

## Freeze Branding

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The purpose of this Agnote is to provide guidelines on the legal, safe and effective use of freeze branding in the Northern Territory to identify livestock.

### OVERVIEW

Freeze branding is used to identify cattle and horses, and differs from fire ('hot') branding and chemical ('cold') branding. The procedure involves the use of super-chilled temperatures as opposed to the high temperatures of fire branding. When correctly applied, a freeze brand selectively destroys the pigment-producing cells (melanocytes) of skin and hair. In comparison, fire branding extensively destroys cells of the skin and hair.

If a freeze brand is applied to a dark coat for a moderate period of time, unpigmented skin and white hair will become visible for up to 50 metres; if long hair overgrows the freeze brand, the brand will be located by the white hairs.

If a freeze brand is applied to a light coloured (i.e. roan, grey) coat, a longer period of time is required to produce a visible brand on such animals, i.e. no hair regrowth and bald skin which may darken over time.



## CRITICAL FEATURES OF FREEZE BRANDING

- It is relatively painless.
- It is up to 100% effective, depending on technique.
- It requires careful use of potentially dangerous materials.
- It requires financial outlay for specific equipment and materials.
- It requires access to 'super-chill' coolant.
- It requires exact timing to effectively brand.
- It produces a permanent brand that must meet NT legal specifications.

## LEGAL ASPECTS

Freeze brands must meet the requirements of the Northern Territory *Brands Act* and Brands Regulations. Information on Northern Territory requirements for making branding irons, registering a brand and branding livestock is available from the Northern Territory Registrar of Brands or Regional Stock Inspectors.

## BRANDING IRONS

The size and shape of branding irons used for freeze branding are the same as those for fire branding. However, in order to produce the best freeze brand results, the figures on the branding irons should be made of copper or copper alloy (i.e. brass, bronze) and have rounded edges. Such metals and edges provide the best temperature conduction (transfer of the super-chilled temperature). Shorter handles (approximately 40 cm) are more convenient than those used for fire branding. Non-conductive material (e.g. wood) is used for the handle grip.



The price of copper alloy branding irons depends on the number and type, e.g. quoted prices December 2005: \$899 for a set of numbers (0 to 9); \$299 for a symbol brand; \$299 for a three-letter brand.

## COOLANT

Either of two products (liquid nitrogen or dry ice) are used for the 'super-chill' coolant.

*Liquid nitrogen* is the most expensive and most dangerous to transport and handle. It is a liquid with a temperature of minus 196°C which vaporises over time into inert nitrogen gas. It is available both in Alice Springs and Darwin (prices quoted December 2005: \$4 to \$16 per litre plus supply charges). Suitable non-pressurised vacuum flasks are required for safe transport and storage. Flasks ranging in size from 5 litres to 50 litres in volume can be purchased from BOC Gas and gas supply stores (quoted prices December 2005: \$848 to \$2,025 respectively). Freight costs are additional.

*Dry ice* is less expensive and a little less dangerous to transport and handle. It is solid carbon dioxide with a temperature of minus 78.5°C which vaporises into inert carbon dioxide gas. It is available both in Darwin and Alice Springs (prices quoted December 2005: the equivalent of \$4 to \$10 per kg). Alcohol (95% to 100%

ethanol or methanol) is used with the dry ice to create a coolant (dry ice - alcohol mixture). Up to two 2-kg blocks of dry ice may be required to initially super-chill a branding iron, and somewhat less to re-chill the branding iron for successive freeze branding. Allowance should be made for up to 0.5 kg of dry ice and 0.5 litre of alcohol to freeze brand an animal.

Both forms of coolant require an insulated (non-heat conductive) container in which the coolant can be placed with the branding iron while the temperature of the branding iron drops. A small Styrofoam or hard plastic 'esky' is suitable, but should be placed within an outside (second) container because plastic may crack with repeated use.

## **SAFETY ASPECTS**

Alcohol is highly flammable. Both liquid nitrogen and dry ice can cause severe 'frost-bite' burns and asphyxiation. Consequently, all such products must be appropriately transported, stored and used with extreme care in accordance with manufacturers' specifications. People must read the material safety data sheets supplied by the manufacturers for each product and follow any required directions for personal protection clothing and first aid.

Three important safety considerations are:

- transport, store and use in an appropriate container and in a well ventilated space;
- handle with appropriate personal protection equipment (i.e. gloves, glasses, covered shoes and clothing);
- do not smoke or use naked flames near a highly flammable substance.

