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Dairy Update

EFFECT OF NEUTRAL ISOLATION ON
MILK PRODUCTION AND HERD HEALTH

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NOTE: This material was abstracted from presentations made at the 1987 annual meetings of the American Dairy Science Association and the American Society of Agricultural Engineers. Copies of the ASAE paper (No. 87-3039) are available from the authors. The ASAE paper does not include Table 1 or Figure 9. RDA

Isolation of the primary neutrals from the farmstead secondary neutral has become a commonly used procedure for elimination of off-farm sources of neutral-to-earth voltage. Through the cooperation of four rural electric cooperatives and one investor-owned utility, 395 farms in west central Minnesota were identified as being isolated before August, 1986. Further investigation revealed 123 of these farms had DHI data available for 24 months prior to and 6 months after isolation; 84 had data available for 24 months prior to and a full 12 months after isolation. Nearly all of the 84 farms are located in Douglas, Otter Tail, Pope and Stearns counties.

Farms were isolated at the distribution transformer. Farms isolated by other means or where other approaches to addressing stray voltage problems were used were not included in this study. Although no record of measured voltages on these farms is available, the general criterion for isolation by utilities in the area is a neutral-to-earth voltage at the barn service entrance above 1.0 V AC, with indication that the principle source is off-farm and that animals were able to access the voltage.

Based on comparison of the study herds to area average values, level of management was above average in that the study herds had a lower percentage of cows with a high somatic cell count, a lower calving interval, a higher heat detection index, and a higher conception rate than the area average. As a result, the annual percentage of cows leaving the herd was lower than expected. Isolation had no apparent effect on these parameters.

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Assessment of rolling herd averages (RHA) showed milk production 12 months after isolation was significantly greater than milk production for the year ending 12 months before, 6 months before or at the time of isolation (Fig. 1). There also appeared to be a trend toward increased peak milk production after isolation in first lactation (Fig. 2) and other (Fig. 3) cows. Data from the 84 study herds showed no significant change after isolation for the following traits: percentage of cows leaving the herd (Fig. 4); percent cows with high somatic cell count (Fig. 5); change in calving interval (Fig. 6); change in heat detection index (Fig. 7); and change in conception rate (Fig. 8).

A further analysis of the 84 herds was completed by ranking the herds based on "percent change" in milk production from time of isolation until one year after isolation. The 21 lowest response herds experienced no improvement in RHA milk production after isolation (15,562 lbs at time of isolation to 15,273 lbs one year later). The 21 high response herds, however, improved their RHA for milk from 13,514 lbs at time of isolation to 15,625 lbs one year later (Fig. 9). This increase of 2,111 lbs of milk per cow in a herd of 50 cows represents an increased gross income annually of nearly \$13,000 when milk is valued at \$12.00/cwt.

A statistical analysis was completed to determine whether significant changes occurred in the mean values of each parameter. Differences between means are considered to be significant when "p" values are less than .05. Differences in peak milk values were significant (Table 1). Other traits indicative of a physiological change in cows failed to approach significance.

SUMMARY

Both controlled research and observation on problem farms shows that animals subjected to stray voltage are likely to exhibit a change in behavior. While there was nothing in the DHI data set to confirm that cows' behavior was modified, the increased milk per cow in the absence of other significant changes is consistent with the hypothesis that correcting a stray voltage problem may improve animal behavior and result in an improved milking routine.

