# What makes a perfect steak?

## A grass-based diet for starters…

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**Lauren Van Rooyen and young steak-lovers at the Teagasc Ashtown Science Week open evening.**

The perfect steak will be tender, juicy and full of beefy flavour. There are many factors that affect eating quality which don't alter the appearance of the steak. Consumers are attracted by a bright red colour in meat but this is unrelated to eating quality.

While on-farm factors such as breed, sex, age, genetics, and feed type affect eating quality, the majority (75% to 80%) of the variation in tenderness, the most important aspect of eating quality, is due to what happens after slaughter. This includes electrical stimulation, hanging method, chilling rate, ageing time, packaging type and cooking. There is also considerable variation in the eating quality of different cuts.

**Figure 1:** Recommended cooking times for a 2.5cm steak. Cooking time depends on the thickness of the steak

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| **Blue, rare** <br> One minute each side | |
| **Rare** <br> 1.5 minutes each side | |
| **Medium rare** <br> Two minutes/side | |
| **Medium** <br> 2.5 minutes/side | |
| **Medium-well done** <br> Three minutes/side | |
| **Well done** <br> Five minutes/side | |

Packaging type affects both the appearance and the quality of a steak. The bright red colour which consumers prefer is due to oxygen reacting with myoglobin, the main pigment in meat. Overwrap packaging and high oxygen Modified Atmosphere Packaging (MAP) encourage oxygen to react with the meat.

Unfortunately, MAP also promotes oxidation of muscle proteins reducing tenderness. It can also lead to oxidation of fats which produces off-flavours. Shelf-life is limited as the meat will turn brown after seven to 10 days. Vacuum skin packaging, where an air-tight film is tightly sealed over the steak avoids these problems and gives a longer shelf life, but the steak has a dark purplish colour due to the absence of oxygen.

Ageing improves tenderness and enhances flavour. Steaks are usually aged for at least 14 days. Longer ageing, up to 35 days, results in a stronger flavour. Dry ageing means chilling carcases or large cuts without packaging. Wet ageing involves vacuum-packaging. Dry, aged meat tends to have a more intense beefy flavour, but incurs chilling costs and yields are lower, therefore wet ageing is more common.

The amount of fat is another aspect of a steak that consumers notice. The fat on the outside edge (subcutaneous) is usually well trimmed but any fat between (intermuscular) or within (intramuscular (IMF) or marbling) the muscles cannot be trimmed.

Marbling adds flavour and juiciness to the meat and may improve tenderness. During cooking, IMF melts providing added flavour and juiciness and improving the eating quality. Highly marbled steaks are more likely to be "the perfect steak", but many consumers will reject them as being too fatty.

### Marbling factors

The extent of marbling depends on animal breed, sex, age, genetics, slaughter weight, feeding regime and cut of meat. Consumers consider a high-fat diet to be unhealthy. However, when compared with other fats in beef, IMF provides higher levels of healthier fats such as monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA), including long chain omega-3 (EPA, DHA).

Animals fed mainly on grass, which is the majority of Irish cattle, produce meat with more omega-3 PUFA compared with those fed on concentrates. Therefore, even though a highly marbled steak will have higher fat content, its nutritional composition is healthier.

Cooking is also an important factor to consider when preparing the perfect steak. Steaks are cooked best at a high temperature for a short period of time, as extended cooking increases toughness.

Cooking time is also important and depends on the thickness of the steak. For a thickness of 2.5cm (one inch), cooking times are presented in Figure 1. In summary, for the "perfect steak", choose Irish premium grass-fed, aged, marbled beef and cook it to medium or medium rare.