

# Slice Shear Force Protocol

USDA-ARS

U.S. Meat Animal Research Center

Clay Center, Nebraska

The USDA neither guarantees nor warrants the standard of the products mentioned to the exclusion of other products that also may be suitable.

This protocol is for longissimus. We also have developed slice shear force protocols and their descriptions for 20 other muscles. If you are interested in these, contact us or go to our website.

We recommend you send someone to our lab to be trained in person. However, if that is not possible the following description of the protocol is fairly detailed and the video in the 2014 AMSA Sensory Guidelines should be helpful. If you have any questions, do not hesitate to call us.

# SSF Standardized Equipment

## Slice Shear Force Kit

To help ensure consistency across institutions a Slice Shear Force Kit is available that includes three items: a sizing box, a slice box, and a double-bladed knife (it also could include the shearing blade if you wanted an extra). We strongly recommend using this kit.

Contact:

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web site is <http://www.tallgrassproducts.com>

The slice blade should be 1.1684 mm (0.046 inches) thick with the cutting edge beveled to a half-round. The spacers creating the gap for the cutting blade to slide through should be 2.0828 mm (0.082 inches) thick. The crosshead speed should be 500 mm/min for automated testing machines (several brands available).

# SSF Protocol

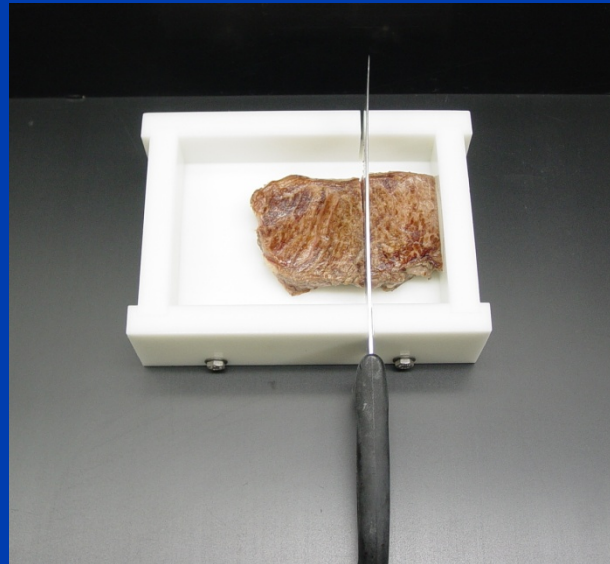
Remove from the lateral end of each steak a 1-cm-thick, 5-cm-long slice that is parallel to the muscle fibers using the following steps.