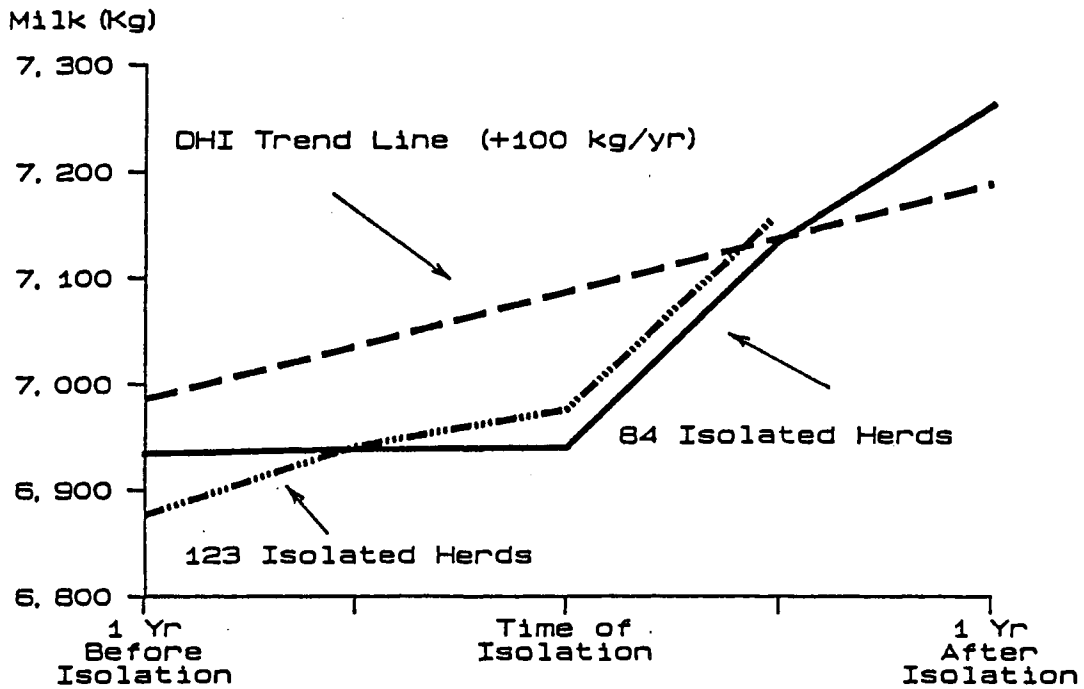


Fig. 1. Changes in Rolling Herd Average

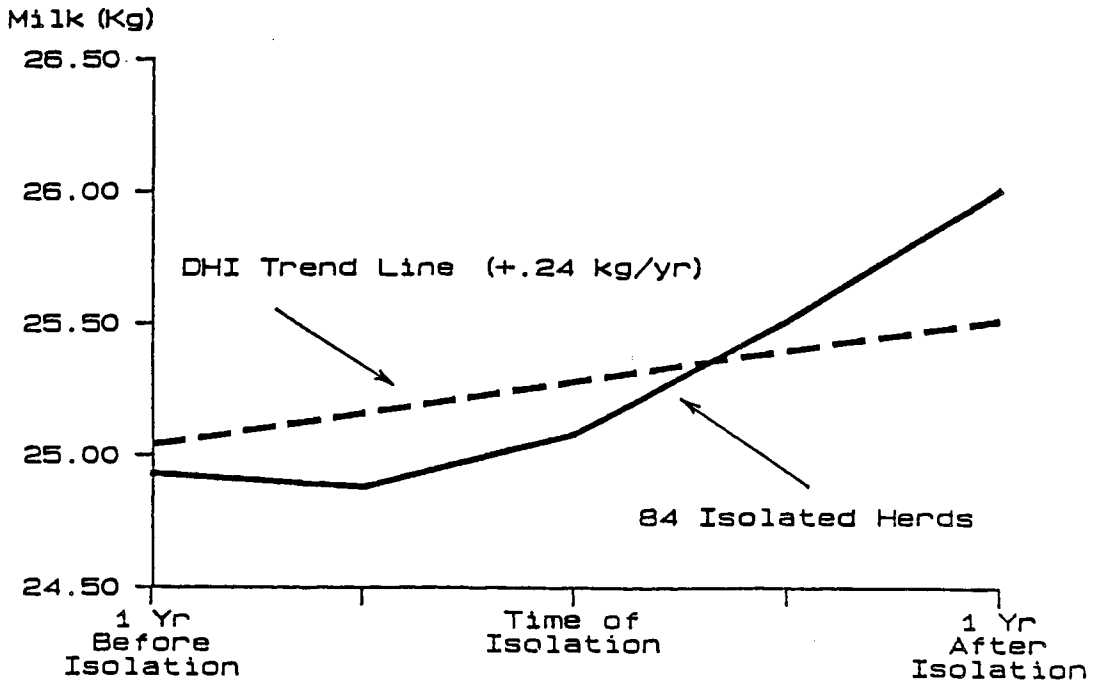


Fig. 2. Change in 1st Lactation Peak Milk/Cow

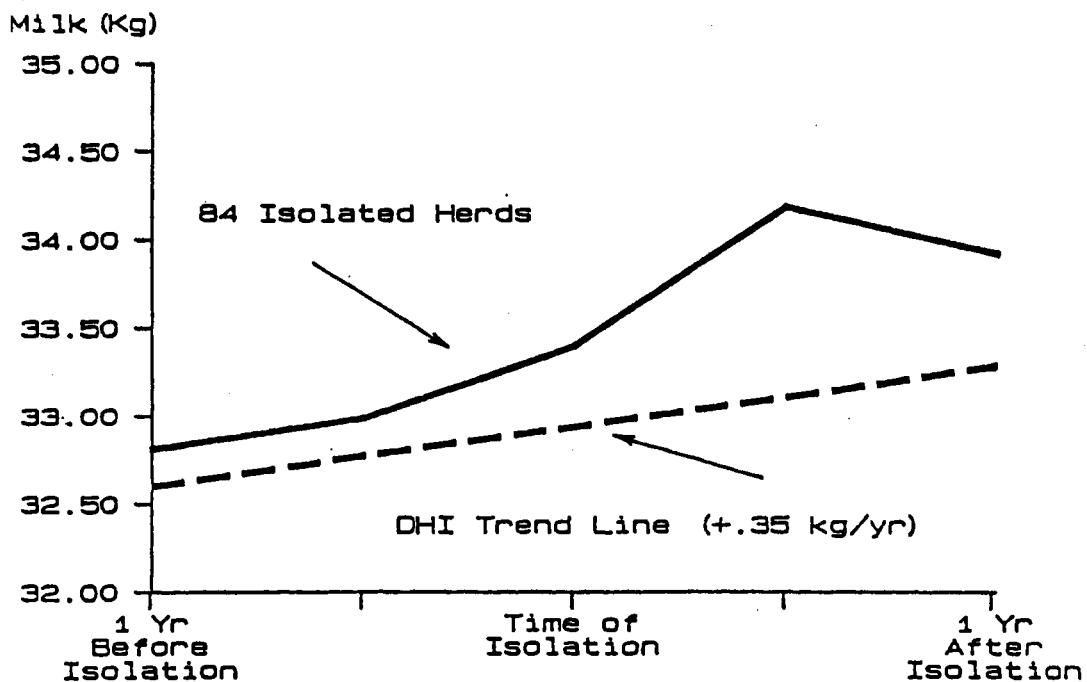


Fig. 3. Change in 2nd+ Lactation Milk/Cow

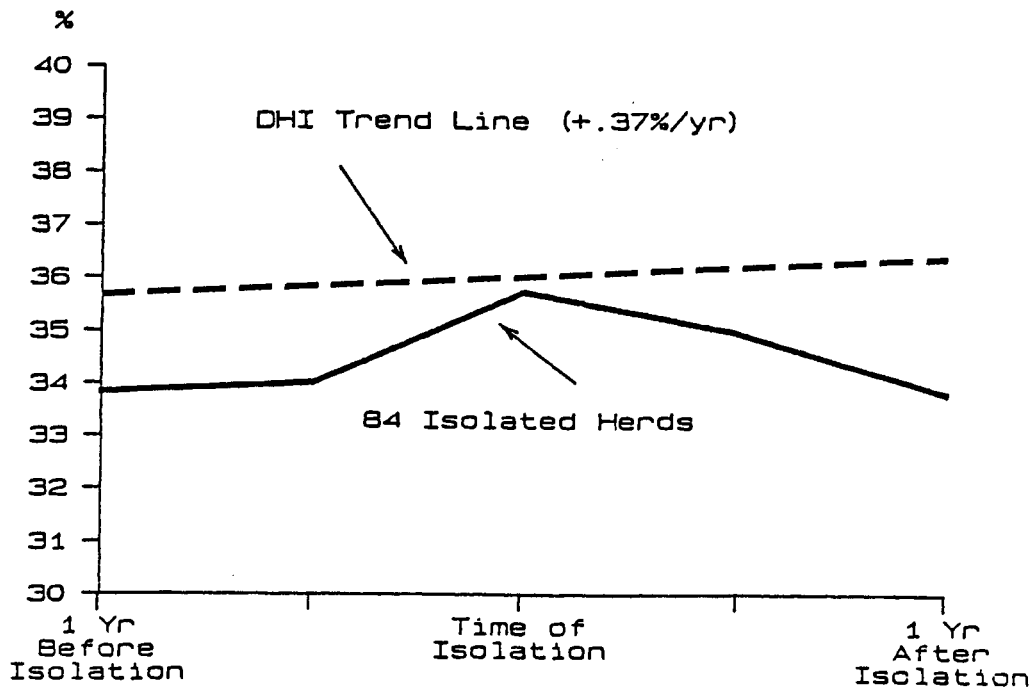


