

Dark Cutters

Darryl Gibb, April 2006

Glycogen is stored in tissue as a readily available energy source animals can access when needed. Dark cutting beef is caused by total or partial depletion of muscle glycogen prior to slaughter. The depletion primarily occurs when the animal suffers stress. In the carcass of an unstressed animal, muscle glycogen will be converted to lactic acid, and cause a muscle pH decline from 7.0 to about 5.6 - the normal pH for beef. Muscle pH does not decline in meat from stressed animals because of low glycogen levels, resulting in a dark color and a high pH.

According to a 2003 US audit, dark cutters average about 2.3% of slaughter cattle and is estimated to cost the industry over \$5 per animal. Compilations of large data sets of slaughter cattle reveals there can be up to 10 fold variation in incidence across loads of cattle. Understanding what contributes to dark cutters will help avoid this costly discount.

Kreikemeier et al (1998) evaluated 3650 lots of cattle with a total of 724,639 animals slaughtered in 1989 and 1990 at 4 IBP plants. The following observations were made:

- There were approximately twice as many dark cutters for cattle slaughtered from August to October (1.1 - 1.4%) compared to other months (0.4 - 0.7%).
- Cattle slaughtered at Amarillo TX or Garden City KS had about 3 times the rate of dark cutters (and lower quality grade) than those slaughtered at Boise ID or Dakota City NE (1.1 vs 0.3). Higher temperatures and cattle type (more brahman) likely contribute to the higher rates in the TX and KS plants.
- Holding cattle over a weekend or holiday at the packing plant increased the number of dark cutters.
- Dark cutters increased with the number of cattle in the lot
- As average weight in a lot increased, dark cutters declined.

Colorado researchers (Scanga et al., 2002) compiled data from 9 commercial feedlots over a 3 year period (15,439 pens of cattle; 2,672,223 total cattle). They observed that:

- Heifers yielded a higher ($P < .05$) percentage of dark cutters per pen than did steers
- Incidence of dark cutters in heifers was increased when heifers received an initial and a terminal estrogen implant. Reimplanting with a combination implant (rather than straight estrogen) reduced incidence from 1 to 0.3% compared to reimplanting with an estrogen implant.
- Steers had fewer dark cutters when receiving estrogen rather than combination implants.
- Holding cattle past 100 days after terminal implant reduced dark cutters 38% in heifers and 69% in steers.

Oklahoma work documented that dark cutters increased from .35 to 1.64% when feed was removed prior to shipping the cattle.

Kreikemeier, K. K., Unruh, J. A., and Eck, T. P. 1998. Factors affecting the occurrence of dark-cutting beef and selected carcass traits in finished beef cattle. *J. Anim. Sci.* 76:388-395.

Scanga, J. A., Belk, K. E., Tatum, J. D., Grandin, T. And Smith, G. C. 2002. Factors contributing to dark cutting beef. *J. Anim. Sci.* 76: 2040 - 2047.