

Meat technology update

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Short-term Preservation of Hides and Skins

Hides and skins, like meat, readily deteriorate. This is often overlooked.

Short-term preservation methods are used to prevent deterioration of hides and skins before they are tanned, part-processed or cured.

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About 50% of Australian hides and skins are not salted before tanning, and various methods have been developed to facilitate this green processing. Chemical methods and chilling are used to preserve hides and skins during transportation and storage. However, short-term preservation should be more widely used because green processing, which eliminates the cost of salting and the environmental problems associated with the salt, is only worthwhile if there is no deterioration in the raw material. Short-term preservation is also necessary if there are delays before curing, drying or other processing, such as fellmongering.

The development of regional brine-curing plants, wet-blue plants and woolskin

tanneries has resulted in large numbers of hides being transported prior to processing, whereas in the past, hides were often immediately salted at their source. Many green hides are being held for several hours at temperatures above 20°C and degradation is causing damage which is sometimes only apparent in the finished products. The grain layer of a hide is very susceptible to damage.

As soon as the skin is removed from the animal it is susceptible to autolysis (self digestion) and bacterial degradation, and the rate of degradation increases with temperature. Therefore, it is best to preserve the skins at their source. If there is a delay before treatment, the recommended methods will be less effective than expected.

- In summer, the risk of hide damage is high. In sunny or hot weather the risk is very high.
- Deterioration cannot be reversed by later chilling, preservation or processing. Even light damage to hides downgrades the resultant leather.
- Best practice is to cool hides to 20°C within one minute of slaughter. If water is recycled, a biocide is required to prevent bacterial deterioration.
- Chemical treatments within an hour of slaughter can protect hides.

Comparison between Chemical and Chilling Methods

Chemical methods are being used for up to 10 days' preservation at 25°C. They are mainly used for one to three days'

preservation under mild climatic conditions.

The main advantages of chemical methods are:

1. The continuing protection given during transportation and delays.
2. The ease of application, especially in tanning drums or converted concrete mixers.
3. Treatments using either sodium chlorite or calcium hypochlorite alone do not affect by-products or effluent.

The disadvantages of chemical methods are:

1. They are not recommended when ambient temperatures are continuously above 30°C.
2. All the chemicals need to be handled with care, although some are more hazardous than others.
3. Some of the chemicals cannot be used in particular circumstances owing to effluent restrictions or contamination of by-products.
4. Loosening of hair or wool can occur within two days at 25°C. This loosening is associated with the autolytic lysosomal enzymes present in skin and does not affect leather quality. However, because of the loosening:
 - (a) most chemical methods are only suitable for the preservation of woolskins and hair hides for 24 hours at no more than 25°C (there is less loosening with zinc chloride than with the other chemical treatments).
 - (b) if hides are held for more than one day prior to salting or brine curing, the lysosomal hair-loosening can be mistaken for bacterial "hair-slip" in the salted hides.

Chilling is used in various ways for holding

hides and skins for up to three weeks.

The main advantages of chilling are:

1. Hides can be quickly chilled by water or ice as they come from the kill floor.
2. No pollution.
3. No contamination of by-products.
4. Suitable for all hides and skins.
5. No hair-loosening. Chilling is therefore suitable for woolskins and hides which will subsequently be cured or tanned with the wool or hair on.

The main disadvantages of chilling are:

1. Hides and skins are good insulators and retain the body heat, so they should be chilled individually, immediately after removal.
2. If low temperatures are not maintained during transport and storage, damage can occur.
3. The temperature of chilled hides needs to be raised before unhairing.

Chilling Methods

The temperature to which hides and skins should be chilled depends on the required time of preservation. Table 1 gives the maximum storage period at various temperatures when chilling occurs immediately after removal. If there is a delay before chilling, the storage time at a particular temperature is reduced, e.g. there will be deterioration within one day if hides are left at body temperature for several hours before chilling to 20°C.

Table 1 : Chilling of Hides and Skins

Storage Hide Temperature	Maximum Storage Period
20°C	1 day
15°C	2 days
10°C	5 days
5°C	2 weeks
0°C	3 weeks

Various chilling methods can be used provided all areas of all hides and skins

quickly reach the required temperature:

- Crushed ice added to collection bins or drummed with hides, often in mixers. This is cost effective and the most commonly used method in Australia. Ice machines are bought or leased, or bulk loads of ice stored in chillers until required.
- Fluming, spraying or bath washing with chilled water.
- Application of dry ice particles (carbon dioxide snow - expensive).
- Placing in a freezer.
- Hanging hides on hooks on a conveyor in a chiller which can be mobile. In one chilling plant hides are hung on hooks on a continuous chain which firstly takes them through a high pressure washer, then through a chiller which chills them to 5°C in 48 minutes while they drain. They are then conveyed out of the chiller where, after trimming, they are automatically removed from the hooks into a crate for storage in the chiller.