Fig. 4. Change in Percentage of Cows Leaving the Herd Annually

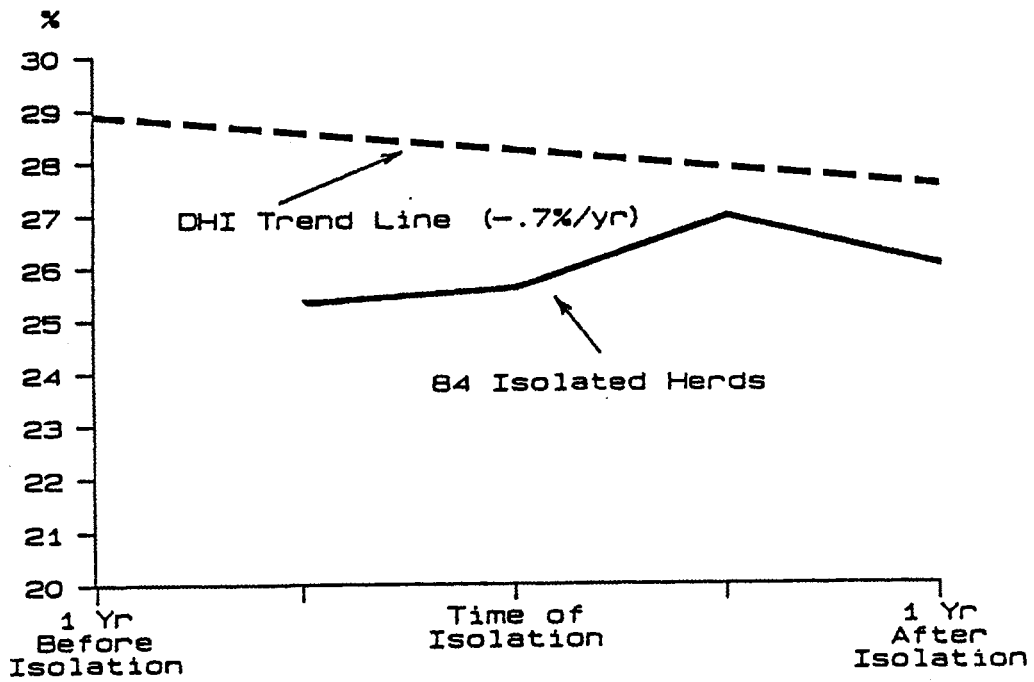


Fig. 5. Change in Yearly Average Percent Cows With High Somatic Cell Count

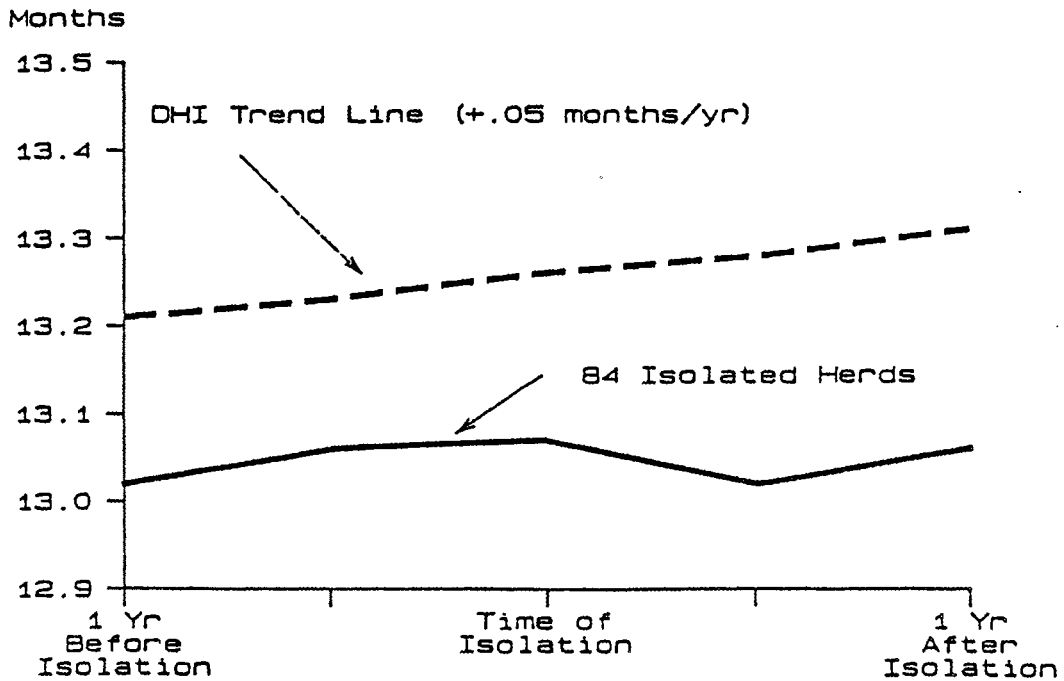


Fig. 6. Change in Calving Interval

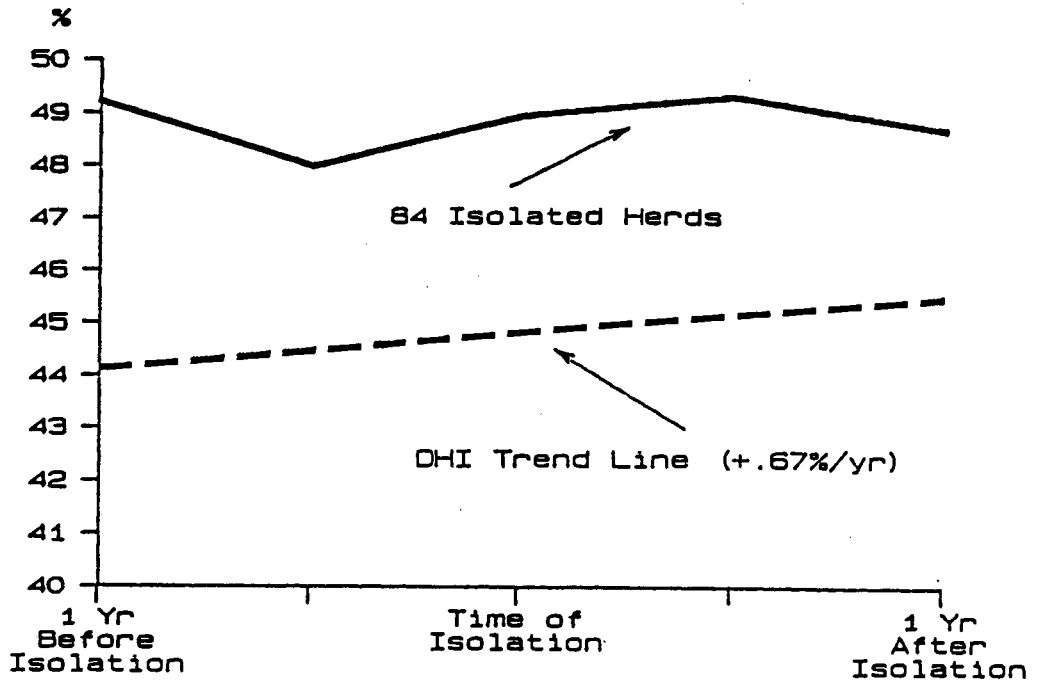


