

Low-temperature cooking

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Low-temperature cooking is a cooking technique using temperatures of 45 to 85 °C (113 to 185 °F) for a prolonged time to cook food. Low-temperature cooking methods include sous vide cooking, slow cooking using a slow cooker, cooking in a normal oven which has a minimal setting of 70 °C (158 °F), and using a combi steamer providing exact temperature control. This method may be used to cook almost anything although the following article assumes it is only used for cooking meat whereas it is more often used for vegetables and other things.

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History

Low-temperature cooking has been used for a long time; evidence of its use can be found in indigenous cultures. Samoans and Tongans slow-cook meat in large pits for celebrations and ceremonies. However, the technique was not scientifically examined until the 18th century, when Benjamin Thompson "described how he had left a joint of meat in a drying oven overnight and was amazed when, the next morning, he found that the meat was tender and fully cooked."^[1] Professor Nicholas Kurti from the University of Oxford repeated these experiments in 1969, and showed that the temperature of Thompson's trial never exceeded 70 degrees Celsius.^[1]

Theory

Meat is cooked for four reasons: to tenderise it, to provide additional flavours, to kill harmful bacteria, and to kill parasites such as *Trichinella spiralis* and *Diphyllobothrium*.^[2] All four can be achieved by cooking meat at high temperature for a short time, and also by cooking at low temperature for a long time.^[3] Each goal is achieved at a different temperature, and takes a different time to achieve. The lower the temperature used, the longer the cooking time. An example of slow, long cooking is Southern pulled pork BBQ.

Tenderisation

Toughness in meat is derived from several proteins, such as actin, myosin and collagen, that combined form the structure of the muscle tissue. Heating these proteins causes them to denature, or break down into other substances, which in turn changes the structure and texture of meat, usually reducing its toughness and making it more tender. This typically happens between 55 and 65 °C (131 and 149 °F) over an extended period of time.

Flavour

Flavours may be enhanced by the Maillard reaction, which combines sugars and amino acids at temperatures above 115 °C (239 °F).^[4] A roast meat typically has a brown crust, which is caused by such a reaction and is generally considered desirable. Meat can be cooked at a high heat for a short time browning just the surface, before or after being cooked at low temperature to obtain the benefits of both methods.

Bacteria

Bacteria are typically killed at temperatures of around 68 °C (154 °F). Most harmful bacteria live on the surface of pieces of meat (assuming the meat has not been ground or shredded before cooking). As a result, for unprocessed steaks or chops of red meat it is usually safe merely to bring the surface temperature of the meat to this temperature and hold it there for a few minutes.^[5] See food safety (<http://foodsafety.wsu.edu/consumers/faq3.htm>)

Gravy

Low-temperature cooking reduces the amount of fat and juices, normally used to make gravy, rendered out of the meat.

Practice

Sous-vide low-temperature cooking is carried out by vacuum-sealing food in a plastic bag placed in a water bath or combi steamer with precisely controlled temperature for a long time. The food may then be browned by heating the surfaces to a much higher temperature of perhaps 200 °C (392 °F), using a roasting pan or a blow torch^[6] prior to serving. A dishwasher has been used to cook salmon.^[7]

See also

- Doneness
- Molecular gastronomy
- Sous-vide
- Combi steamer
- Food safety
- Critical control point
- Slow cooker

References

1. "Full on Food: Low Temperature Cooking". BBC. Archived from the original on August 31, 2007. Retrieved 16 May 2012.
2. Joel Fuhrman, M.D. (September 12, 2006). "The Cold Truth About Raw Food Diets". DiseaseProof.com. Retrieved

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3. "Low Temperature Cooking". BBC. Archived from the original on August 31, 2007. Retrieved 16 May 2012.
4. McGee, Harold (2004). *On Food and Cooking*. Scribner. p. 779. ISBN 9780684800011.
5. "Low Temperature Cooking". BBC. Archived from the original on August 31, 2007. Retrieved 16 May 2012.
6. Heston Blumenthal (2006). *In Search of Perfection*. ISBN 0-7475-8409-5. (see recipe for cooking steaks)
7. Riley Woodford (2006). "Dishwasher Salmon". Alaska Department of Fish and Game. Retrieved 2011-03-02.

External links

- Slow-cooked roast wing rib of beef (by Heston Blumenthal) (<http://www.bbc.co.uk/dna/h2g2/A36869494>)
- Slow Cooked beef cheeks (by Sous Vide Australia) (<http://sousvideaustralia.com/cookingsousvide/red-meat-dishes/slow-cooked-beef/>)

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