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Dark Cutting Beef - Why?

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Many producers have heard of the carcass that did not grade because it "cut dark". What is dark cutting beef and why does it happen?

The cut surface of the rib-eye in a dark cutting carcass is dark red to purplish-black in color, coarse and sticky to the touch. A normal rib-eye surface is a light cherry red color, smooth, moist and velvety. There is usually no apparent difference in carcass youthfulness, conformation or marbling level between the dark cutter and normal carcasses from the same lot. Tenderness or other palatability traits are not influenced by dark cutting.

Two other conditions do produce dark lean in the carcass, however. They are increased maturity of the animal and staginess. Both can be identified by other carcass traits. An older animal will produce a harder boned, more angular carcass and a staggy carcass will generally have a crest or extreme muscle development of the round and chuck. Bulls and more mature animals, under some conditions, do produce less tender carcasses. The consumer knows this and discriminates against dark meat in the case. Consumer discrimination against all dark beef reduces the value of it, and thus justifies the reduction of carcass grade when lean is dark.

Stress or activity for extended periods (at least 24 hours) immediately before slaughter may result in dark cutting beef. In performing its functions, the muscle uses an energy source, glycogen. A supply of glycogen is stored in the muscle and it is replaced as it is used by glycogen from the blood stream. Oxygen passes from the blood into the muscle cell where it combines with glycogen to produce energy plus carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O). The CO<sub>2</sub> and H<sub>2</sub>O are waste products and go back into the blood stream to be lost through the lungs. During excessive activity or stress the muscle uses more glycogen than it receives from the blood. Therefore, the glycogen storage supply is reduced. If the animal is slaughtered while the glycogen supply is low, a dark cutting carcass will probably result.

After slaughter, the muscle still "lives" and tries to function. Although the oxygen supply has been removed because of bleeding, glycogen is still broken down to produce energy. Because there is no oxygen, an acid, lactic acid, is produced instead of CO<sub>2</sub> and H<sub>2</sub>O and acid accumulates in the muscle. Normal muscle accumulates more acid than stressed or dark muscles because there was more glycogen available in the muscle at slaughter. The amount of acid determines whether the muscle will be light or dark with higher levels of acid providing light colored lean.

Cattle that may have reduced the level of glycogen in the muscle before slaughter and cut dark include show steers, excitable cattle in feedlot groups or animals which have been shipped during extreme weather conditions. The stress or activity must be long term to produce dark cutting. If a rest period of 24

hours is provided before slaughter, dark cutting incidence and degree can be reduced. Withdrawing cattle from feed additives prior to slaughter may produce some stress, but available data does not indicate that it is serious enough to increase dark cutting incidence. Avoid excitable animals, marketing during severe weather or sudden changes in weather, and unnecessary activity in handling animals on the way to slaughter. If high stress has been imposed on market animals, a rest period before slaughter may reduce dark cutting incidence.