Fig. 7. Change in Heat Detection Index

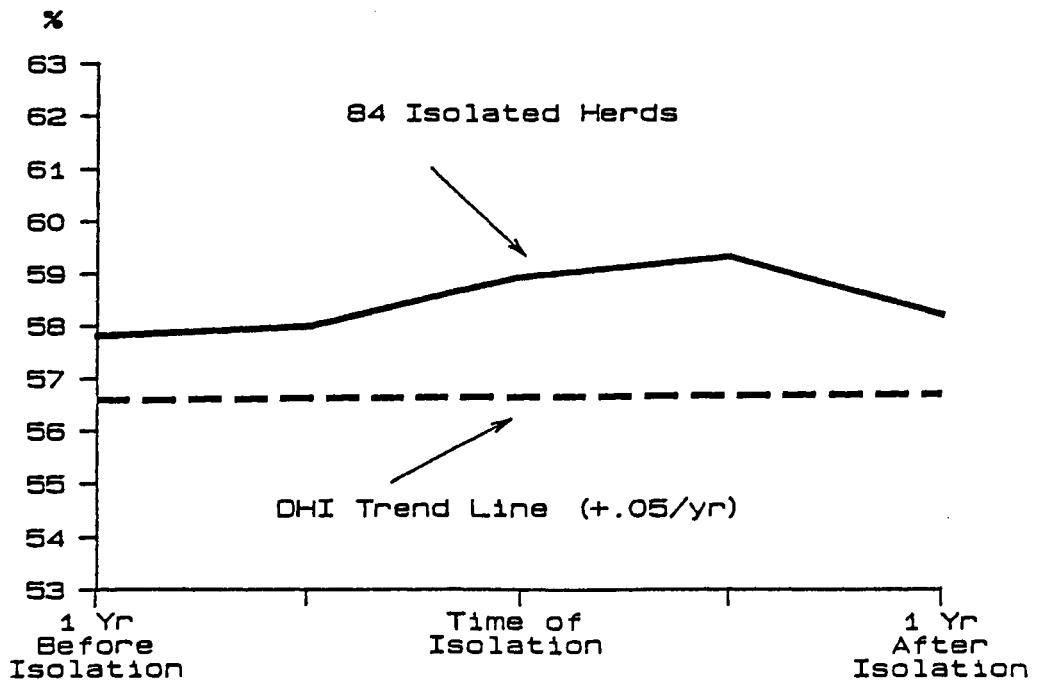


Fig. 8. Change in Conception Rate

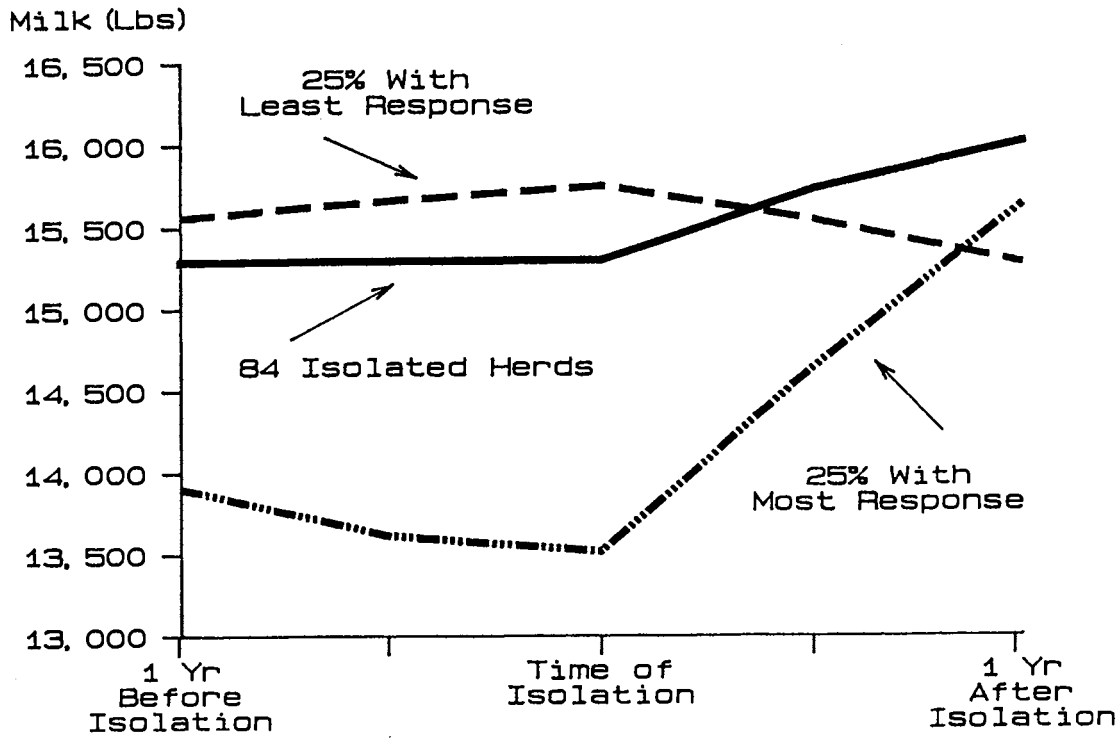


Fig. 9. Change in Milk Per Cow of Herds Ranked According to Percent Increase in Rolling Herd Average After Isolation.

Table 1. Change in Other Parameters for the Upper 25% Herds Ranked According to Percent Increase in Rolling Herd Average After Isolation.

Parameter	1 Yr. Before Isolation	Time of Isolation	1 Yr. After Isolation	p
Production Traits (lbs)				
Peak Milk, 1st Lact.	49.2	51.9	56.0	.04
Peak Milk, 2nd+ Lact.	67.4	67.2	73.7	.02
% Cows Leaving Herd	35.1	36.7	33.3	.93
Mastitis (SCC)				
Current Month (000's)	432	331	317	.21
Yearly % Pos. Cows	25.5	26.1	23.7	.81
Reproduction				
Calving Interval (mon.)	12.8	13.0	12.9	.75
Heat Detection (%)	51.0	47.5	49.7	.94
Conception Rate (%)	58.5	60.4	60.6	.91