



BEEF CARCASS INSTRUMENT GRADING PROCEDURES

1 Purpose

The U.S. Department of Agriculture (USDA), Agricultural Marketing Service (AMS), Livestock and Poultry (L&P) Program, Quality Assessment Division (QAD) has implemented a program to predict beef carcass quality and yield factors made by approved instrument systems. Applicants may use this voluntary program to augment the official USDA beef carcass grading in their plant(s); in doing so applicant's will adhere the appropriate QAD Procedures and the USDA grader continues to determine the official USDA grade.

2 Scope

The intent of utilizing beef carcass instrument grading augmentation is to improve the accuracy and uniformity of grade application nationwide. Instrumentation grade data may be obtained from both sides of a carcass or from either side. When both sides are available and the plant only collects grade data from a single side, the plant instrumentation operator shall determine which side will be used to collect the best quality and/or yield grade data. When neither side of a carcass can be used for instrumentation assessment, the carcass may be presented for traditional grading provided an accurate grade determination can be made by the QAD grader or re-presented for instrument assessment if further preparations are conducted for proper image capture.

3 References

[QAD 500 Procedure: *Beef, Bullock, and Bull Grading Methods and Procedures*](#)

[QAD 515A Appendix: *Instrument Marbling Validation Cards*](#)

[Cam Check electronic form](#)

[Override Data electronic form](#)

[United States Standards for Grades of Carcass Beef](#)

4 Instrument and Cooler Operation

4.1 Applicant Responsibility

4.1.1 Provide the QAD grader with approved procedures for startup and re-startup in the event of instrumentation failure during a single shift.

4.1.2 Provide documentation that the instrument operator(s) and/or technician(s) is/are trained.



- 4.1.3 Use only instruments approved by QAD.
- 4.1.4 Assure carcasses are adequately chilled, properly split, and properly ribbed a minimum of ten minutes prior to presentation to the instrument and presented for grading in accordance with QAD 500 Procedure: *Beef, Bullock, and Bull Grading Methods and Procedures*.
- 4.1.5 Operate instrument technology in accordance with the manufacturer's guidance.
- 4.1.6 Provide instrument prediction information and images to the QAD grader monitoring of the system.
- 4.1.7 Store images (both raw and processed) and corresponding information a minimum of 15 days. When requested by QAD, provide images and information within 5 business days.
- 4.1.8 *When an instrument fails a long-term validation check, written documentation of servicing must be provided to the grader prior to reinstating the use of the instrument.*
- 4.2 AMS Responsibility
- 4.2.1 Review, understand, and apply the approved start-up procedures.
- 4.2.2 Verify the training of the operator and technicians are current (within the last 12 months) via a training log or other acceptable documentation.
- 4.2.3 Verify, as applicable, that the instrument(s) is/are on an approved list via serial numbers, etc.
- 4.2.4 Verify that all components (camera head, cable and controller box) of the LED and Xenon cameras have the same ID number. Verify that the camera number displayed on the monitor matches the number on camera head on the GigE cameras.
- 4.2.5 Assign a sufficient number of QAD graders to provide an efficient and effective service.
- 4.2.6 Monitor calibration/validation of the instrument immediately at the beginning of each shift and prior to the start of operations, even if one shift runs continuously into the second shift. Additional validation by the applicant (system check) will occur at the mid-shift meal break.
- A. Daily Validation - Ensure that the marbling validation readings are within the daily tolerances established in QAD 515A Appendix: *Instrument Marbling Validation Cards - Target and Tolerance Values*.
1. Submit the average marbling check scores (low, medium, and high) as well as the standard deviation for each card on the [Cam Check electronic form](#). If the marbling score readings are within the daily tolerances, a "pass" shall be indicated with a "1" (one) for correct or a "0" (zero) for not correct in the "Daily" box. Also record the average value for the USDA marbling card as well as the



standard deviation (these values are not considered when validating the instrument and are used for maintenance issues only).

2. If the marbling check system fails, notify applicant management, and discontinue use of the instrument until the problem has been corrected. At the option of the applicant, traditional grading by the QAD grader may occur until corrective action is completed. The system must be rebooted and allowed to warm up a minimum of 20 minutes. After a corrective action, monitoring/validation will be repeated before a restart of instrumentation operations.

