



In the hide curing department, ears, snouts, lips and tails are trimmed from the hides. Excess fat and meat are also removed. They are graded on the basis of species, brands and weight and identified for curing.

Curing in dry salt packs and curing in saturated brine are the two commonly-used methods of curing.

Hide Curing in Salt Packs

Packs are built by spreading hides, flesh side up, evenly and smoothly with the pates and shanks laid flat. Hides are salted with a new salt mixture of 75 percent No. 2 size and 25 percent No. 1 size rock salt on the basis of one pound of salt to one pound of hide. When relatively clean used rock salt is available, hides are salted with a mixture up to 50 percent used and 50 percent new salt. The pates and other thicker portions of the hide take more salt to maintain the proportion and to cure all parts of hides properly.

Packs are commonly built in a space 16×36 ft with approximately 1000 hides to the pack. This will allow for one pack to be built per two adjoining bays of normal size (Fig. 9). According to this plan four such packs can be put down. In general, these are built slightly away from the wall.

New packs are started on a clean floor that has been covered with a one inch or more layer of salt. This is to protect the hair side of the hide which is next to the floor.

Packs are usually made up of all one grade. It is preferable that packs not be built higher than 3½ ft. They are built higher as found necessary due to limited floor space, but will increase the shrink. During the minimum curing period of thirty days, that the hides are in the packs, the moisture from the hides dissolves about 50 percent of the salt, thus forming brine. The salt penetrates the hides through the brine as a medium, replacing the moisture and effecting a cure. Surplus moisture and brine drains off, resulting in hide shrinkage. If the pack is bunched in the center, excessive draining will result. When the pack is overly dished, an undue amount of brine will be collected. Salt may be banked around the bottom of the entire pack to prevent water damage from cleanup. Packs are built away from the walls to prevent leaching out of salt due to condensation.

The location of the curing space should be convenient for receiving and shipping of hides such that proper temperature and humidity can be maintained. For design conditions, a temperature of 55 F and a relative humidity of 85 percent



The most common form of producing the desired refrigeration is provided by either direct expansion ammonia coils or brine circulating coils. They may be located in banks over the aisles that are clear of packs; or along the walls clear of the racks.

Other arrangements can be used as long as the location of the coils is not over the hide packs, which would make it possible for rust and moisture to drip on the hides and cause spoilage. The desired relative humidity is abetted by the evaporation of water on the floors.

Climatic conditions will dictate the degree of necessity for providing heating coils or heating units. Where this consideration is required, the location should follow the same principles described for the cooling medium.

Hide Curing in Saturated Brine

Brine curing is increasing in popularity. This procedure is faster, more uniform and more economical than the salt pack method. The brine cure is generally better for tanneries in that it practically eliminates so-called salt stains, reduces the amount of dirt and manure on the hides, and improves the quality of the leather.

The brine cure requires a minimum of 14 to 16 hr. The hides are submerged in a tank filled with saturated brine. Fig. 10 shows a typical layout. Curing facilities should be designed for a ratio of four pounds of brine to one pound of green hide. Hides should be placed in the brine curing tank flesh side down. To insure uniform treatment, hides should be agitated by paddle wheel-type agitator throughout the curing period, although it is not necessary to agitate them continuously during the last several hours.

The oval-shaped brine tanks as shown in Fig. 10 are 21 ft wide and 25 ft long, which is generally believed to be the smallest practical size. According to Kaufmann (see Bibliography) these tanks are invariably 5 ft inside depth with an 8 ft raceway, and project 2 ft above the floor. By computing the volume based on a 4:1 ratio of brine to hides, the tank will hold approximately 30,000 lb of hides. Standard practice says Kaufmann, is to use paddles 4 ft in diameter and geared to rotate at 15 rpm. If the speed of rotation is much above 20 rpm, there is considerable splash of the brine. When the speed is much lower than the 15 rpm recommended, the hides do not receive enough push to travel properly. When the brine tank is fully charged with hides, the brine level

will be very close to the brim of the tank. At this condition the paddles will dip about 12 in. into the hide-brine mixture and deliver the desirable push and circulation around the tank.

New brine should be built up to 97 to 100 Salometer reading at 60° Fahrenheit, and be maintained at this strength throughout the curing period. The temperature of the brine should be maintained between 60 and 70 F. This temperature range is high enough to permit rapid penetration of the brine and yet low enough so that, with the aid of bactericides, the growth of microorganisms is prevented. Usually sodium hypochlorite is adopted for bactericidal purposes. A 10 to 12 percent solution is used to the amount of one percent or more on the basis of green weight of hides.