# Obtaining 1 cm-thick, 5 cm-long slice

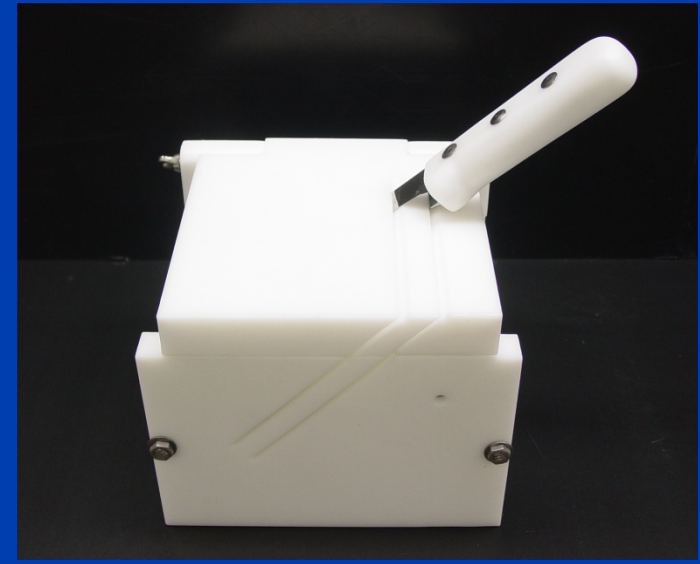
1



2



3



# SSF Protocol

1. A cut is made across the width of the longissimus at a point about 1 to 2 cm from the lateral end of the muscle.



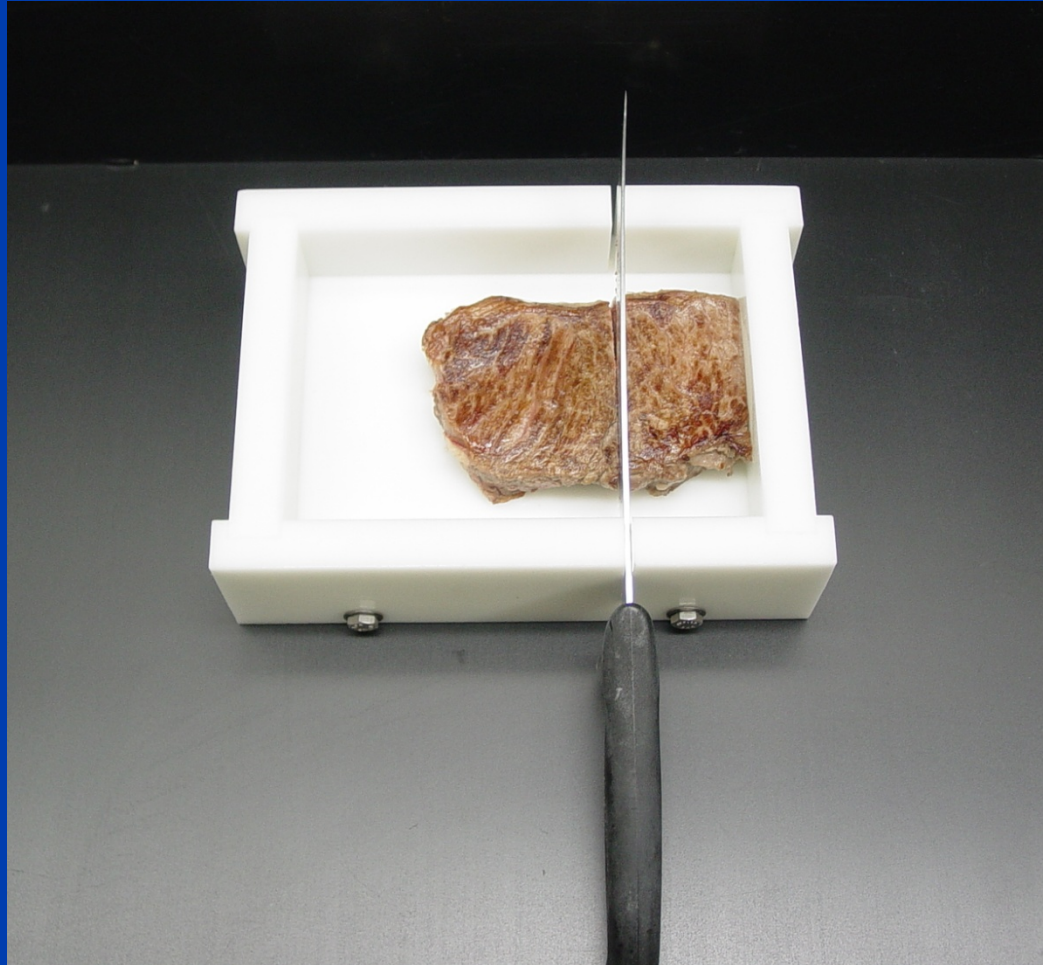
Step 1. Square off the end of the muscle



# SSF Protocol

2. Using the sample sizing box, a second cut is made across the width of the longissimus, parallel to and at a distance of 5 cm from the first cut.

