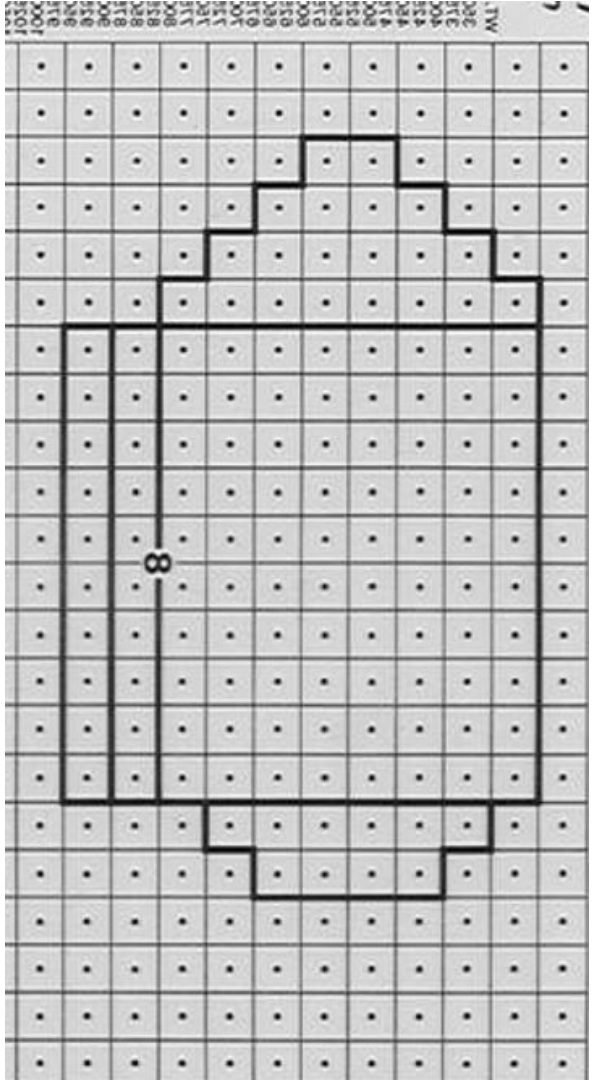


PYG of 3.2

HCW = 967 - NEEDS 15.4 – Has 15.6 so subtract .06 (.2 x .3)

KPH = 2.0% - Subtract .3

Final YG = 2.8 or YG 2

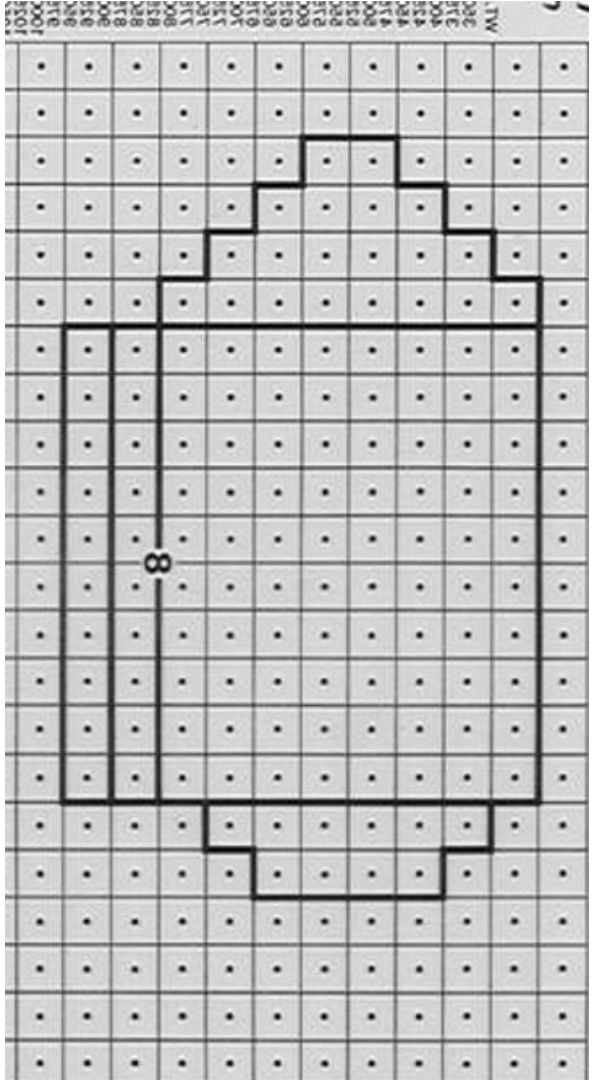


PYG of 3.3

HCW = 925 - NEEDS 14.9 – Has 15.7 so SUBTRACT .24 (.8 x .3)

KPH = 3.0% - Subtract .1

Final YG = 3.0 or YG 3

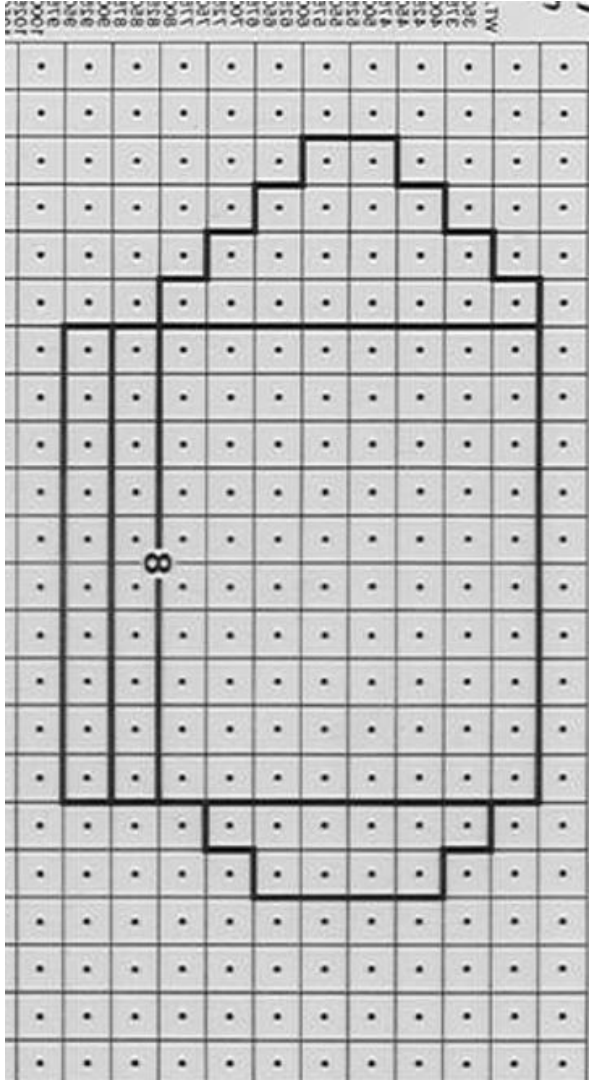


PYG of 3.3

HCW = 875 - NEEDS 14.3 – Has 13.6 so ADD .21 (.7 x .3)