B. Long Term Validation - Ensure that the long-term readings are within the tolerance four (4) or more times for the last ten (10) checks (see QAD 515A Appendix: *Instrument Marbling Validation Cards - Target and Tolerance Values*).

1. If two or more of the readings from the Low, Medium or High cards are within the long-term tolerances, (Low and High, Medium and High, Low and Medium, or all three), a “pass” shall be indicated with a “1” (one) in the “Long Term” box. If two or more of the marbling score readings are outside of the long-term tolerances, place a “0” (zero) in the “Long Term” box.

NOTE: The USDA marbling card is not part of the long-term validation check.

2. If seven of the last ten long term marbling validation checks have failed, notify applicant management, and discontinue use of the instrument until the instrument system has undergone a documented service and recalibration, and the problem causing the noncompliance has been corrected. Written documentation of servicing must be provided to the grader. Management may use an alternate instrument system or may use traditional grading by the QAD grader until the corrective action is completed.

4.2.7 QAD graders will submit Cam Checks via the [Cam Check electronic form](#).

4.2.8 Supervisors and the Instrument Grading Program Manager will regularly monitor Cam Check submissions located on the [QAD AGNIS site](#).

5 Carcass Presentation Phase

5.1 Applicant Responsibility

5.1.1 Ensure carcasses are presented split and ribbed in accordance with the *United States Standards for Grades of Carcass Beef*.

5.1.2 Provide an employee to identify the carcasses with the official USDA grade shields and acceptance stamps. Staffing and position placement of QAD graders for this purpose will be



determined locally by the QAD supervisor on a case-by-case basis.

- 5.1.3 In chain grading operations, provide a shut-off switch for the QAD grader to stop the operation when additional time is needed to override the instrumentation grade prediction.

5.2 AMS Responsibility

Ensure official grading equipment is used to apply grade and certification identification stamps when accepting instrument grade factor data output. Plant employees applying grade stamps must be in close and visual proximity to the QAD grader so that the proper grade carcass identification can be monitored.

6 **Image – Capture Phase**

6.1 Applicant Responsibility

- 6.1.1 Ensure images are sharp and clear (properly focused and not blurred).
- 6.1.2 Ensure images are free of processing debris that would negatively impact instrument prediction (cumulative area must not exceed 0.5 square inches).
- 6.1.3 Ensure camera placement includes the 12th-13th rib cross section.
- 6.1.4 Ensure quality control measures are being conducted to verify proper alignment of camera mechanism on carcass surface.
- 6.1.5 Ensure images do not have extra muscles (examples: spinalis dorsi and intercostal) that would negatively impact instrument prediction (cumulative area must not exceed 0.9 square inches) for over tracing or under tracing. If they do, image would be deemed unacceptable for grade.

7 **Official Grade Determination Phase**

In addition to monitoring the plant operational system as described above, the QAD grader is responsible for the official grade determination in accordance with the *United States Standards for Grades of Carcass Beef*, within the following limitations.

7.1 AMS Responsibility

- 7.1.1 The on-line QAD grader will accept the instrument grade factor data output for each carcass unless:
 - A. Carcasses are not presented in accordance with official USDA standards and QAD 500 Procedure: *Beef, Bullock and Bull Grading Methods and Procedures*. Carcasses not properly presented would include carcasses exhibiting on one or both side(s) as applicable:



1. Ribbed on a bias
 2. Fat trim or fat pulls (if yield grading)
 3. Mis-splits not allowing proper evaluation of the bone surfaces
 4. Carcasses exhibiting a surface other than the 12th-13th rib cross section
- B. Carcasses presented have:
1. Frozen ribeyes
 2. Dark cutting characteristics
 3. Advanced maturity for instrument assigned grade
 4. Blood shot area of more than a small amount
 5. Callous areas in excess of ½ square inch
- C. Carcass ID number does not match the monitor carcass ID number.
- D. Image and data does not match the carcass even if the carcass ID numbers match.
- E. Override instrument prediction of Official Quality or Yield Grades if the QAD grader determines that:
1. Visual assessed marbling is 20 degrees or greater different from the instrument and would result in a different quality grade. All instrument marbling calls will be rounded down for instruments that call marbling to the single degree. (For example, instrument calls marbling a Small-08, we will call it a Small-0. If the instrument calls the carcass a Slight-97, we will call it a Slight-90.) Overrides will be submitted on the [Override Data electronic form](#).
 2. Ribeye area is 1.0 square inch or greater different from the instrument and would result in a different yield grade, or carcass specification certification decision. (If applying yield grades.)
 3. Fat thickness is 0.2 inch or greater different from the instrument.
 4. Preliminary yield grade (PYG) is 0.5 inch or greater different from the instrument. (If applying yield grades.)
 5. Final yield grade is 0.50 or greater different from the instrument and would result in a different yield grade. (If applying yield grades.)



