MEAT RESEARCH NEWS LETTER

CSIRO

NUMBER 69/10

DATE 28th November, 1969.

MEAT RESEARCH LABORATORY

P.O. BOX 12. (CNR. CREEK AND WYNNUM ROADS). CANNON HILL. BRISBANE. QLD 4170 TELEPHONE 954006 TELEGRAMS FOODPRES BRISBANE

DARK CUTTING BEEF

Colour is an important factor in determining consumer acceptability of beef. Beef which is coloured dark red to dark purple is termed "dark-cutting". Since dark-cutting beef has a low acid content (i.e. high pH), the meat does not develop the normal bright red colour of oxymyoglobin (see News Letter 69/4). The meat appears dark because of a predominance of the purplish red pigment (reduced myoglobin) in the surface layer, and because less light is reflected from the surface.

IMPORTANCE

- Consumers do not like the appearance of dark beef. Some people associate a dark colour of beef with old animals or with meat that has deteriorated.
- Bacteria grow more rapidly on meat of high pH and therefore dark-cutting beef may have a reduced shelf life, at chiller temperatures, up to 50 percent less than for beef of low pH.
- High pH meat in packs which contain low oxygen (e.g. Cryovac) is susceptible to spoilage by bacteria which produce a light green pigment. For this reason, dark-cutting beef (pH above 6.0) should not be used for ageing in vacuum packs.

UTILISATION OF DARK-CUTTING MEAT

This meat should be used for outlets where a long shelf life at chiller temperatures is not required.

CAUSES OF DARK-CUTTING BEEF

The glycogen reserve in the muscle of a normally fed animal, handled carefully prior to slaughter, is about 1% of wet muscle weight. After slaughter, this glycogen is converted to lactic acid (about 0.7%) giving a pH of about 5.6 in the primal cuts at rigor mortis.

Dark-cutting beef results when there is a low muscle glycogen concentration (less than 0.5%) in the live animal at the time of slaughter. The amount of lactic acid production post mortem is less than about 0.5% and dark-cutting beef with a pH above 6.0 will occur.

CONDITIONS CONTRIBUTING TO LOW MUSCLE GLYCOGEN

- Sickness in animals, e.g. three day sickness.
- Animals that are exhausted or insufficiently rested prior to slaughter.
- Animals that have been exposed to cold, wet, windy weather. This effect could be greater in underfed animals, e.g. during the recent Queensland drought, the incidence of dark-cutting beef was particularly high in animals from drought areas that had just experienced a cold snap.
- Sudden withdrawal of feed after feeding on high energy rations.
- Animals that have been excited just prior to slaughter after a long period of transport.

The intensity and duration of the stress as well as the susceptibility of individual cattle to stress will determine the prevalence of dark-cutting carcases.

PREVENTIVE MEASURES

There is no easy measure known at present to prevent the incidence of dark-cutting beef. Care should be taken to avoid or minimise any of the above factors.

Resting and feeding cattle can reduce the incidence but the improvement in meat colour should be assessed against the cost of feeding and any loss of carcase weight which may occur.

INCIDENCE OF DARK-CUTTING MEAT

There are no figures relating to the incidence of dark-cutting beef in Australian Works. The average incidence of dark-cutting in the steer kill at a Canadian plant was 8% over a period of 2 years.

Overseas investigations show that there is a seasonal incidence in dark-cutting beef with the highest incidence in autumn. The incidence has been shown to be more prevalent in lower grades of beef and significantly higher in cows than in heifers and steers. With increasing age of the animal the muscle colour darkens but this is not a "dark-cutting" effect.

DETECTION OF DARK-CUTTING BEEF

Dark cutting meat can be detected by using a portable pH meter or by visual appraisal. pH readings can be taken 24 hours after slaughter. Visual detection of dark cutting meat is best done in a good light by observing a meat surface 30 minutes or more after quartering or boning.

Next Issue will be Cysticercosis.