KPH = 3.5% - No change

Final YG = 3.5 or YG 3

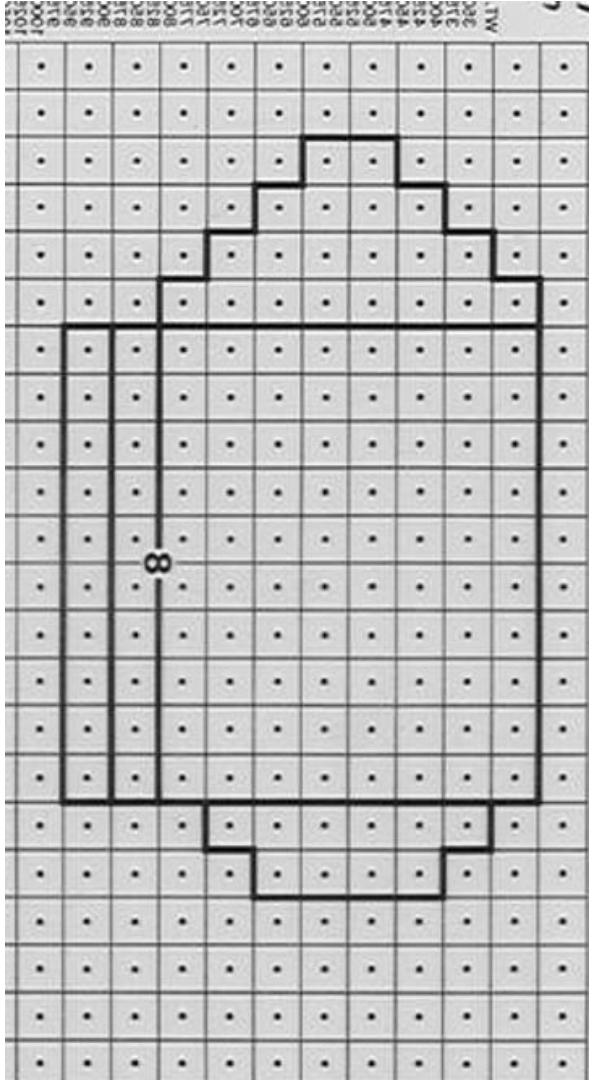


PYG of 3.8

HCW = 941 - NEEDS 15.0 – Has 13.8 so ADD .36 (1.2 x .3)

KPH = 4.5 % - Add .2

Final YG = 4.4 or YG 4



PYG of 4.0

HCW = 1075 - NEEDS 16.7 – Has 11.5 so ADD 1.56 (5.2 x .3)

KPH = 3.0% - Add .3

Final YG = 5.9 or YG 5

READY???

* 15 ribeyes
* 10 seconds for each one
* Just call the final YG of 1, 2, 3, 4, 5

Here we go!!!

How did you do???

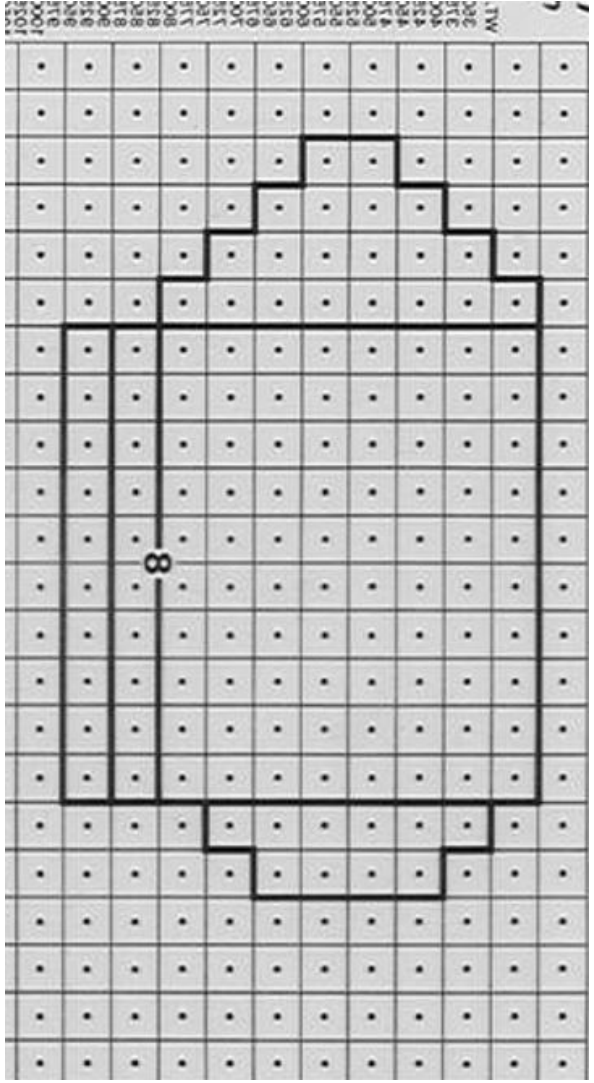
Scoring:

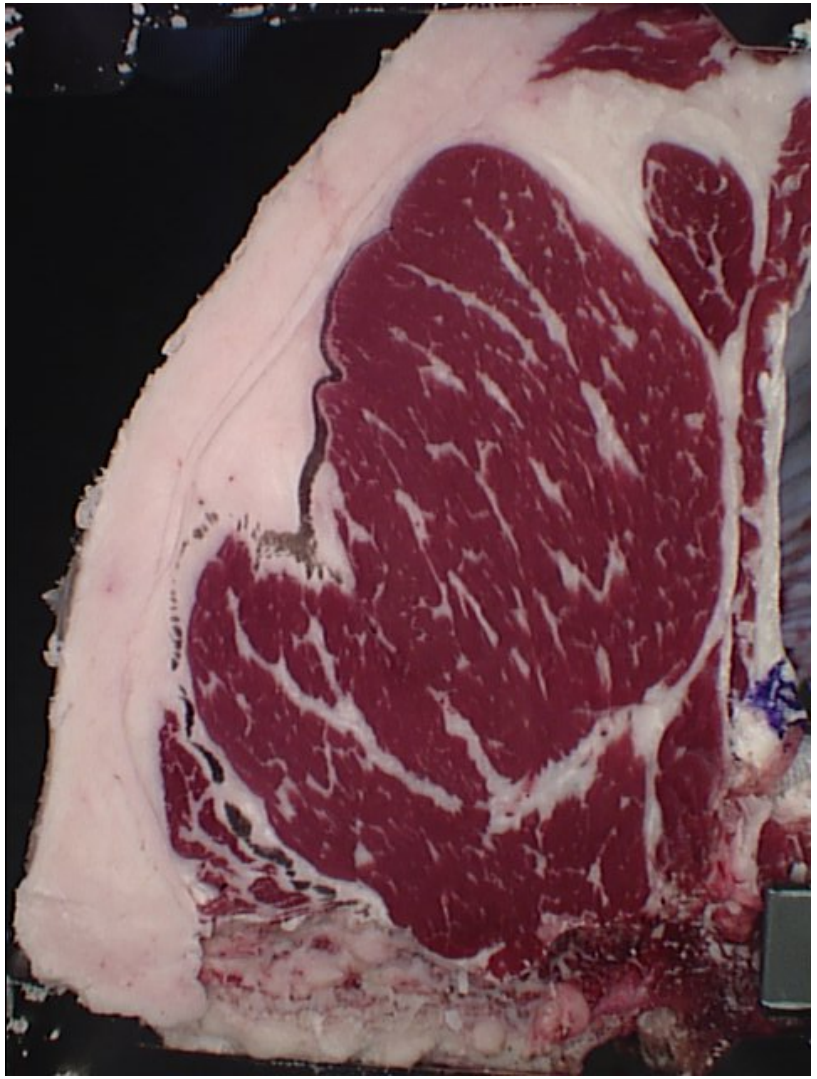
*10 points for correct

*5 points for one Yield Grade off

*0 point for more than one YG off

Total of 150 points

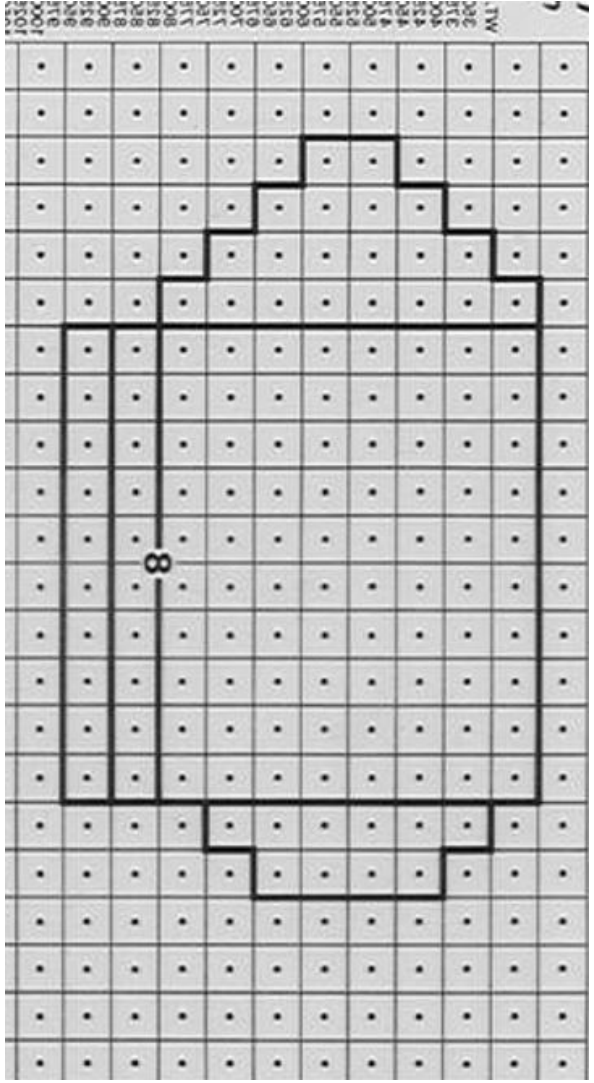




PYG = 3.6
HCW = 950 – NEEDS
15.2 – HAS 14.2
KPH = 3.5%
Final YG of 3.9 or

YG 3

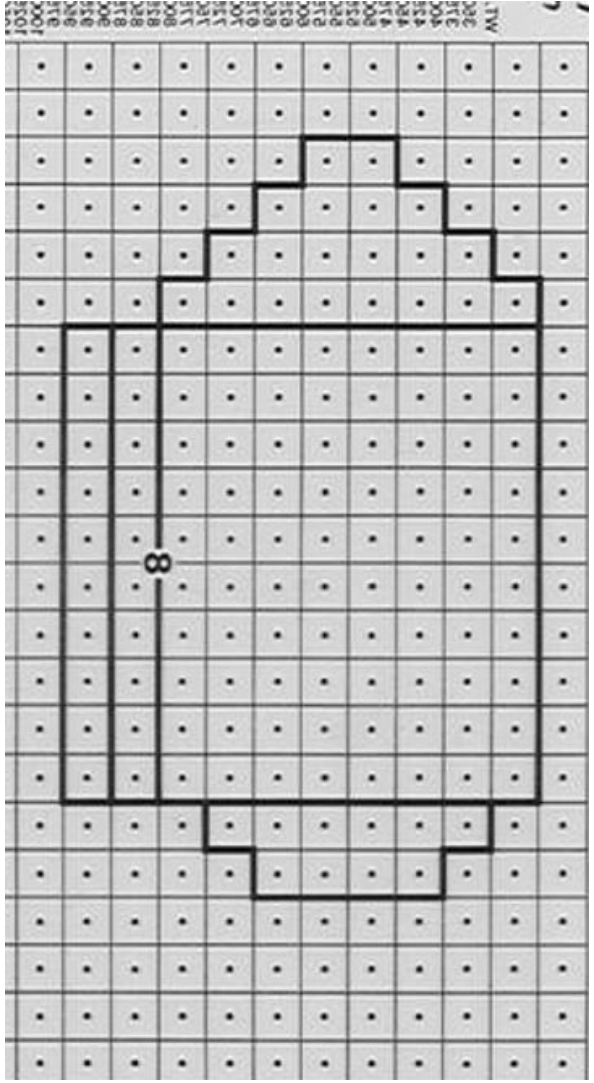