Note: The override determination is made independently for 1, 2, 3, and 4 above, and is applied even if only one side of the carcass was properly imaged.

7.1.2 Carcasses will be eligible for instrument or visual (traditional) assessment for the purpose of re-grading as requested by the plant. If presented for visual re-grade evaluation, graders will use the following criteria.

A. Utilize tolerances established by QAD before changing instrument prediction.

B. Override instrument prediction if the QAD grader determines that:

1. Visual assessed marbling is 40 degrees or greater different from the instrument and would result in a different quality grade.
2. Ribeye area is 1.0 square inch or greater different from the instrument and would result in a different yield grade, or carcass specification certification decision. (If applying yield grades.)
3. Fat thickness is 0.2 inch or greater different from the instrument.
4. Preliminary yield grade (PYG) is 0.5 inch or greater different from the instrument.
5. Final yield grade is 0.50 or greater different from the instrument and would result in a different yield grade.

Note: The override determination is made independently for 1, 2, 3, and 4 above, and is applied even if only one side of the carcass was properly imaged.

C. Carcasses presented for re-grades using instrument assessment factors may be imaged by the on-line instrument on the grading chain, or by an approved portable instrument on stationary re-grade rails. Both on-line and portable instruments must be calibrated and validated daily in accordance with this procedure. Carcasses may be imaged one (1) time for re-grade purposes during the time graders are asked to review regrades (similar to the process for traditional regrades when a carcass will be examined once during a review). Over and under tracing of the ribeye muscle is not a consideration for instrument marbling prediction.

7.1.3 Supervisors and the Instrument Grading Program Manager will monitor overrides on the [QAD AGNIS Override Data website](#).

7.2 Applicant Responsibility



- 7.2.1 Provide instrument assessment data and ribeye images (color or black and white) to the QAD grader for each carcass presented for visual re-grading. The applicant may use a tablet to pull up images and marbling calls along with carcass ID numbers, provided the QAD grader can clearly see the information.
- 7.2.2 Ensure a mechanism is in place to reflect any change of grade made by the QAD grader.
- 7.2.3 Re-grades presented for visual assessment must be presented to the QAD grader in adequate lighting (100 foot candle power minimum).
- 7.2.4 Provide the QAD grader daily quality and yield grade counts by shift by grader.

8 Gross Non-compliance

The QAD grader may suspend the use of grade factors from instrumentation systems at any time gross non-compliance is observed and cannot be immediately corrected.

Gross non-compliance is defined as within a 1-hour period, 10% of carcasses being considered were either over or under graded by 20 degrees of marbling or more. For example, carcasses being evaluated as Choice (Small-0) by the instrument and the marbling calls evaluated by the grader as Slight-80 or less marbling will be considered to be incorrectly graded and be over-graded.

Graders will count over-rides on each shift for marbling only. The method of keeping these counts is approved by local supervision. Graders submit an [Override Data electronic form](#) and send an email notification to their supervisor and the Instrument Grading Program Manager no later than the following morning.

- 8.1 Other examples of gross non-compliance:
 - 8.1.1 The displayed instrumentation image or instrument prediction does not match the carcass presented for grading.
 - 8.1.2 The monitor does not display carcass information while the grading chain is running.
 - 8.1.3 Traditional grading by the QAD grader may occur until a corrective action has been taken.

9 Report of Numbers Graded

On a daily basis, applicants will provide the grader(s) the number of total carcasses transferred and presented for grading and the total number of head graded by quality grade, yield grade, and carcass specification, and the average weight for carcasses transferred for grading. This information should be made available to the grader on the day following grading.



10 Change of Record

The following changes were made to the 08 31 18 revision of this document:

1. Revised 1st paragraph
2. Removed QAD 515 B, C, and D forms
3. Added Cam Check electronic form
4. Added Override Data electronic form

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