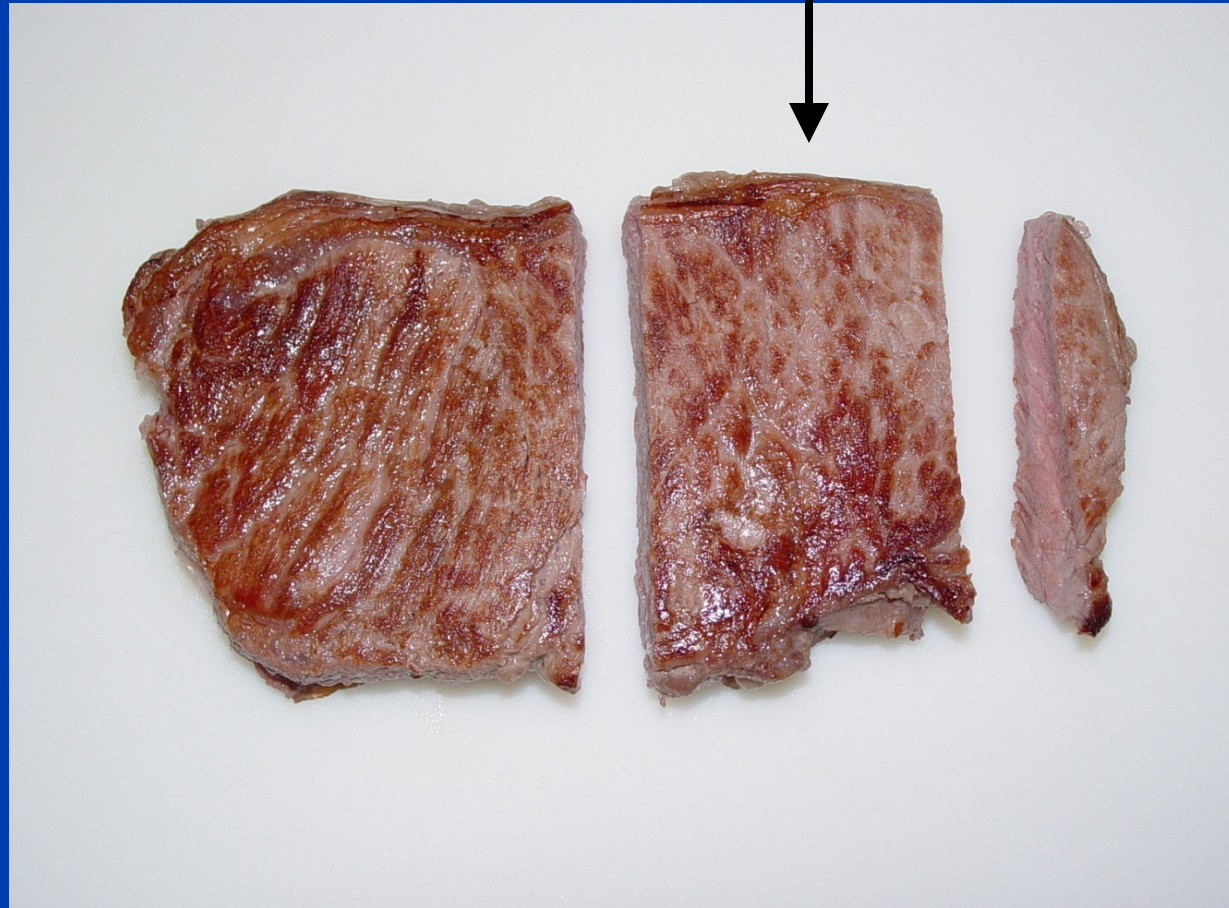
Step 2. Obtain the 5-cm long section



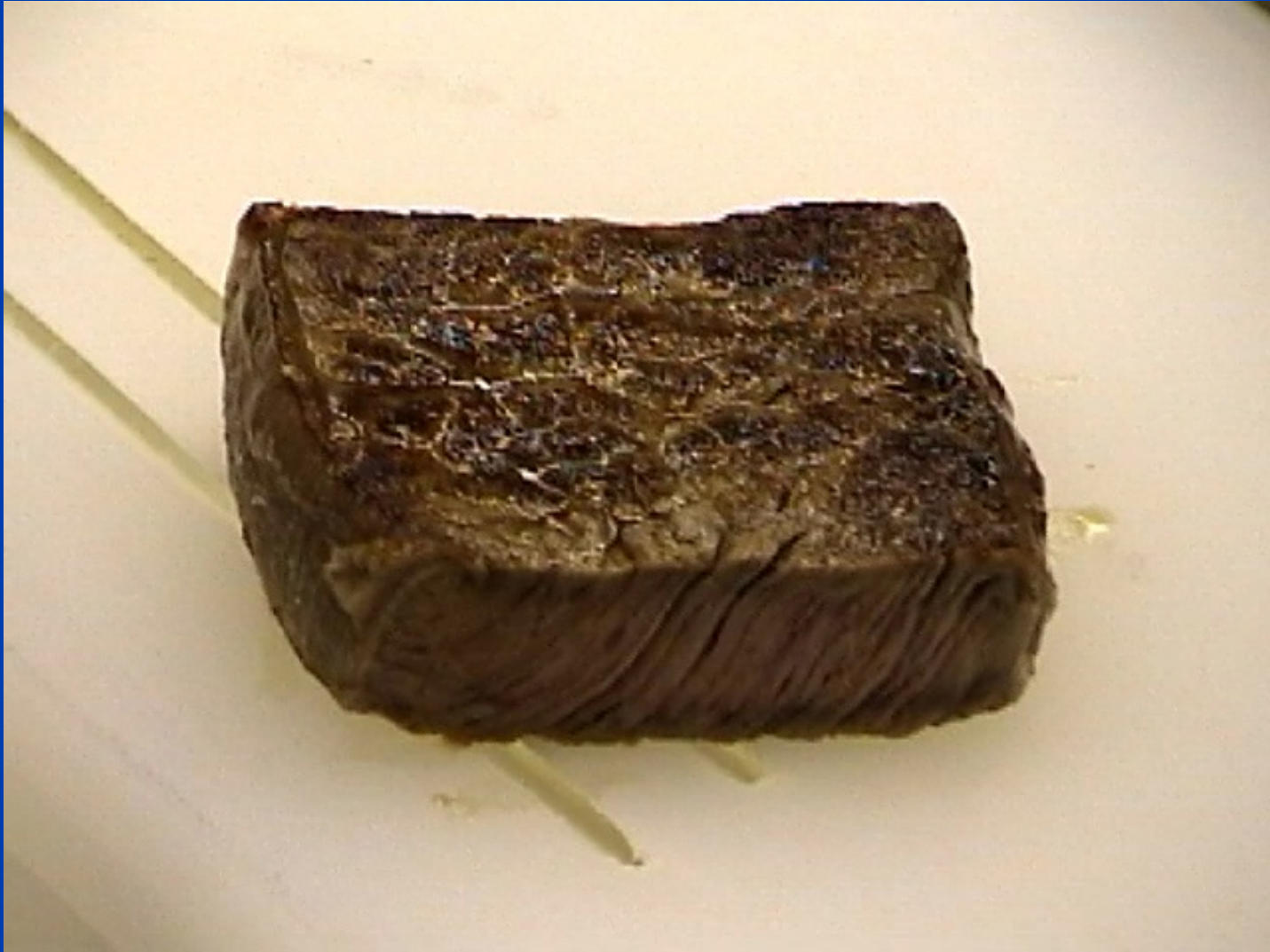
We now have a 5-cm long section from the lateral end of the longissimus with muscle fibers at a 45° angle.