1



PYG = 3.3
HCW = 925 - NEEDS 14.9 – HAS 15.7
KPH = 3.0%

Final YG of 3.0 or YG 3

2

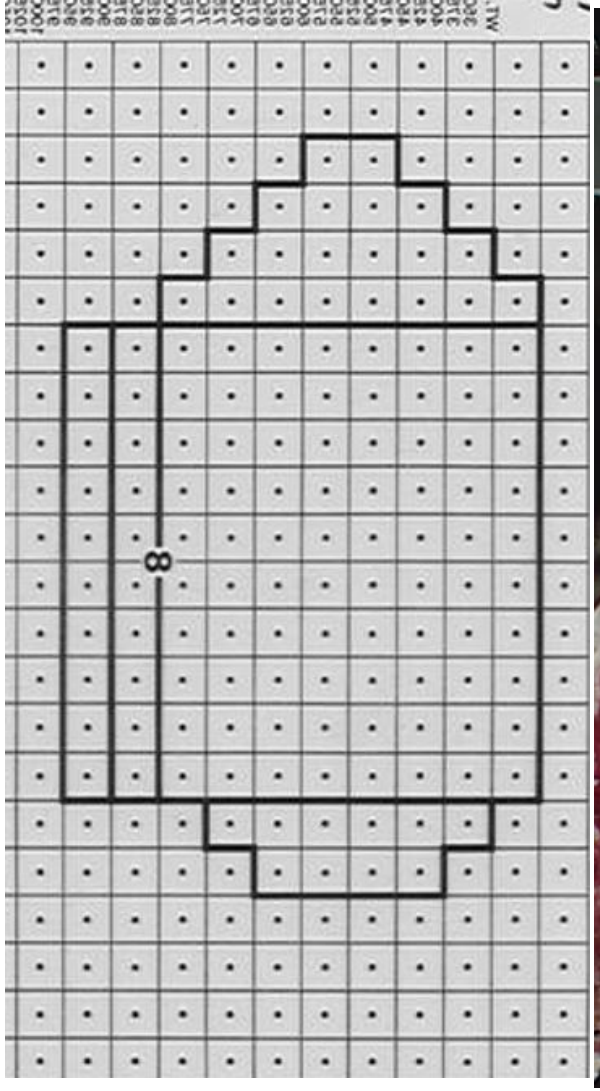


PYG = 3.4

HCW = 985 - NEEDS 15.6 – HAS 14.0

KPH = 4.0%

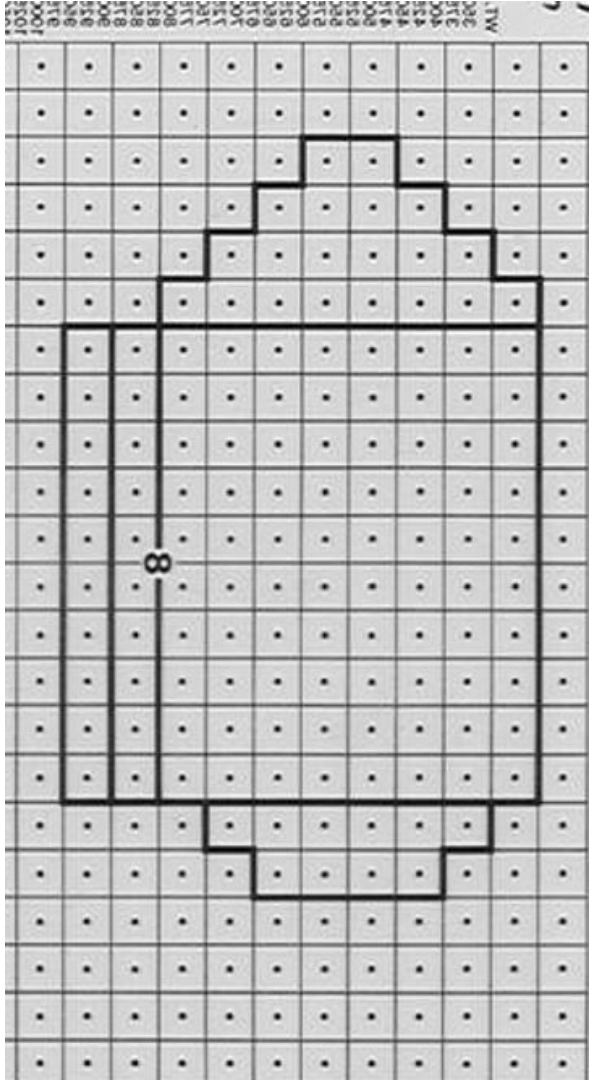
Final YG of 4.0 or YG 4



PYG = 3.0
HCW = 890 - NEEDS 14.4 – HAS 14.8
