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## Comparison of Time and Method in Freeze-marking Cattle

R.R. Schalles, C.L. Drake and D.M. Allen

Freeze marking for within-herd identification was used on 65 Hereford females. The cattle were 18 months to nearly three years old. Three numerals were placed on the right rump of each animal in the fall of 1967. The "branding irons" used were four-inch brass numerals with a half inch face. Dry ice and ethyl alcohol were used as the coolant with 40, 50 or 60 seconds of contact time as well as liquid nitrogen with 30, 35 or 40 seconds of contact. Three men each applied one of the three numerals using dry ice and alcohol coolant with 60 seconds contact time on 14 head. The remaining 51 head were marked by one man.

The area to be freeze marked was clipped as close as possible with large animal clippers equipped with a 83 AU Stewart blade and 84 AU comb. That left hair about 1/8 inch long. Immediately before the "branding iron" was applied, the area was thoroughly wet with ethyl alcohol.

Five months after marking, freeze marks were evaluated before and after clipping. After clipping each numeral was scored on a scale of 1 to 10. An ideal freeze mark was scored five, under frozen marks (normal color hair present) less than five, and over frozen marks (loss of hair and skin scarring) more than five. A five mark indi-

cated the normal amount of hair in the marked area, all of which was white. A ten score indicated heavy scaring and no hair, similar to a hot iron brand. The scoring system permitted analysis of variance to determine significance of various marking factors. Duncan's Multiple Range test was used to determine significance among contact times within treatments.

### Results and Discussion

All times used with the liquid nitrogen method resulted in considerably over frozen marks (Table 1 ) and especially so at 35 or 40 seconds, both of which scored higher than the 30-second time. This was also indicated by less variation among numerals at the 40-second time.

The most desirable results were obtained with dry ice and alcohol. Differences due to time were not significant; however, the 60-second time produced slightly more readable freeze marks. Differences among animals and among personnel doing the marking were significant and accounted for 76% of the variance. The greatest variation was due to differences among animals.

In this study dry ice and alcohol produced the best freeze marks, however, it was concluded that the contact time was much too long when liquid nitrogen was used as the coolant. It also appeared that the length of contact time was much more sensitive when liquid nitrogen was used. Good results were produced using dry ice and ethyl alcohol as the coolant with 50 or 60 seconds contact time.

Table 1  
Means for Time Within Freeze Marking Method

Method	Time	Numerals Evaluated	Mean score and std. errors <sup>a</sup>
Liquid nitrogen			
	30	30	7.90±.20
	35	24	9.08±.20
	40	24	8.29±.19
Dry ice and alcohol			
	40	21	4.71±.30
	50	27	4.85±.26
	60	27	5.04±.28

<sup>a</sup> Five represents an ideal score, higher numbers over freezing and lower numbers under freezing.

Table 2  
Analysis of Variance for Method and Time  
of Freeze Marking Within Method

Source of Variation	d.f.	S.S.	M.S.	F-ratio
Method	1	469.4	469.4	282.4**
Time/method	4	20.2	5.1	3.0*
Error	147	244.3	1.7	
Total	152	734.0		

\* P < .05

\*\* P < .01

Table 3

Analysis of Variance for Personnel and Animals  
Using Dry Ice and Ethyl Alcohol With  
60 Seconds Contact Time

Source of variation	d.f.	S.S.	M.S.	F-ratio
Persons	2	9	4.50	8.3**
Animal	13	64	4.92	9.1**
Error	26	14	0.54	
Total	41	87		

\*\* P < .01