The flesh side of skins can partially dry out during chilling and, if these skins are subsequently salted, salt penetration problems occur. Moistening the skins before salting will allow rapid penetration of salt.

If chilling facilities are not available but there are drying sheds on site, hanging sheepskins as for drying will lower their temperature. The skins can be further processed before they are dry but there must be compensation for the loss in moisture. This system is not recommended prior to salting.

Chemical Methods

The recommended methods are based on the use of either sodium chlorite, calcium hypochlorite, dithiocarbamates, zinc chloride or benzalkonium chloride (BAC). Sodium hypochlorite is not effective because it is not sufficiently stable. Sodium chlorite and dithiocarbamates are the most widely used chemical short-term preservatives for hides. Higher levels of chemicals are needed in summer and for dung-covered hides than for clean winter hides.

Safety precautions must be taken with the chemicals.

Treatments for hides, calf, goat and kangaroo skins

Dimethyl dithiocarbamate (DTC) drum processes can be used for preservation for up to three weeks. In addition to the DTC, boric acid and BAC are required for the longer storage times.

Each chemical supplier has individual recommendations and should be contacted for details.

Imprapell (30% sodium chlorite), or calcium hypochlorite, zinc chloride or benzalkonium chloride in drum or soak treatments are recommended methods developed by CSIRO Leather Research Centre.

Sodium chlorite has been used in Australia for 30 years, usually with no other additive. In Brazil it is preferred to chilling, and rotating drums attached to trucks are used to treat up to 1000 hides with Imprapell during transport.

Drum methods are mainly used, often in mixers, but soak and spray methods are possible. Occasionally preservation has not been adequate and there has been some damage to the resultant leather. Although the reason for this has not always been identified, usually there has been a delay before treatment, the temperature has been too high, or insufficient chemical has been added.

These short-term preservatives are mainly used to hold hides for one to three days and it is not necessary to add a fungicide. For three to six days' storage at 25°C, fungicides should be included to control mould growth. Owing to lysosomal hair-loosening (see disadvantages of chemical methods), chemical treatments are mainly used for hides being held prior to green processing, although the chemical methods can be used for up to one day's preservation before salting.

The choice of biocide used prior to salting will depend on several factors, including the possible effect on the effluent and the biocide used in brine curing. If a reducing agent such as dimethyl dithiocarbamate is

added to the brine, benzalkonium chloride (BAC) or dimethyl dithiocarbamate could be used for short-term preservation. If the brine additive is sodium fluoride, then sodium chlorite could also be used as the biocide.

Treatments for sheep and lambskins

Soak treatments: 20L/skin.

For holding one day: benzalkonium chloride, zinc chloride, or Imprapell.

For holding, more than one day: zinc chloride.

General

Some points to note are:

- Chemical methods are not recommended for sheep and lamb skins which are to be subsequently salted.
- The choice of method will depend on particular conditions and requirements, including the subsequent fate of the hides or skins.
- For all systems, bacterial growth must be controlled and this can be monitored with Dip Slides.
- Temperature loggers are useful for monitoring the temperature profile of hides during storage and transport. Suitable immersible loggers are available.
- Provided it is done as each hide comes from the kill floor to avoid delay, hides can be fleshed

before short-term preservation to improve tallow quality and to reduce weight and temperature.

- For hides and skins which are to be salted after short-term preservation, chemical treatments are only suitable for overnight storage, whereas chilling is recommended for longer periods.
- It must be remembered that if hides or skins are wet by icing or chemical treatments prior to brining or salting, more salt is required for curing because all the moisture must be saturated with salt (see *Meat Technology Update Nos. 94/2 and 94/3* 'Curing of Hides and Skins'). Therefore, owing to the amount of water held by the wool, if sheepskins are wet during short-term preservation, either by a chilling method or a chemical soak treatment, the water should be removed before salting. A chilling method which does not wet the skins is the preferred treatment of sheepskins to be subsequently salted.

Supplementary material on the recommendations, properties of the chemicals, safety precautions and effects on effluent and by-products is available in the *Further Information Paper* 'Short-term Preservation of Hides and Skins'.

Contact us for additional information

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