KPH = 4.5%

Final YG of 3.0 or YG 3

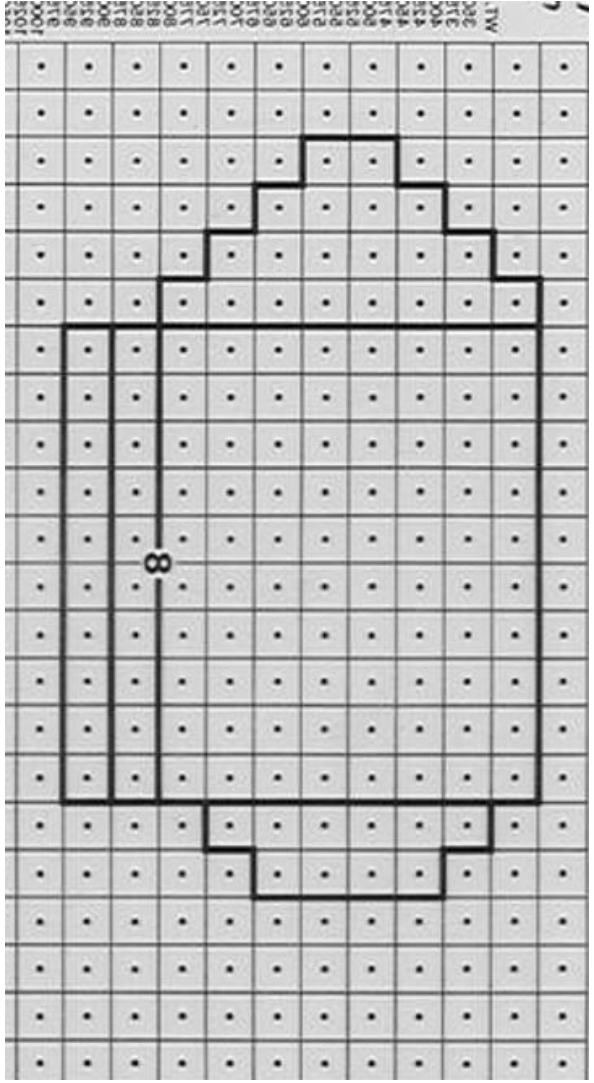
4



PYG = 3.3
HCW = 875 - NEEDS 14.3 – HAS 13.6
KPH = 3.5%

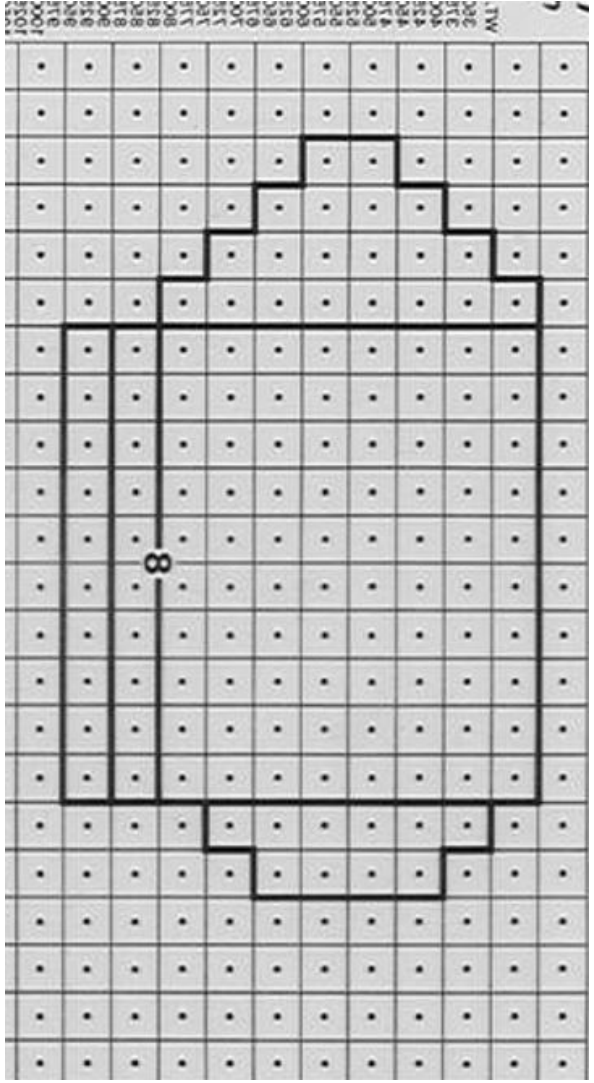
Final YG of 3.5 or YG 3

5



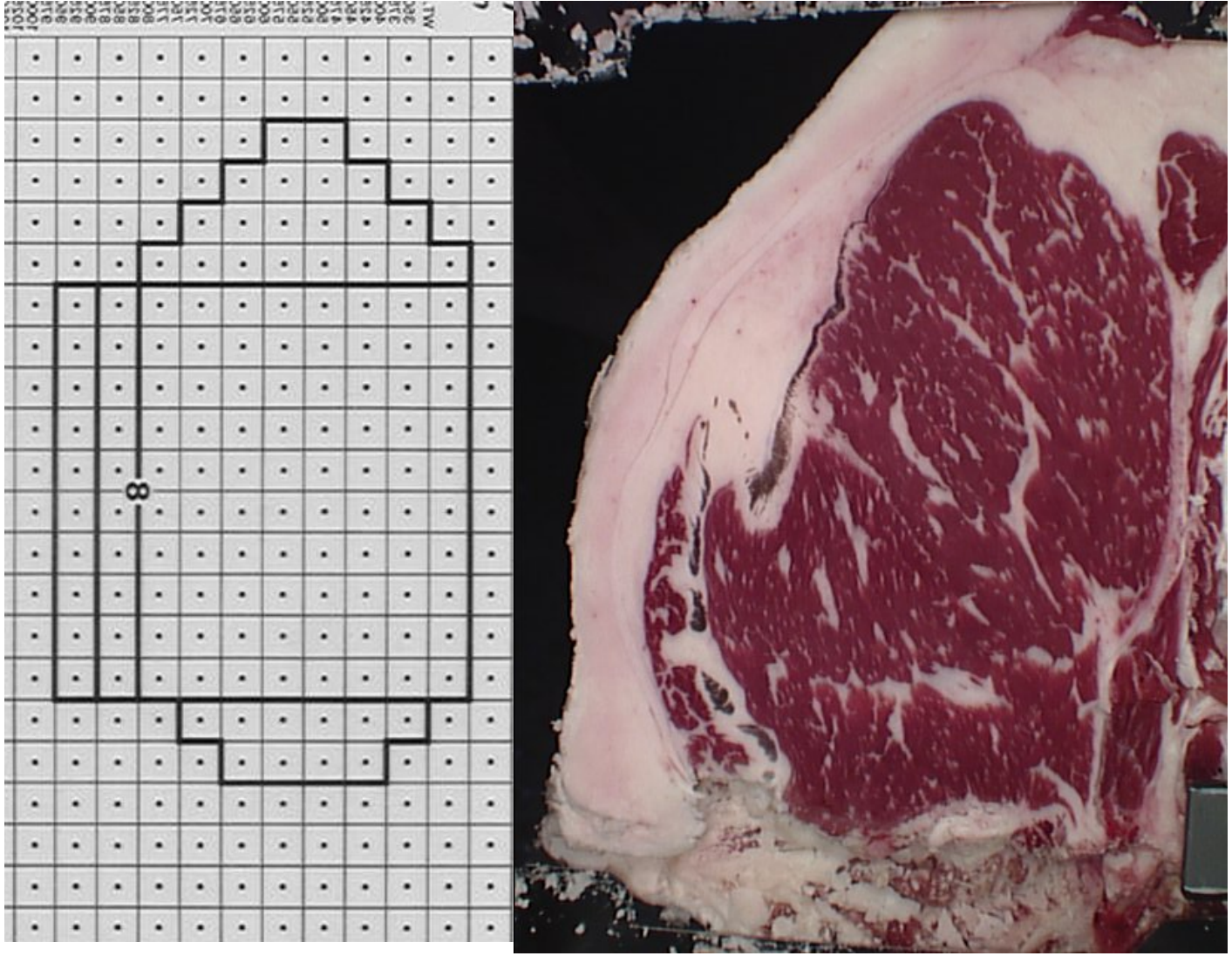
PYG = 3.8
HCW = 941 - NEEDS 15.1 – HAS 13.8
KPH = 4.5%

