

**Production:** SAUSAGE

**Objective:** Comparison of cutting force of frankfurters vs. chorizo sausage using a Warner-Bratzler Blade

**Type of action:** Cutting test

**Test mode settings:**

Speed	Test mode	Trigger	Target	Hold
1.5 mm/s	Distance (c)	40 gf	30 mm	0 sec

**Accessory:**

Blade of Warner Bratzler, Platform

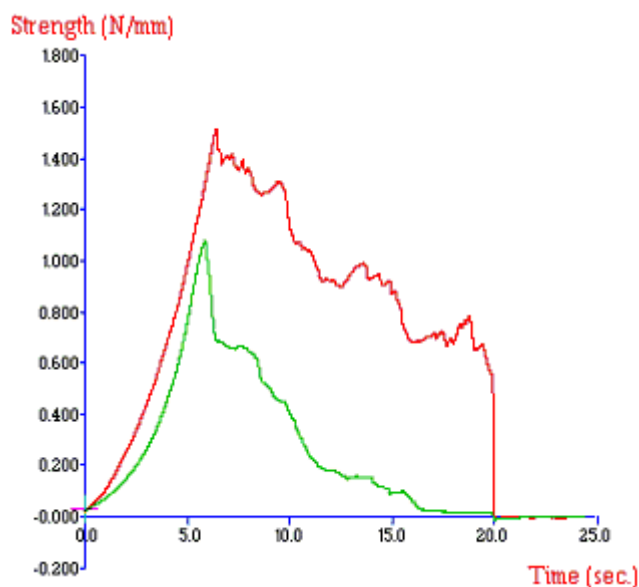
**Sample Preparation:**

Remove samples from place of storage e.g. 5.0C just prior to testing and cut in half.

**Test Set-Up:**

Place the Heavy Duty Platform on the base of the machine and loosely secure it. Insert the slotted blade plate into the Heavy Duty Platform and tighten the screws so that the plate is pushed right into the corner. Reposition the Heavy Duty Platform to enable the blade (attached to the load cell carrier) to pass through the base plate slot without contact when lowered. Running a 'blank' test i.e. a test with out any sample on the plate can check this. Place the sample centrally under the blade, perpendicular to the slot length, and commence the test.

**Typical plots:**



The above curve was produced from frankfurter and chorizo sausages, tested at 5C.

**Observations:**

Once the trigger force is attained, the blade proceeds to shear through the sample. The maximum force denotes the point at which the sample completely fills the triangular cavity of the blade and cuts through the sample surface. After this point shearing continues throughout the whole sample until the blade has passed through the base plate slot. The blade then returns to its starting position. The results indicate that Chorizos required the largest force and total energy to shear. The breaking of muscle fibers and connective tissue requires much larger energy than the breaking of ground or finely comminuted products as is such for frankfurters.

**Data Analysis:**

☒ Max Force

**Results**

Sample	Mean Maximum Force 'Firmness' (+/- S.D.) (N/mm)	Mean Area 'Work of Shear/Toughness' (+/- S.D.) (N/mm·s)
Frankfurter	1.26 +/- 0.11	6.5 +/- 0.5
Chorizo	1.67 +/- 0.14	17.0 +/- 1.8

**Notes:**

- When placing the sample on the base plate ensure that the uppermost surface is consistent in shape throughout testing, i.e. some samples develop a flat surface during storage. Failure to do this will add to variability of results.
- If a very unsmooth curve is produced following the peak force it may be preferable to increase the test speed slightly as this may be due to the sample wriggling on tearing which will add force to the blade on descent. This however could otherwise denote a coarse, variable textured sample (as shown for chorizos).
- If the sample is not placed centrally under the blade a false trigger may occur which will then be followed by the slip of the sample across the base plate into the central cavity, hence producing an incorrect force profile.
- The microstructure of cooked meat emulsion may be influenced by the processing conditions, particularly cooking, and its composition, i.e. the type of meat protein, (meat) fat-protein ratio, salt level, moisture and filler content.
- The biting action is used as a basis of many devices designed to provide a measure that will closely relate to human assessment. The most common biting or shearing system for the assessment of meat and meat products is the Warner-Bratzler shear.
- Factors that affect the results of Warner Bratzler shear tests are: uniformity of sample size, direction of muscle fibers, presence of connective tissue and fat deposits, sample temperature, and speed of shearing.
- When attempting to optimize test settings it is suggested that the first tests are performed on the hardest samples to anticipate the maximum testing range required and ensure that the force capacity allows testing of all future samples.