5-cm section



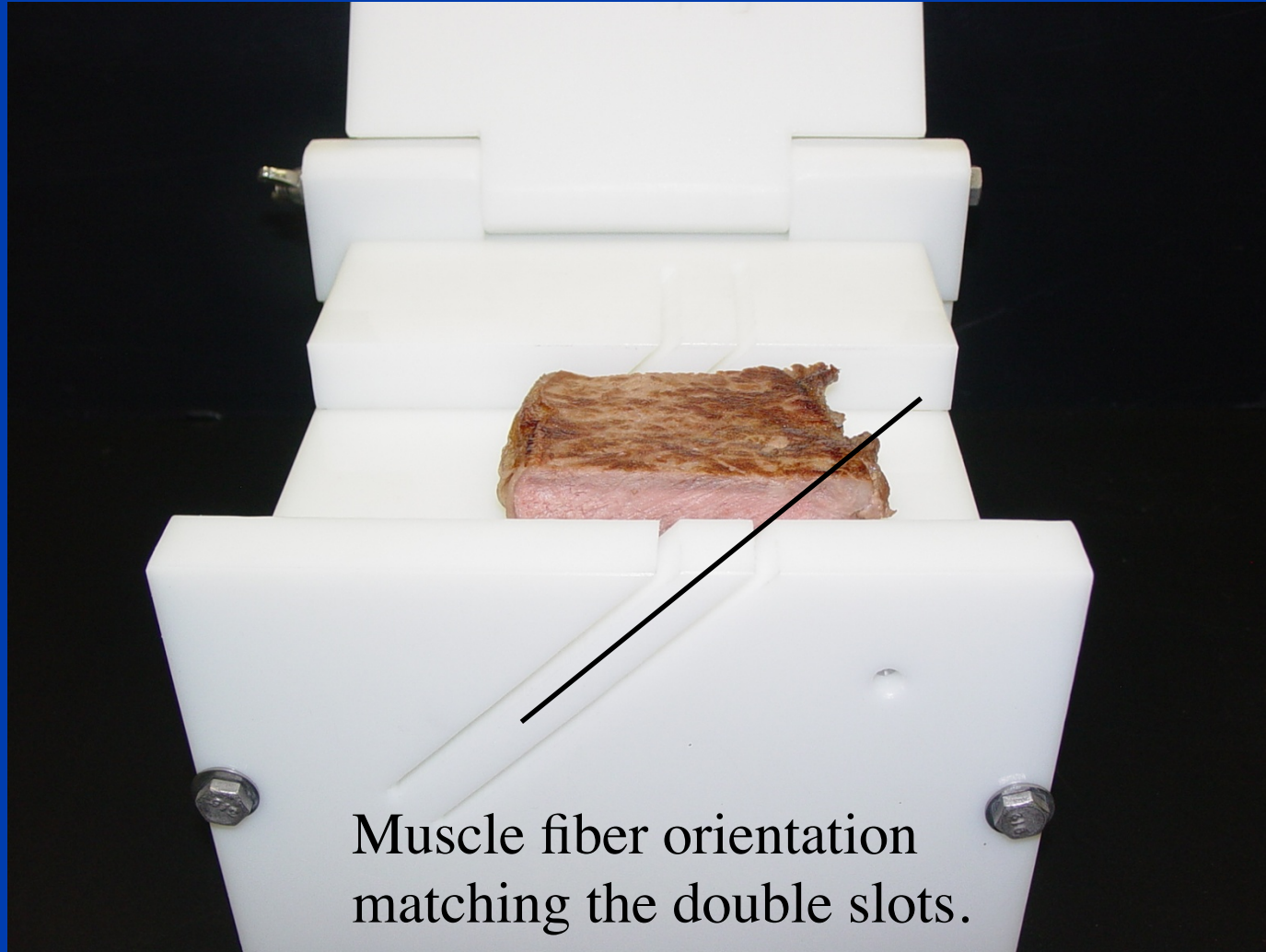
5-cm section with  $45^\circ$  fiber angle



