



The Colour of Meat: A Reliable Test for Food Safety?

The Expected Colour of Cooked Meat

Ground beef normally browns (denatures) at about 68°C. As such, the statement "*the centre of a hamburger patty should be brown and the juices should run clear*" is generally accepted as an indication that hamburger has reached a safe cooking temperature.

However, as in most things, there are exceptions to the rule.

Persistent Pink

Some meat will not brown at 68°C. A persistent pink colour may occur even after cooking at usual time/temperatures because:

- The meat contained very little oxygen as affected by package size, film type, and storage time.
- The meat had a high pH (>5.8) caused by animal stress at slaughter or the addition of high pH ingredients (e.g. egg white, soda crackers) prior to cooking.
- The meat was mixed with nitrate containing ingredients, such as cured meat or vegetables.
- When cooked on a gas stove the meat could be exposed to carbon monoxide.
- The browned cooked meat was mixed with vegetables and stored prior to serving. Uncooked meat pigments, normally present in cooked meats, can combine with the nitrates in vegetables to produce the persistent pink effect.

Premature Browning

Some meat will brown below normal cooking temperatures. Premature browning may occur when:

- The meat is obtained from an older animal.
- The meat is held in frozen storage for an extended length of time.

Also, 'brown' raw meat denatures at a much lower temperature than red raw meat, and as a result may cause premature browning.

What are the Implications?

The persistent pink colour can normally be regarded as a nuisance since safe cooking times/temperatures should have been reached. Awareness of the causes should, however, help food operators and the public to better understand the dynamics of complex food systems.

Premature browning can, however, have serious food safety implications. Operators and the public should be aware of the potential causes and ensure normal cooking times and temperatures are followed, even when early browning occurs.

Note: A guide to the colour of cooked ground beef patties can be purchased from:

Dr. Kropf
Department of Animal Sciences and Industry
232 Weber Hall
Manhattan, Kansas
USA 66506-0201