Objectives

Subcutaneous Fat Edema (SFE), commonly known as “water pocket”, is a defect on beef that leads to significant economic losses. SFE is commonly seen on high value cuts such as ribeyes and strip loins. We hypothesized that SFE is caused by a combination of two major factors: long spray chilling and thinner subcutaneous fat. The objective of this experiment was to develop a subjective evaluation to predict SFE, and evaluate the effect of long spray chilling and subcutaneous fat thickness on SFE formation.

Materials and Methods

Hides from all animals were removed by using mechanic pullers. Three different sets of data were collected. Set 1- Carcass sides (n = 252) were evaluated on entering the cooler (0 h) using a subjective 3-point scale to score subcutaneous fat at the rib/loin separation area: 0 = Subcutaneous fat firmly attached, 1 = Subcutaneous fat slightly detached/soft, and 2 = Subcutaneous fat detached/very soft. Sides were spray chilled for either 24 or 72 h to monitor the development of SFE. Carcasses were ribbed after chilling and immediately evaluated for incidence of SFE at the 12th rib. Set 2- A total of 28,801 ribeyes and 28,213 strip loins were evaluated for the presence of SFE based on spray chilling time (24 and 72 h). Individual cuts were evaluated during d 12 for carcasses spray chilled for 24 h and d 6 for carcasses spray chilled for 72 h. Set 3- Ribbed sides (n = 313) were assigned to two SFE categories (SFE × NO SFE) to evaluate the effect of subcutaneous fat thickness on SFE. Subcutaneous fat thickness was measured after grading at the 12th and 13th rib interface. Data were analyzed by using the GLIMMIX and FREQ procedures of SAS (SAS Inst. Inc., Cary, NC).

Results

Set 1- No differences (P = 0.95) were observed for the development of SFE based on the attachment and softness of subcutaneous fat prior entering into the cooler. Prediction by using the subjective evaluation was not accurate. On sides that had no SFE, 75.40% had subcutaneous fat firmly attached, 12.3% had subcutaneous fat slightly detached/soft, and 1.59% had subcutaneous fat detached/very soft. On sides that had SFE, 44.44% had subcutaneous fat firmly attached, and 55.56% had subcutaneous fat slightly detached/soft, and 0% had subcutaneous fat detached/very soft. Set 2- Spray chilling time did not affect the presence of SFE on ribeyes (P = 0.32) and strip loins (P = 0.63). Within ribeyes that showed SFE, 45.36% were spray chilled for 24 h and 55.64% were spray chilled for 72 h. Within strip loins that showed SFE, 53.65% were spray chilled for 24 h and 46.35% were spray chilled for 72 h. Set 3- Sides with SFE had thinner subcutaneous fat (5.59 mm, SE = 0.16 mm) whereas sides with no SFE had thicker subcutaneous fat (6.86 mm, SE = 0.17 mm; P ≤ 0.05).

Conclusion

Results from this experiment showed that prediction of SFE occurrence through subjective evaluation of the subcutaneous fat on the carcass surface is not possible. Long spray chilling did not affect SFE development when compared to short spray chilling. Subcutaneous fat thickness had a significant impact on SFE development. This study suggests that thinner subcutaneous fat can be the main cause that leads to “water pocket” development on ribeyes and strip loins.
Figure 1. Subcutaneous Fat Edema (SFE) on ribeyes (A- No SFE; B, C, and D– SFE).