Final YG of 4.4 or YG 4



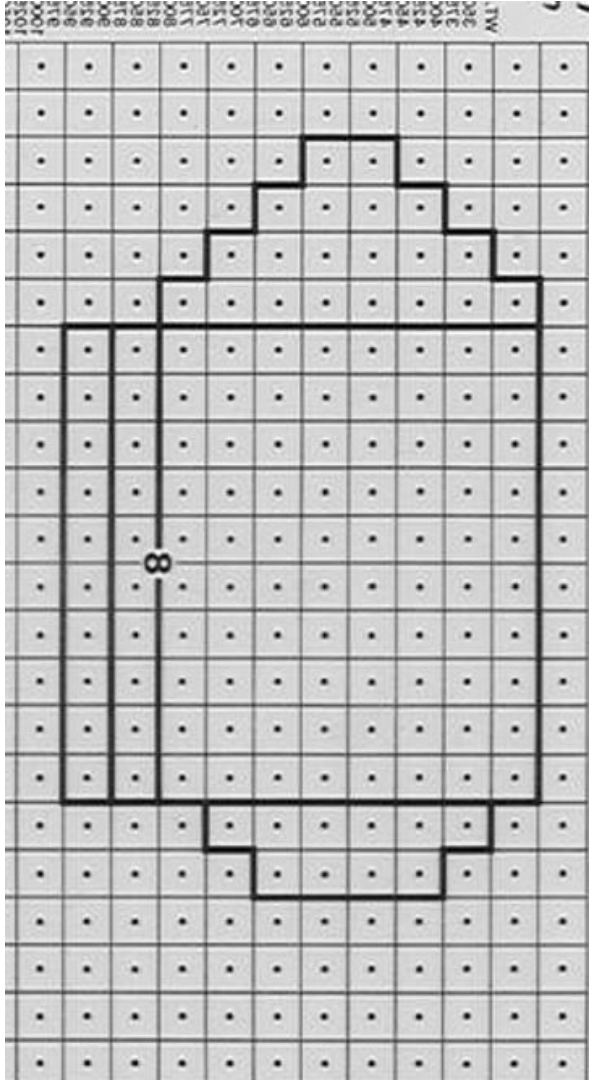
PYG = 3.5
HCW = 1065 - NEEDS 16.5 – HAS 14.4
KPH = 2.0%

