

Reducing the Incidence of Dark Cutting Beef in Junior Livestock Shows

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4-H and FFA livestock shows place cattle in a surrounding where they are stressed physically and psychologically. Cattle are usually exposed to physical exertion, unfamiliar smells, tastes, various sounds, people, cattle and other animals. Owners of beef cattle who place them in these situations need to understand that stress can be reduced or eliminated with proper care and management. Many cattle are stressed to the point where they may even go off feed and water. Cattle may appear agitated and exhibit abnormal behavior at shows but often a more serious condition appears once the animal has been sold and harvested. This is known as dark cutting beef (DCB) and can be a serious problem in junior livestock shows. In some junior livestock shows, instances of DCB can be 10 to 20 times that of the commercial beef industry.

What Causes Dark Cutting Beef?

The pH of living muscle is just above 7.0 in well fed and rested cattle with glycogen concentrations from 0.8% to 1.0%. When the animal is harvested, pH in normal muscle falls to

5.5. If the animal is stressed for long durations for any reason then glycogen concentration can fall to less than 0.6% and normal acidification of the muscle tissue from lactic acid does not occur and pH will remain high (above 6.0). This abnormally high pH (>6.0) increases the light-absorption and water binding abilities of postmortem muscle resulting in an undesirable, dark, firm, and dry cut lean surface (Lister, 1988). This causes the muscle to turn a darker color of red, almost dark purple, hence the term dark cutter. There also appears to be a relationship between muscle pH and (or) muscle color and meat tenderness (Purchas, 1990). Dark cutting beef is undesirable because it has low consumer appeal and is more susceptible to microbial growth (Lawrie, 1998). Dark cutting is an expense to the beef industry but can be managed.

Factors Contributing to Dark Cutting Beef

Weather, growth promotants, genetics, disposition and handling practices before harvest all may play a role in creating the dark cutting condition (Hedrick et al., 1959; Smith et al., Voisinet et al., 1997).



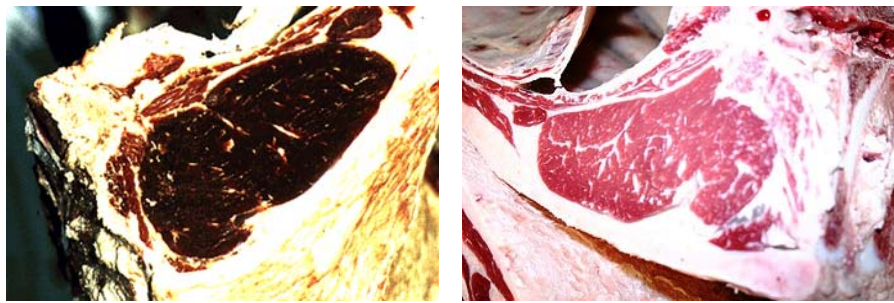


Figure 1. Beef carcasses with and without dark cutting characteristics.

1. **Weather:** Heat can be a factor, especially when temperatures are very high or when cattle are subjected to fluctuations in temperature which occur over short periods of time (Skanga et al., 1999). Many junior livestock shows are held during the summer. Care should be given to ensure that cattle have comfortable surroundings including bedding, shade and plenty of water.
2. **Growth Promoting Implants:** Steers treated with a combination of on-feed implants followed by combination reimplants revealed a higher percentage of DCB than steers given on-feed estrogen type implants

followed by estrogen type reimplants. Also, as the number of days between harvest and the final implant increases, the incidence of DCB declines (Scanga et al., 1999). This requires further research as we do not advocate non-use of growth promoting implants. Implants can positively influence muscle growth and daily gain resulting in greater efficiencies. However, the use of implants must be understood and managed so that misuse does not occur. There are many excellent Extension publications and resources on implants that can be obtained through internet searches or from your County Agent.

Table 1. Common Types and Brands of Growth Promoting Implants

Growth Promotant	Androgen	Estrogen	Combination	Estrogen Combination	Double Androgen
	Synovex-H [®]	Synovex-S [®]	Revalor-H/S [®]	Synovex-S [®] / Revalor [®]	Finaplix [®] Synovex-H [®]
	Implus-H [®]	Ralgro [®]			
	Finaplix-H/S [®]	Implus-S [®]			
	Heiferoid [®]	Compudose [®]			
		Steeroid [®]			

3. **Physical Activity:** Cattle can experience increased activity and stress when exposed to a new environment. Standing for long periods of time, frequently getting up and down, and other strenuous activity common to a livestock show should be limited as much as possible. Loading and unloading cattle should take place during cooler times of the day.
4. **Psychological Stress:** Cattle can experience increased stress when they are exposed to

unfamiliar surroundings, people, smells, and sounds that are typical at a livestock show. Feed rations should not change once the animal has arrived at a livestock show. Some cattle will not drink chlorinated water if they are not familiar with the taste. For instance, one year at the Box Elder County Junior Livestock Show, more than 50% of youth (38 out of 62) reported their steer's drinking habits changed after being brought to the show. If the calf has never been exposed to the taste of chlorinated water, it would be a good idea to familiarize the steer with

chlorinated water before the show. A good rule of thumb is to make the animal's stay at the livestock show as comfortable as possible.

5. **Yield Grade:** Yield grade is a muscle to fat ratio and a strong indicator of whether a steer may become DCB. Higher yield grade (>3.0) steers have more finish and more energy reserves to carry them through a stressful event like a livestock show. Try not to select cattle with very low yield grade characteristics.

Why Is This a Concern?

The greatest problem with dark cutting beef is consumer rejection because of its color. Consumers associate dark color beef with old cattle, toughness, poor flavor and short shelf life. Although the incidence of DCB has declined in recent years from 2.7% to 2.5% (NBQA – 2000), packers must still discount DCB carcasses between 20% and 40%. The most recent quality audit calculated that dark cutters cost the industry \$6.08 per head on every fed steer and heifer slaughtered. The percentage of show cattle exhibiting DCB is much higher (25% - 50%) in unusual circumstances. This can vary extensively and is a real concern for packers.

Conclusion

4-H or FFA projects provide youth with a unique opportunity to use live animals to develop valuable life long skills. However the youth need to understand they are not just raising a project for the county fair; they are in the business of producing a food product for the consumer. A reduction of DCB will help the consumer have a positive experience, while delivering the best possible product.

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