# SSF Protocol

3. The 5-cm long section is placed in the slice box with the angle of the two  $45^\circ$  slots lined up with the muscle fiber angle and aligned so the slice will be cut from the center of the 5 cm section.

## Step 3: Muscle fiber orientation in slice box

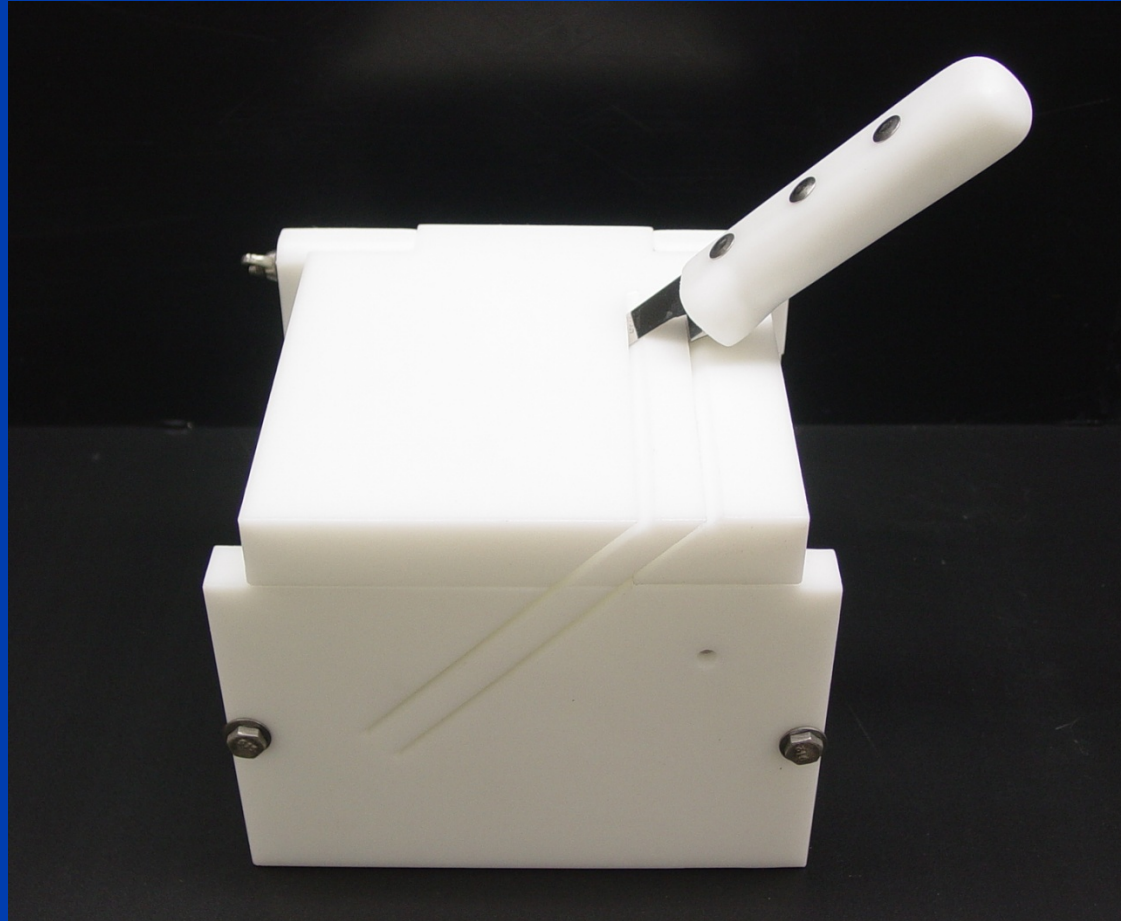




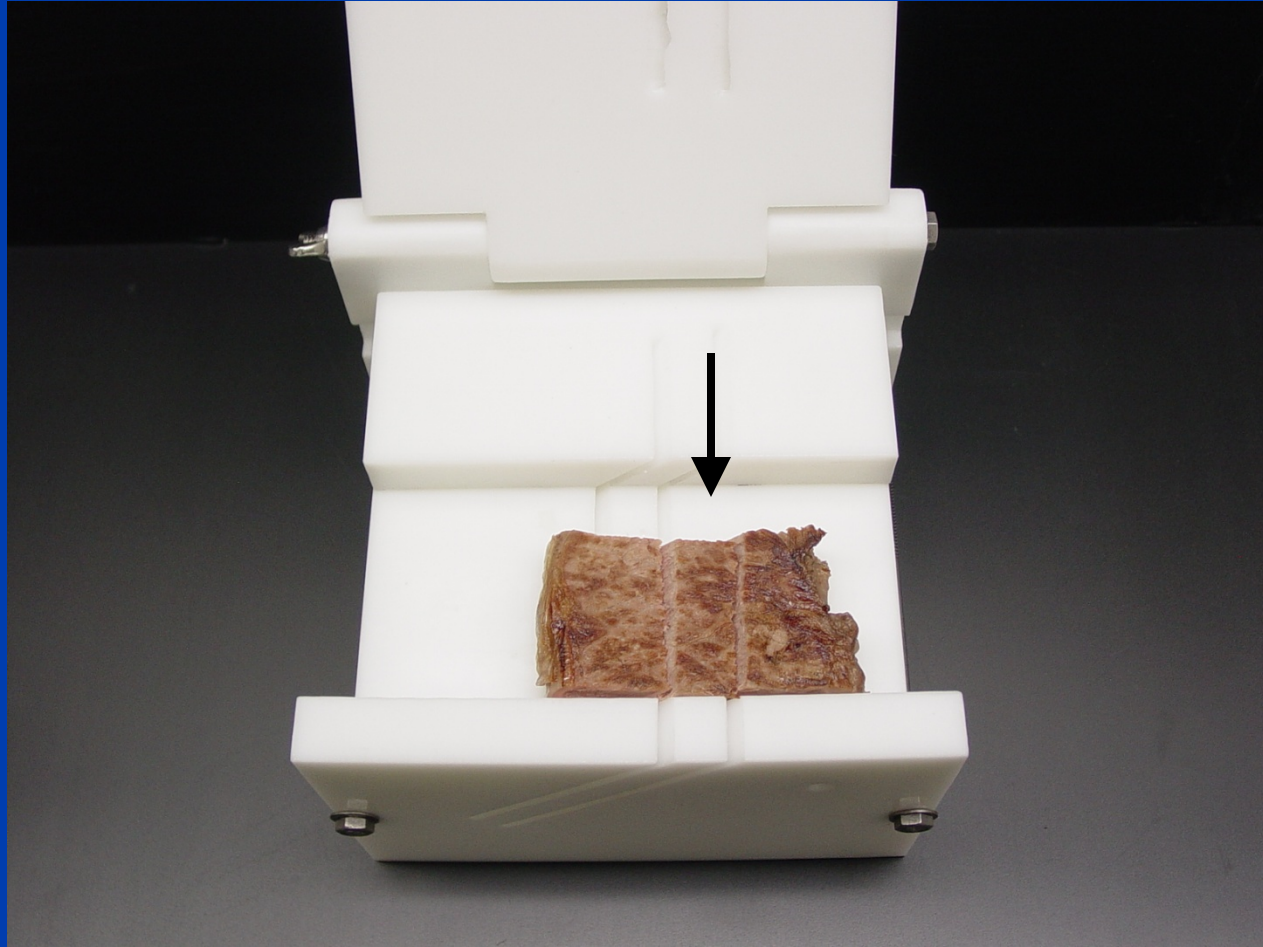
# SSF Protocol

4. Close the lid of the box. Insert the double-bladed knife that consists of two parallel blades spaced 1 cm apart into the slots at the back and make two parallel cuts simultaneously through the length of the 5-cm long section. This cut is made with 4 to 5 up-and-down sawing motion strokes while pulling the knife forward (the knife blades must be kept sharp to get a good “clean” cut – failure to do so will result in slices less than the full thickness and underestimate SSF). This cut provides a 1-cm thick, 5-cm long slice that is parallel to the muscle fibers.

