Warner-Bratzler Shear Force Protocol

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Standard Equipment

Warner-Bratzler Shear Force can be performed using a Warner-Bratzler shear machine or an automated testing machine with a Warner-Bratzler shear blade and crosshead speed of 200 or 250 mm/minute. Warner-Bratzler shear blade specifications include: 1) blade thickness of 1.016 mm (0.040 inches), 2) vee-shaped (60° angle) cutting blade, 3) cutting edge beveled to a half-round, 4) corner of the vee should be rounded to a quarter-round of a 2.363 mm diameter circle, 5) the spacers providing the gap for the cutting blade to slide through should be 2.0828 mm thick.

Warner-Bratzler Shear Machine

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Testing machines from Instron Corp, United Testing Systems, or Texture Technologies could be used with a Warner-Bratzler shear blade attachment.

Warner-Bratzler Shear Blade

Protocol

1. After cooking and recording final cooked temperature and weight, steaks should be chilled overnight at 2 to 5°C before coring. Chilling firms the steak making it easier to obtain uniform diameter cores. If chilling is not used, some protocol to obtain consistent steak temperature before coring should be followed, such as allowing steaks to reach room temperature (23°C).

Protocol

2. Round cores should be 1.27 cm (0.5 inches) in diameter and removed parallel to the longitudinal orientation of the muscle fibers so that the shearing action is perpendicular to the longitudinal orientation of the muscle fibers.

Protocol

3. Cores can be obtained using a hand-held coring device (cork borer) or an automated coring device (drill press with cork borer attached).

Coring Devices

Protocol

4. Coring devices must be in good condition and sharp or the core diameters will not be consistent and will result in spurious increased variation in shear values.

Coring with a drill press

Protocol

5. A minimum of six cores should be obtained from each sample (this may require 1 or more steaks or chops depending on the muscle and species). Cores that are not uniform in diameter, have obvious connective tissue defects or otherwise would not be representative of the sample should be discarded.

Cores

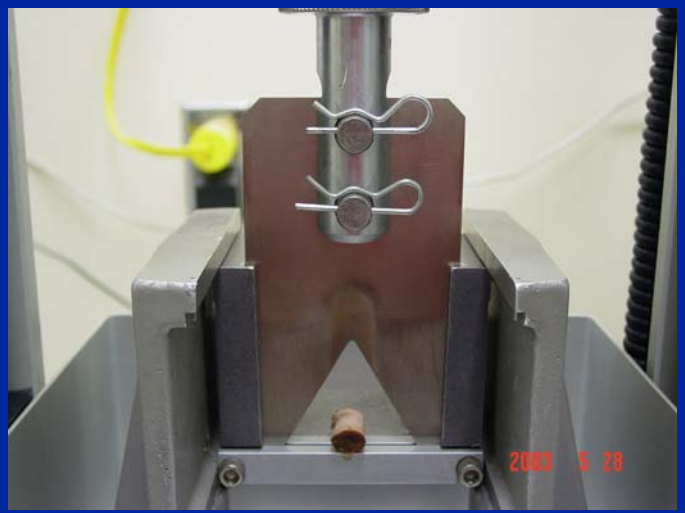
Protocol

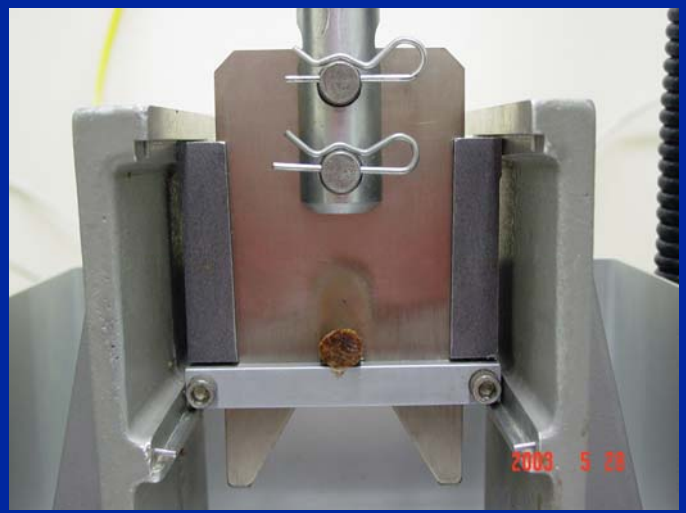
6. If steaks were chilled, cores should be kept refrigerated until sheared to maintain consistent temperature. All values obtained should be used for mean calculation, unless visual observation indicates some reason a value should be discarded (e.g., a piece of connective tissue).

Protocol

7. Each core should be sheared once in the center to avoid the hardening that occurs toward the outside cooked edge of the sample.

Shearing a core





Shear tests that do not follow these equipment or sample specifications should not be referred to as “Warner-Bratzler” shear force (such as square holes in the shear blade, square meat samples, straight edged shear blade, or blade not properly beveled, etc).