Final YG of 3.8 or YG 3



PYG = 3.8
HCW = 1095 - NEEDS 16.9 – HAS 13.4
KPH = 5.0%

Final YG of 5.1 or YG 5

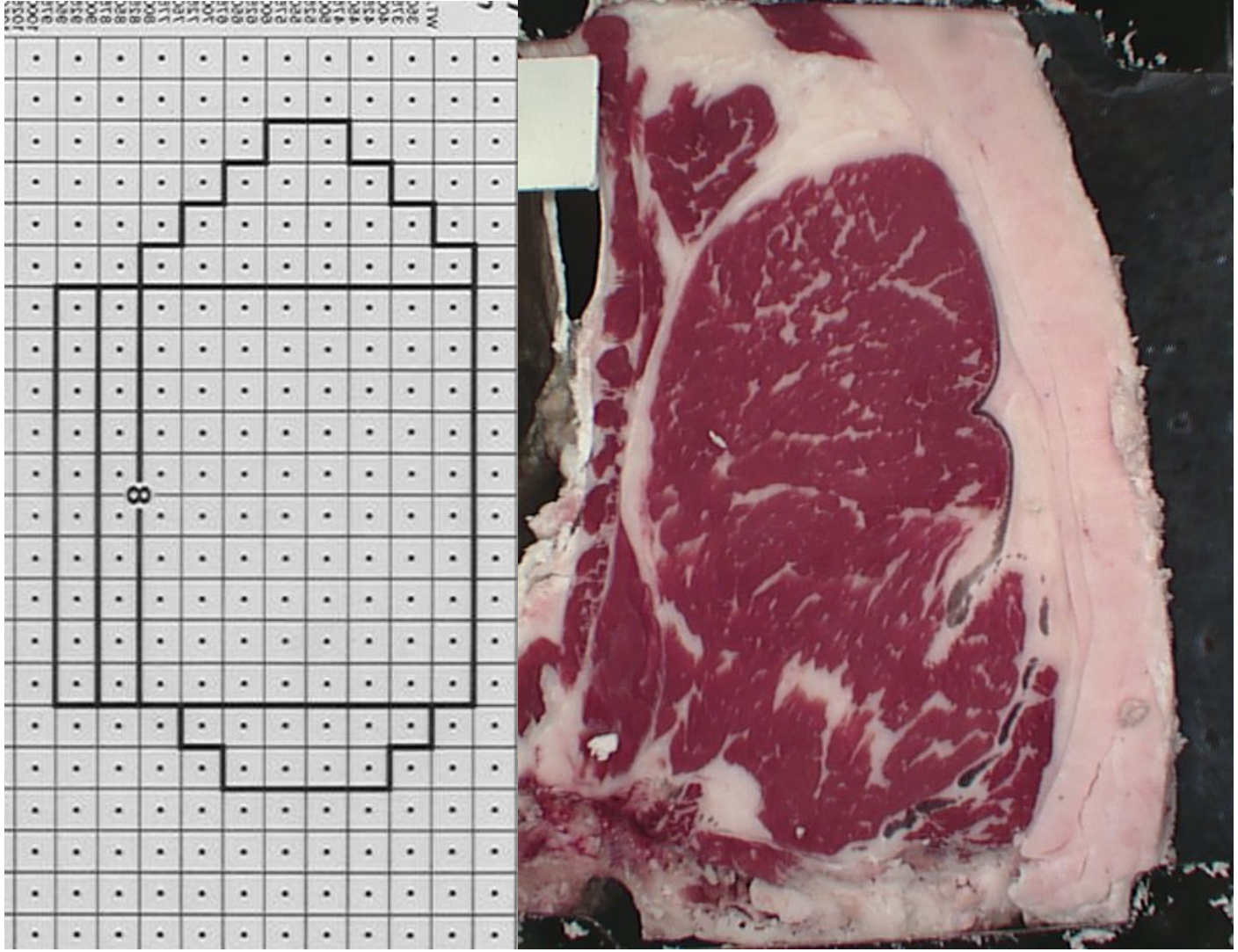


PYG = 3.7

HCW = 955 - NEEDS 15.7 – HAS – 13.5

KPH = 3.5%

Final YG of 4.2 or YG 4

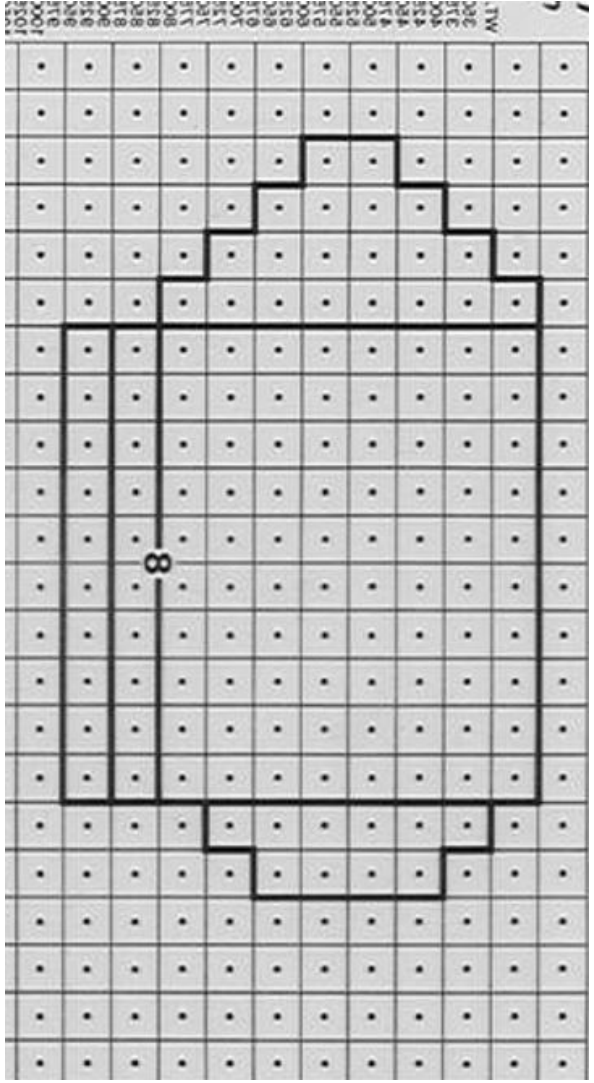


PYG = 4.4

HCW = 1010 - NEEDS 15.9 – HAS 12.6

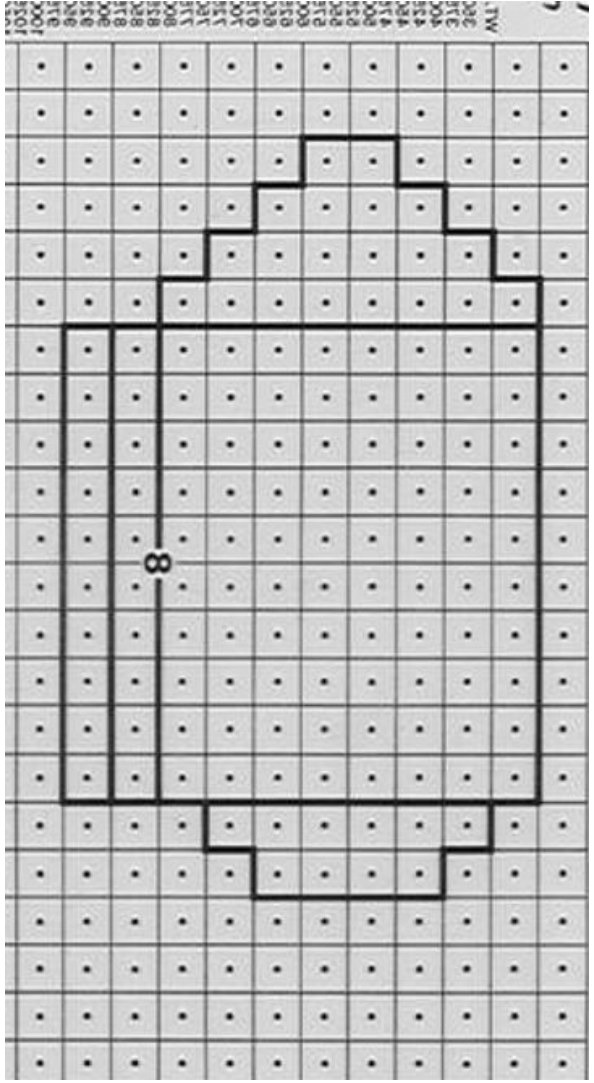
KPH = 3.0%

Final YG of 5.3 or YG 5



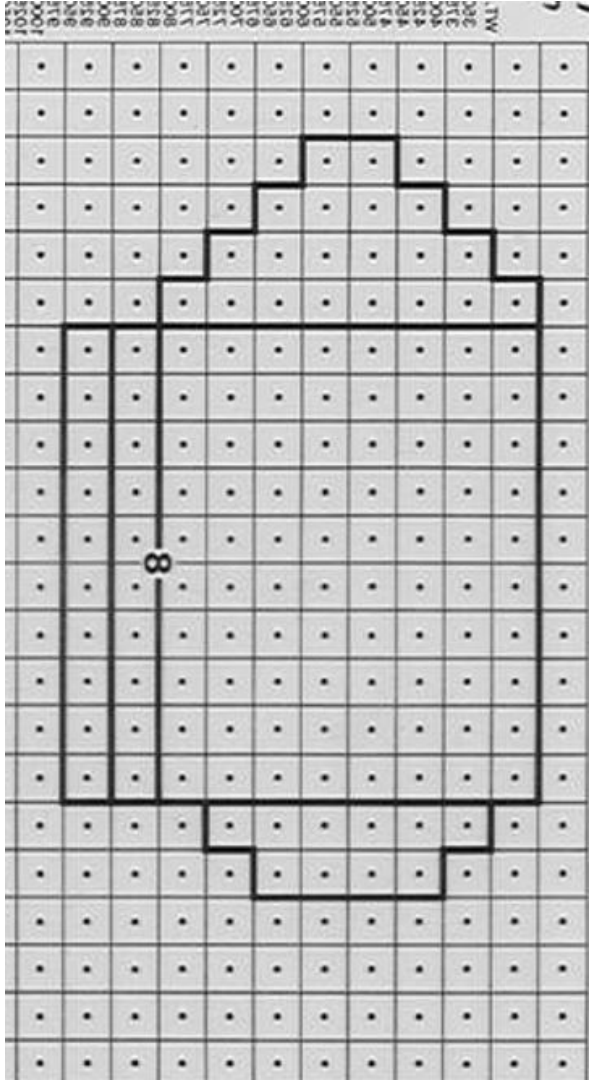
PYG = 3.3
HCW = 998 - NEEDS 15.7 – HAS 14.3
KPH = 4.5%