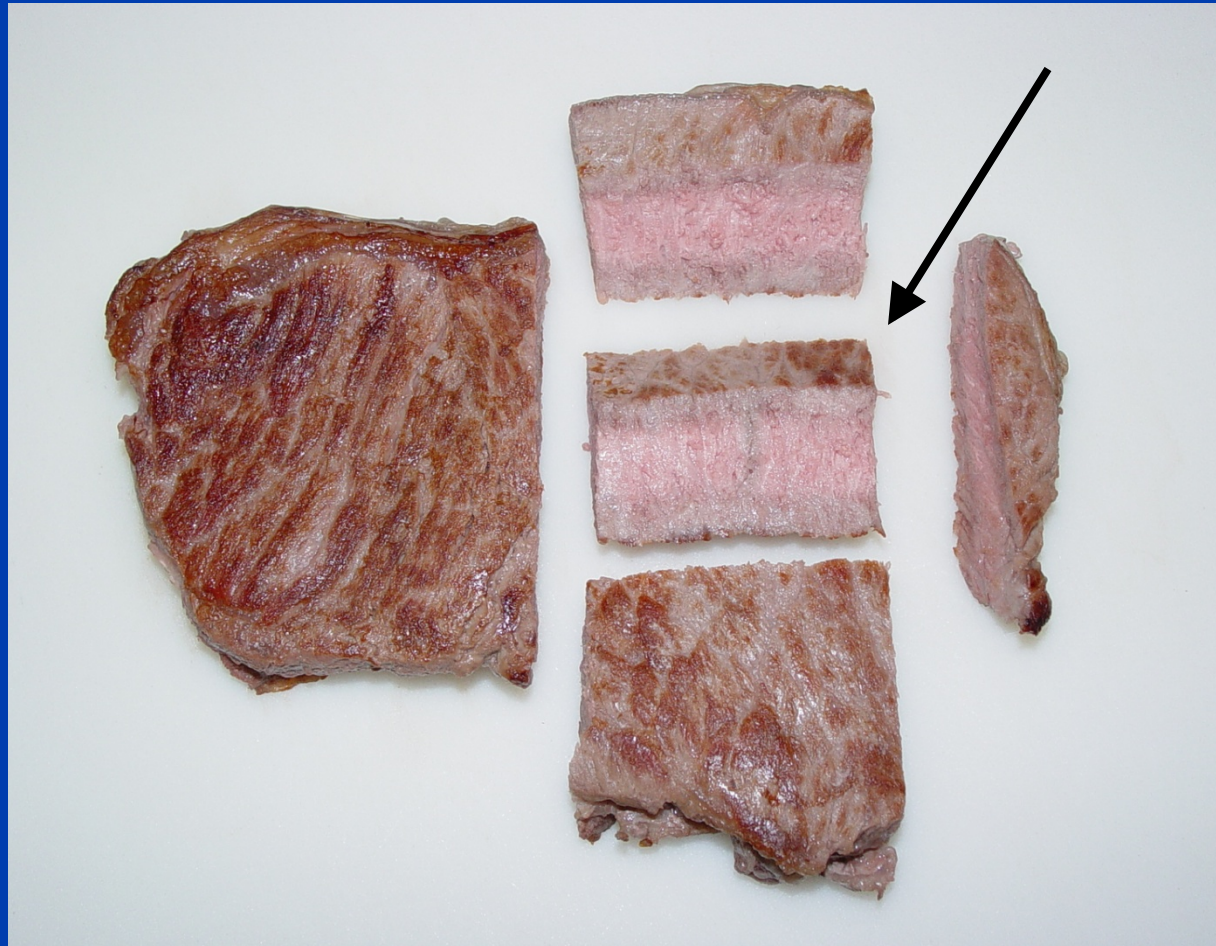
Step 4. Obtaining 1 cm-thick, 5 cm-long slice