The brine is kept to full strength by recirculating it through a concentrating vat. When operating at full capacity, the brine should be sterilized by heating in a sterilizing vat having sufficient capacity to contain a full batch. This is done to coagulate the soluble protein and to kill the bacteria. The circulating brine will remain sufficiently sterile for a fairly long period of time, but the function is usually performed weekly for uniformity of operation and comparative ease of sterilizing. Brine can be heated to a temperature of about 228° F by means of closed heating coils, or by direct injection of steam (this method dilutes the solution and requires greater consumption of salt). The liquid is held at this temperature of 228° F for about 20 to 30 min, or until the protein matter is coagulated. The coagulated mass rises to the top after boiling and is skimmed off. Sludge settles to the bottom. It is flushed to the sewer after the brine has been returned to the system. Holding tanks are equipped with refrigerating coils to temper the brine to the recommended temperature of 70° F. The sterilized brine is then ready for re-use. Economic conditions may exist which make it impracticable to sterilize the brine. An alternate method would be to discharge the spent solution to the sewer. Where this is employed, strainers are inserted into the system to obtain continuous screening. This will allow longer use of the made up brine before disposal is required.

There are two recommended methods of maintaining the brine at the desired temperature: (1) route the recirculating brine through a direct expansion ammonia heat exchanger; and (2) circulate the cooling medium (chilled brine solution or ammonia) through coils installed in the brine concentrating vat.

At the end of the curing period, the hides are removed and allowed to drain. After the hides have thoroughly drained, they are put in packs without salting. The last layer of hides is placed hair side up and the pack is capped with about a one-half inch layer of rock salt when necessary to offset the effects of condensation. Care must be taken to prevent the hides from coming into contact with water. The hides are fully cured when taken from the brining tank, but are placed in packs for complete draining and also to accumulate enough of any one grade for shipment.

Shipping and Storage

Where the requirements are such that it is not necessary to accumulate hides by grades, the saturated, brined, cured product can be shipped immediately after proper drainage. Green salted hides taken up from a pack are shaken free of salt. This is done in the take-up alley (Fig. 9). In any case, hides are banded prior to shipment.

Where hides are to be stored for several months, the storage spaces should be designed to hold the temperature of 40 to 45°F. At temperatures of 30 to 32°F hides can be stored quite safely for a year. Where it is necessary to store hides for an indefinite period of time, the storage space should be capable

Most packing plants use ammonia as their refrigerating medium due to its excellent refrigerating characteristics and nominal cost.

REFRIGERATING MACHINERY

The type of compressors used depends on the refrigeration load, which may vary from less than 100 tons to more than 4000. The most frequently used machine for the smaller ton-nages is the vertical electrically driven compressor with the load usually divided among two or more units.

For many years, the greater tonnages have been supplied by large horizontal, double-acting compressors, either electric motor or steam engine driven although there are some installations which consist of multiplicity of somewhat smaller vertical compressors, and occasionally a large multi-cylinder vertical compressor.

During the last twenty years, the centrifugal refrigeration machine has become popular in some of the larger plants and the use of small high speed multi-cylinder machines has increased in the smaller plants.

The centrifugal machines, which usually develop 400 tons or more, are of two types: (a) those which compress halogenated hydrocarbon refrigerants and use the halocarbons to chill and liquefy the ammonia at ammonia suction pressure, and (b) an even more recent type which compresses ammonia directly from suction pressure to condenser pressure. These units can be driven by steam turbine, electric motor, or both, with the load being carried by either prime mover, depending on the demand for exhaust steam.

A very desirable feature about the turbine driven centrifugal compressor is its ability to fit into the overall heat balance of some packing plants, by bleeding or exhausting process steam.

These centrifugal compressors are composed of very few moving parts, and this simplicity results in extreme dependability and freedom from maintenance in spite of their relatively high speed. These two factors are undoubtedly sufficient to account for the growing popularity of this type machine.

The use of high speed multi-cylinder compressors which are finding favor in the smaller plants and branches is probably due to lower first cost of the machine; the smaller foundations required; and smaller space requirements.

There are varied opinions regarding the merits of the high speed multi-cylinder compressor (900 to 1200 rpm) as compared to the twin cylinder vertical machine of larger bore and lower speed (300 to 550 rpm), which only time and experience will resolve.

In most plants, two suction pressures are used: one for freezers, usually 0 to 5 psig; and the other for coolers, usually 20 to 25 psig. When lower temperatures are needed for quick freezing, a third lower suction pressure is required, and is usually supplied by a booster compressor. In many plants the normal freezer suction as well as the quick freeze suction is supplied by booster compressors discharging to the 20 to 25 psig main.

In meat packing operations, rapidly fluctuating loads are common. It is good practice to install ammonia accumulators to trap out entrained liquid ammonia. To be effective they must be equipped with ammonia liquid pumps or other means for returning the liquid ammonia to the high side receiver or in some cases, to the low side receiver. It is also good practice