

Storage life of meat

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Meat is a highly perishable product and must be stored under refrigerated conditions to control microbiological growth and other deteriorative changes. This information sheet gives you a guide to the storage and display life of a range of meat and meat products that have been produced and stored (either chilled or frozen) according to good manufacturing practice. It has been prepared in response to repeated requests for documented information on the storage life of chilled or frozen meats.

The end of a product's storage life can be difficult to define accurately as changes that are acceptable to one person may not be acceptable to another. Storage life can be limited by adverse changes in colour rather than by changes in odour and flavour. In our experience, downgrading or rejection is usually based on visual assessment rather than on odour or flavour. As far as possible, the storage lives given here are based on published estimates of practical storage life (PSL) defined by the International Institute of Refrigeration (1986) as 'the period of storage during which the product retains its characteristic properties and remains suitable for consumption or the intended process'.

Chilled Storage

The time for which meat can be stored at chill temperatures is influenced mainly by the species of animal, pH, initial level of bacterial contamination, storage temperature and the type of packaging. High pH (6.0 or higher) meat will spoil quicker than meat with a pH of 5.3 to 5.7. Also, high initial levels of bacterial contamination on the surface of the meat will reduce the storage life because spoilage numbers of bacteria are reached sooner. Microbiological spoilage is characterised by off-odours, slime formation and discolouration, and generally, spoilage occurs when the microbial population reaches around 100 million per cm². For these two reasons, beef will keep longer than lamb, because lamb has a higher pH and because of differences in the slaughter and dressing process, lamb carcasses tend to have higher numbers of initial bacteria.

Chilled meat should be stored as cold as possible to maximise the storage period. A temperature of -1°C to 0°C is desirable and practical. Vacuum packaging and packaging in a modified atmosphere of 100% CO₂, will greatly extend storage life. The practical storage lives of different chilled meat products are listed in Table 1.

Table 1. Practical storage life of chilled meat

Product	Storage Life	Reference
Carcases/quarters etc in air (0°C to 2°C)		
Beef (stockinette)	3 – 4 weeks	1, 2
Beef (poly wrapped)	12 days	1
Lamb & mutton	10 – 13 days	2, 3
Offals	7 days	2
Primal cuts – vacuum packed (0°C)		
Beef	10 – 12 weeks	2, 4
Lamb & mutton	6 – 10 weeks	2, 4, 6
Telescoped lamb & mutton	6 – 8 weeks	4
Telescoped lamb & mutton (acetic/lactic acid treated)	10 – 12 weeks	4
Beef & lamb offal	3 – 4 weeks	5
CO ₂ (100%) gas flushed (0°C)		
Lamb & mutton carcasses and cuts	Up to 16 weeks	2

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Frozen Storage

During frozen storage microbiological growth is arrested, but meat will slowly deteriorate due to oxidative and other changes. Frozen storage life is normally limited by the development of adverse flavours caused by oxidative rancidity of fat. The temperature of storage, method of packaging and degree of saturation of the fat all affect the onset of these changes. The effect of temperature is evident in Table 2. Meat from ruminants (saturated fats) is generally more stable with respect to oxidative changes than meat from non-ruminants, such as pork. There is also evidence that a longer chilled storage time before freezing will reduce the frozen storage life - for instance, if chilled meat has been aged in vacuum packs and then frozen. The frozen storage life may also be reduced if the product is comminuted, because this process exposes more meat surfaces to air.

Some people are more sensitive to alterations in flavour than others, so practical storage periods for frozen meat may depend on the market destination and the end specific use for the product. The data in Table 2 are based on information from consumer panels tasting boiled, roasted or grilled samples.

Table 2. Practical storage life (months) of some frozen meat products

Product	-12°C	-18°C	-24°C	Reference
Beef (stockinette)	12	18	24	7, 8
Lamb & mutton (wrapped)	8	16	18	7, 8
Veal (wrapped)	4	14	8	7
Ground beef (wrapped)	4	6	8	7
Beef steaks (vac. packed)	8	18	24	8
Lamb chops (wrapped)	12	18	24	8
Liver	4	12	18	8
Cooked meats	3	4		7

Retail Display

The retail display life of consumer portions of meat is normally limited by colour changes. Brown discolouration of fresh meat (due to formation of metmyoglobin) normally occurs before unacceptable bacterial growth has occurred. The onset of discolouration occurs more rapidly at higher temperatures, and also in meat that has been stored for extended periods in vacuum packs. Modified atmosphere packaging (MAP) in an atmosphere high in oxygen will extend display life. For a more detailed discussion of MAP meat, please refer to Meat Technology Update newsletter 01/4.

Table 3 shows retail display life (in days) at about 5°C of packaged meats, some of which has been stored for various periods in vacuum packs at 0°C.

Table 3. Retail display life (in days) at about 5°C of packaged meats after storage in vacuum packs at 0°C

Product	Display packaging type (at 5°C)	Time stored in vacuum packs (at 0°C)					Reference
		0 weeks	2 weeks	4 weeks	6 weeks	8 weeks	
Beef retail cuts	Overwrapped	3	3	2	2	1	4
Beef retail cuts	80% O ₂ , 20% CO ₂ MAP	>7	5 – 6	4 – 5	3 – 4	2	4
Lamb cuts	Overwrapped	3	3	2	1 – 2	1	9
Beef patties	100% CO ₂ MAP	7					10
Ground beef	Overwrapped	1					2
Ground beef	80% O ₂ , 20% CO ₂ MAP	3 – 5					2
Sliced corned beef	Vacuum-packed	14					4

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