## **PROCEDURE FOR FREEZE BRANDING**

Place the coolant in the insulated container. If using liquid nitrogen, pour in carefully and beware of back-splashes into the eyes. If using dry ice, place the blocks in the container and cover with a couple of centimetres of 100% alcohol.

Immerse the branding iron in the coolant until vigorous bubbling stops (up to 30 minutes for a fresh dry ice - alcohol mixture) and frosting appears on the lower end of the branding iron handle, just above the level of the coolant.

Clip the site to be branded with fine clippers and clean the skin surface with un-chilled 100% alcohol immediately before applying the branding iron. This removes dirt and oil on the skin and promotes good contact with the skin without the branding iron sticking to the skin.

Restrain the animal to minimise movement and allow easy access to the site to be branded. Movement of the animal may blur the brand.

Place one hand on the animal to minimise flinching and with the other hand remove the branding iron from the coolant. Shake off excess coolant and place the branding iron firmly on the site to be branded. Brand on a firm fleshy area—do not brand on thin skin over superficial bones or joints.

Hold the branding iron in place for the time period shown in Table 1 in order to produce an effective brand. A longer time period is required when using dry ice - alcohol because its temperature is not as low as liquid nitrogen. A relatively longer time period is also required for livestock with thicker skins (adults or males) or light-coloured coats (roans or greys). A stop watch is recommended for exact timing.

Replace the branding iron in the coolant if re-chilling is necessary. When ready for re-use, the vigorous bubbling subsides and frosting reforms on the lower end of the branding iron handle (minimum 2 minutes).

After the freeze branding is complete, recycle unused coolant. If liquid nitrogen has been used, the unused portion may be carefully poured back into the original transport container. Beware of back-splashes into the eyes. If dry ice - alcohol has been used, let the alcohol stand overnight in a well ventilated area before replacing in a container.

**Table 1.** Recommended freeze branding times for two types of coolant, using copper (alloy) branding irons

	<b>Liquid nitrogen</b>	<b>Dry ice - alcohol</b>
Horse (adult)	8-12 seconds ... increasing up to 14 seconds for bald-skin brands	20-40 seconds ... increasing up to 60 seconds for bald-skin brands
Horse (yearling)	6-12 seconds	16-24 seconds
Cattle (adult)	25-30 seconds ... increasing up to 35 seconds for bald-skin brands	40-50 seconds ... increasing up to 60 seconds for bald-skin brands
Cattle (calves)	21-24 seconds	30-50 seconds

## SKIN RESPONSE

When a freeze brand is applied to the skin, the following occurs:

The skin is indented and frozen in the shape of the applied freeze brand. Within a few minutes the skin thaws, becomes warm and marked reddening of the brand outline occurs. This is followed by a marked swelling of the area which persists for one to three days, depending on the time exposed to the branding iron. During the following three to four weeks, various amounts of hair and surface skin (scab) peel off, but the brand is clearly legible.

From 6 to 10 weeks, any white hair growth will become obvious depending on seasonal hair growth patterns. If the freeze brand application is prolonged, then no hair growth will occur in the centre of the brand (bald-skin brand). If the brand application period is too short, no brand (neither white hair, nor bald skin) will be visible.

## NORTHERN TERRITORY DEPARTMENT CONTACTS:

Registrar of Brands	phone: 08 8999 2033
Regional Stock Inspector – Darwin	phone: 08 8999 2031
Regional Stock Inspector – Katherine	phone: 08 8973 9754
Regional Stock Inspector – Tennant Creek	phone: 08 8962 4490
Regional Stock Inspector – Alice Springs	phone: 08 8951 8182

## **OTHER CONTACTS:**

SMIMAC Food Services Distributors, <http://www.smimac.com.au/>

BOC Gas and Gas Stores, <http://www.boc.com.au/>

Shoof International (The Animal Equipment Company), <http://www.shoof.com.au/>

Drovers Rural, [http://www.drovers.com.au/html/drovers\\_rural.html#Vet](http://www.drovers.com.au/html/drovers_rural.html#Vet)

## **OTHER SOURCES OF INFORMATION:**

Hall, J. B., Greiner, S. P., Gregg, C. (2004). 'Cattle Identification: Freeze Branding' Publication Number 400-301, available online: <http://www.ext.vt.edu/pubs/beef/400-301/400-301.pdf> (accessed December 2005)

Householder, D., Webb, G., Wigington, S., Bruemmer, J. n.d., 'Freeze Branding Horses, L-5084', Texas Agricultural Extension Service, The Texas A and M University System, available online: <http://animalscience.tamu.edu/ansc/publications/horsepubs/L5084-freezebranding.pdf> (accessed December 2005)

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