Final YG of 3.9 or YG 3



PYG = 4.3
HCW = 987 - NEEDS 15.6 – HAS 13.6
KPH = 3.0%

Final YG of 4.8 or YG 4

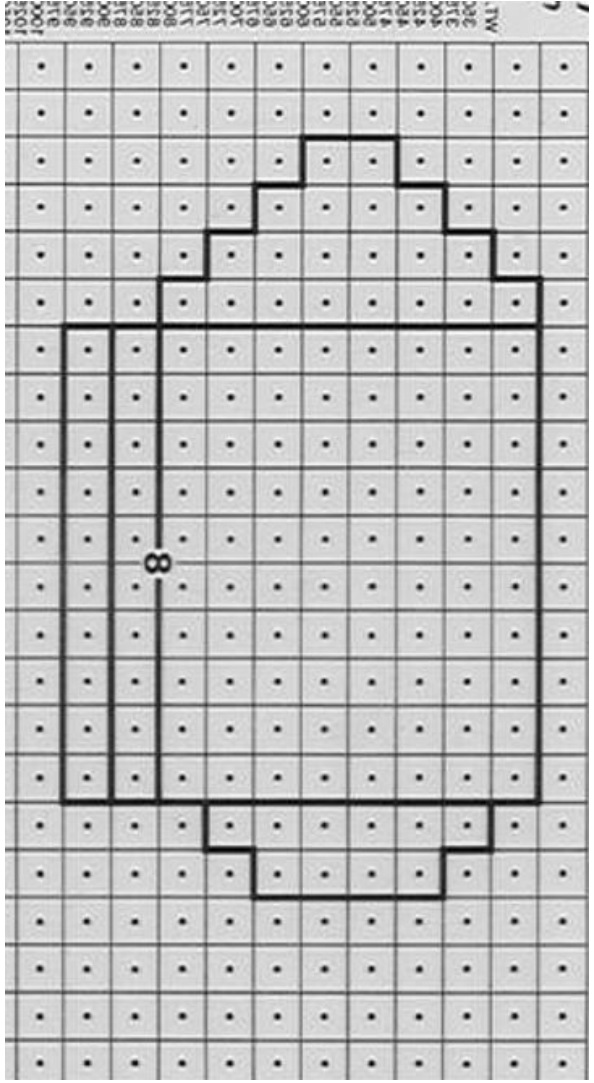


PYG = 4.0

HCW = 1075 - NEEDS 16.7 – HAS 11.5

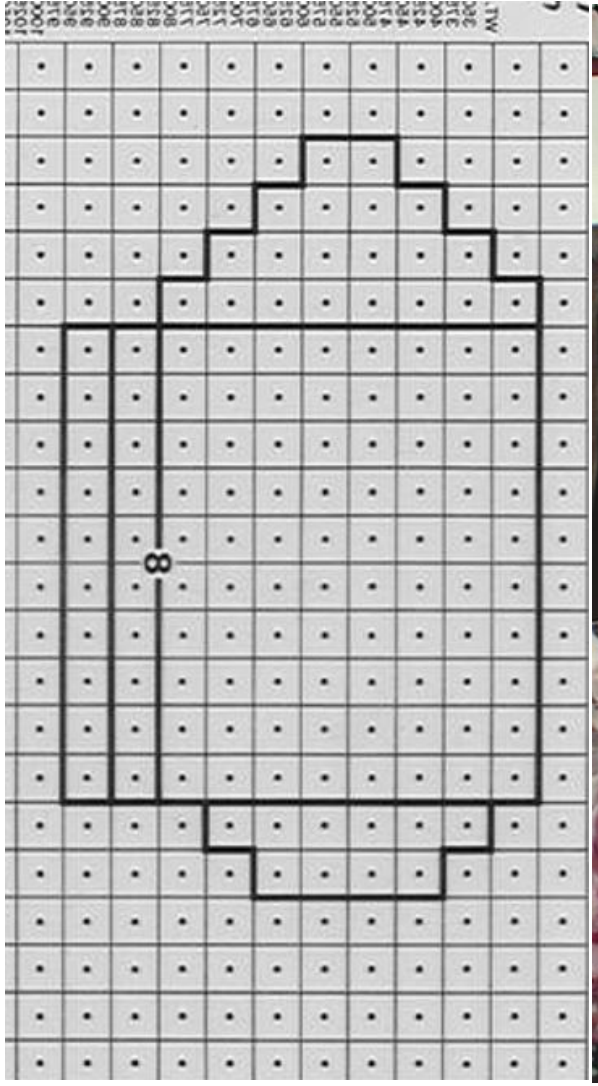
KPH = 5.0%

Final YG of 5.9 or YG 5



PYG = 3.2
HCW = 967 - NEEDS 15.4 – HAS 15.6
KPH = 2.0%

Final YG of 2.8 or YG 2



PYG = 3.7
HCW = 1017 - NEEDS 16.0 – HAS 15.9
KPH = 3.5%

Final YG of 3.7 or **YG 3**

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