# The slice



1 cm-thick, 5 cm-long slice parallel to fibers



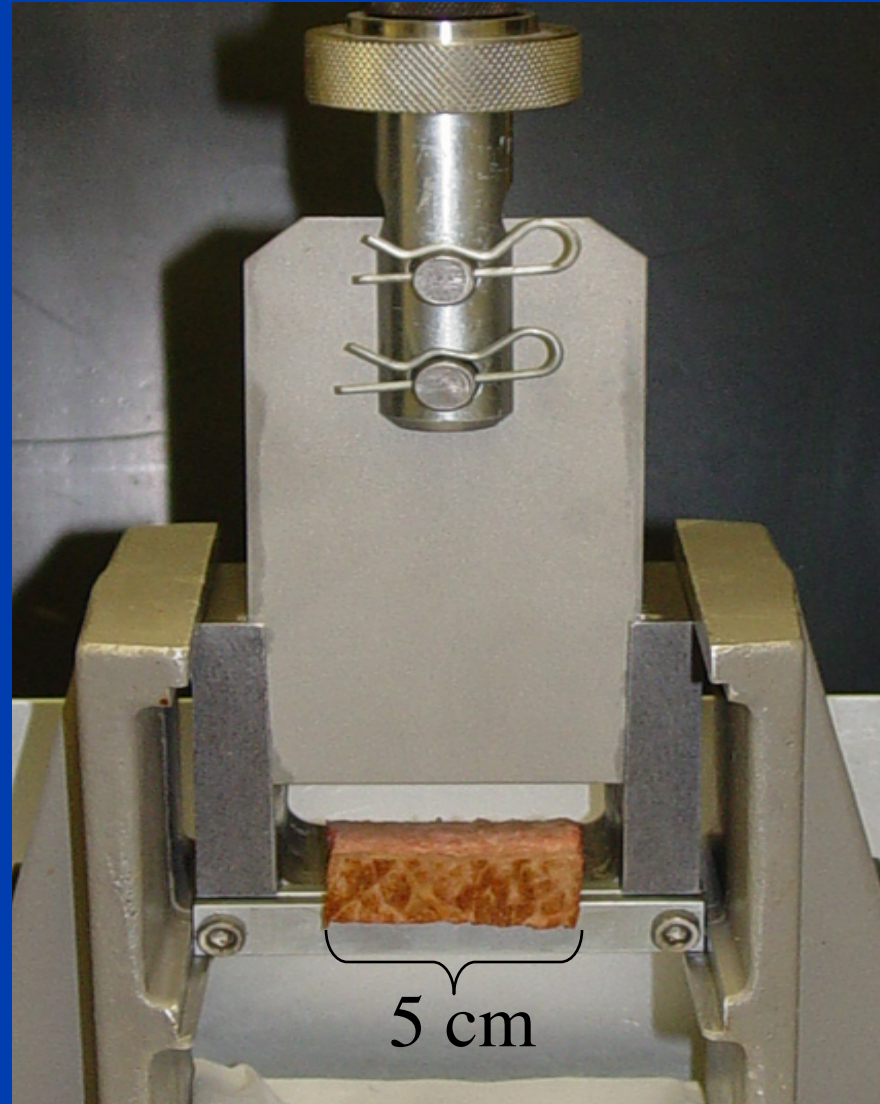
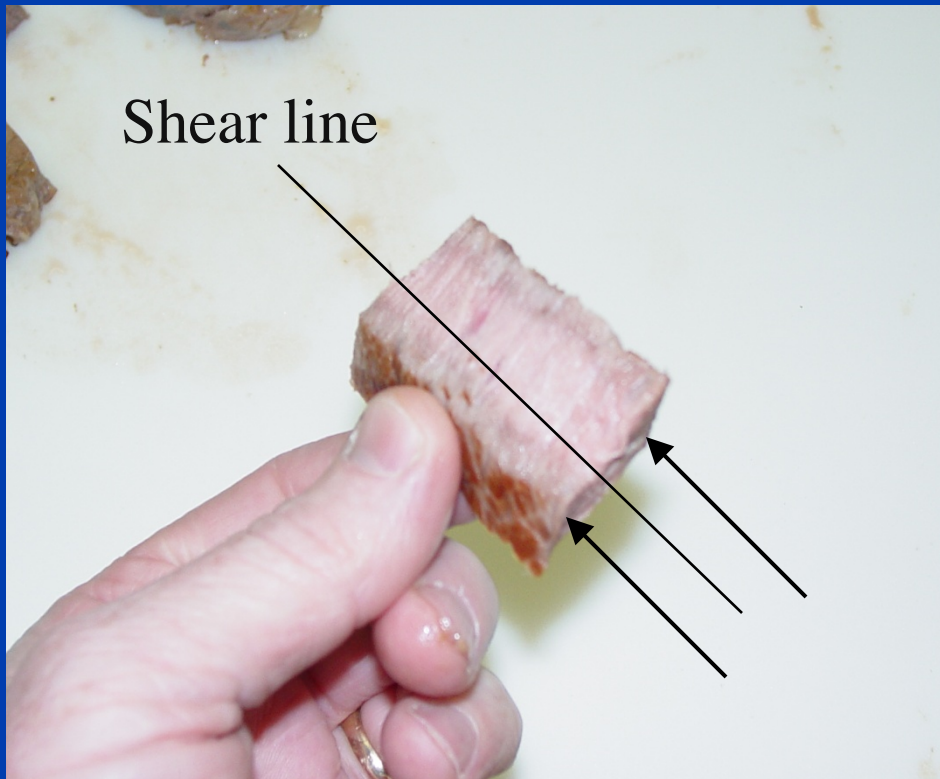


1 cm-thick, 5 cm-long slice parallel to fibers



The slice is placed in the testing machine so that the blade shears perpendicular to the muscle fibers along the 5-cm dimension of the slice. When positioning the slice, it must be exactly centered so the blade shears in the center and avoids the cooked crust on both the top and bottom sides of the slice.

# Slice positioned in testing machine



Shear the slice. The data should be captured by the instrument software on the computer running the instrument. We record the values as a backup for computer failure. The slot the blade passes through should be cleaned periodically with a paper clip. Rinse the slots the blade passes through with water periodically. The blade should be cycled through periodically with no slice to ensure the blade is free and not dragging.