

MEAT RESEARCH LETTER 68/1

CSIRO MEAT RESEARCH LABORATORY

STORAGE TEMPERATURES FOR FROZEN MEATS

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## THE PROBLEM OF TIME AND TEMPERATURE

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The question is frequently asked "How long is it safe to keep meat in frozen storage?" Although there is no clear cut answer to this question it is nevertheless true that frozen meats do deteriorate during storage, and that under some conditions the changes can result in severe economic loss. Changes during storage are slow and progressive and there is no point in time where deterioration suddenly occurs. Very slight changes in flavour may sometimes be difficult to detect, and be unimportant for some markets. For other markets, however, even slight off-flavours may be regarded as a serious blemish.

Although stability during storage depends on several factors, the most important of these is temperature. The attached graph summarises a great deal of published information about the effects of temperature on frozen foods, and should assist you in deciding on storage conditions which will protect your products against deterioration.

The graph shows the relation between the rate of deterioration and the temperature for some frozen meats. Every position on the graph represents a combination of time and temperature. All points below and to the left of the curved lines represent time-temperature combinations which should be safe. Conversely those above and to the right of the curves describe combinations for which detectable deterioration and perhaps economic loss are to be expected.

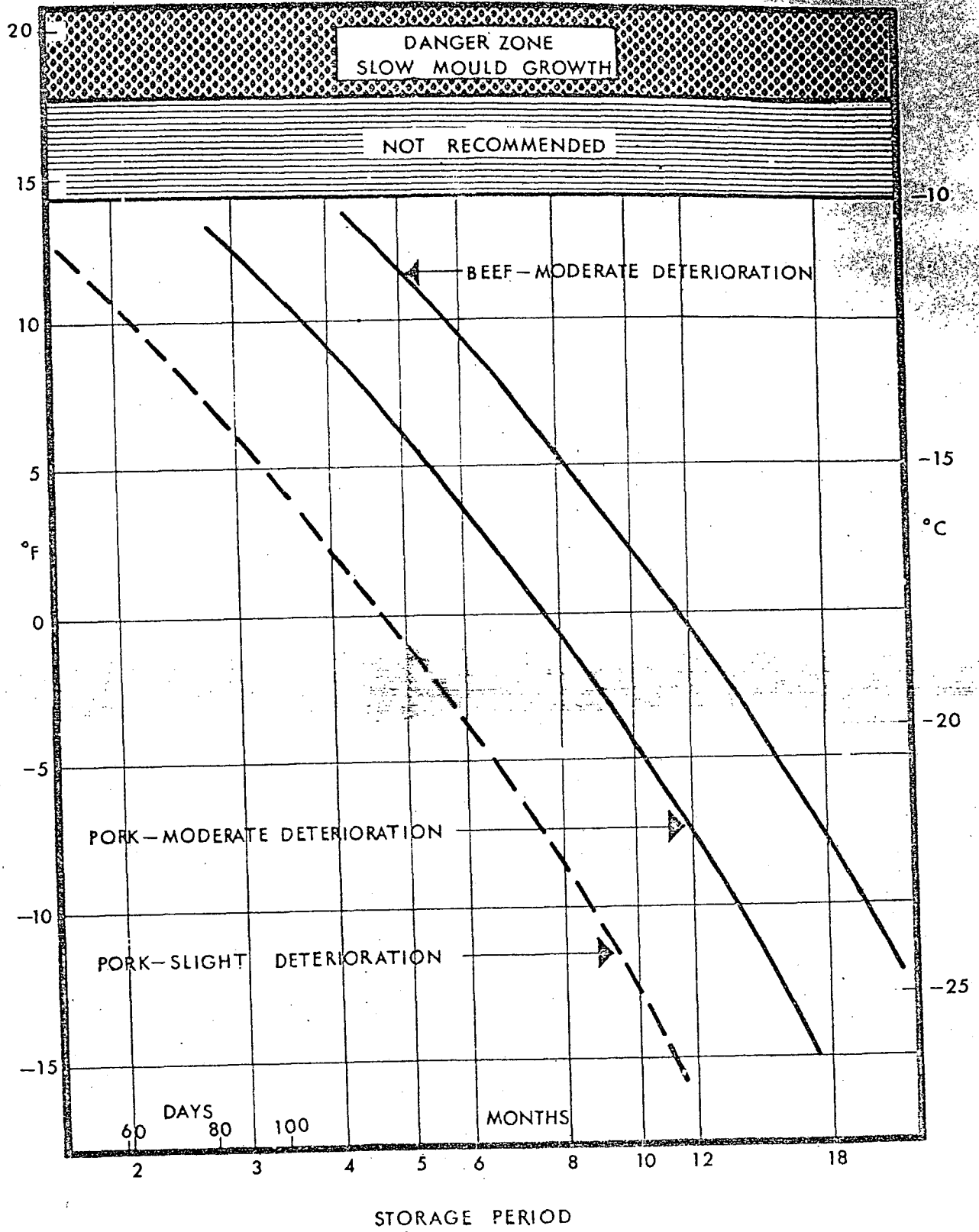
### To find Safe Storage Temperatures:

- (1) Decide maximum period for which storage is likely to be needed.
- (2) Decide how much deterioration you can permit.
- (3) Draw a vertical line from selected storage period on the base to meet the curved line appropriate to your product and the Maximum Permissible Storage Temperature is given by the horizontal line intersecting the curve at this point.

### To find Safe Storage Times:

- (1) Draw horizontal line for the temperature in your store until it intersects the curve for the product and permitted level of change.
- (2) The vertical line from this intersection then gives the Maximum Safe Storage Period.

RELATION BETWEEN TEMPERATURE  
AND STORAGE PERIOD OF MEAT



SOME POINTS TO REMEMBER

1. Pre-freezing and post-freezing deterioration are cumulative. Careless handling before freezing may, therefore, reduce the period for which the meat could safely be held in the frozen condition.
2. Weight loss from frozen meat and any associated freezer burn may be prevented by adequate packaging.
3. Slow mould growth may occur on frozen meats - but only at temperatures above 18-20°F (-7 to -8°C) and storage temperatures higher than 14°F (-10°C) are not recommended.
4. Rates of deterioration differ from one product to another. Because of the chemical nature of the fats, pig meats have a shorter storage life than beef and mutton.
5. Small cuts and comminuted meats with a large ratio of surface to weight spoil more rapidly than carcasses and quarters.
6. In the range of temperatures available commercially, a temperature reduction of 10°F approximately halves the rate of deterioration. In other words, a shift of 1°F changes the rate of deterioration by about 8%.
7. Care should be taken to avoid variations in temperature in your store and in your stock. Ensure that all your meat is stacked so that cold air can circulate freely beneath and around the stock. This is essential to avoid warm spots by heat leakage through walls and floors. Fluctuating temperatures increase weight loss and reduce shelf life.
8. Check your thermometers for accuracy, at least once a year. Make sure they are correctly placed to indicate true temperatures within the store.
9. Watch your inventory and do not store for longer than necessary. Keep good records. Your customer may want to continue storage elsewhere and to know the time and temperature which have applied under your conditions.
10. The information in the attached graph is approximate only. It is desirable to check the applicability of the recommendations to your products by checking with your customers or obtaining independent assessments of quality after known periods of storage.

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