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Milking Management and Housing Studies

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SUMMARY

A study was made of records of 30 Guernsey cows milked and housed in a tie-barn one lactation and in loose housing and milking parlor facilities the following lactation.

A decrease of 8.12 percent ($P < 0.01$) in milk production (975 lb/cow) occurred when animals were switched from a tie-barn to milking parlor for milking. The effect on production and persistency of the higher producing cows was greater ($P < 0.01$) than on the lower producing animals. Cows were less persistent ($P < 0.02$) when milked in a parlor than when milked in a tie-barn.

A difference in the milk production and persistency was noted in sire daughter groupings when cows were milked under the two conditions.

Age of cows did not influence the decrease in production appreciably, although the older cows (avg. age 8.4 yrs.) produced less milk and their production declined to a lesser extent than that of their younger (avg. age 3.6 yrs.) herdmates. Types of housing and feeding practices were not measurable contributors to the marked decrease in milk production, as evidenced by similar decreases in milk production among cows housed in either tie-barn or loose housing facilities.

Although present trends are to loose housing and milking parlors, many dairymen prefer stanchion or conventional-type housing and milking facilities for their dairy cows.

Milking Management and Housing Studies

REVIEW OF LITERATURE

The merits of loose versus conventional housing were reviewed by Reed (9). The economy of housing, labor, and equipment costs, ease of handling milk and feed are important; however, the level and persistency of milk production and the productive longevity are also important, especially to the breeder of purebred dairy cattle, who expects to realize premium prices for breeding animals.

Woodward, et al., (12) reported higher milk production in pen-type (loose) housing than in the stanchion barn. Graves, Dawson, and Kopland (4) obtained similar results. In studies extended over four winters, Witzel (11) also found that cows in loose housing facilities produced more milk than animals in a stanchion barn. Davis (2) reported lower milk production in loose housing, as did Kelley and Rupel (6).

Dice (3) noted that in three, two-month periods in different years, cows housed in open sheds were more persistent in production than similar groups in conventional housing.

In studies involving three winters, Buckley and Lamson (1) found no ill effects of temperature on cows housed in open pens compared to a conventional stanchion barn. However, Davis (2) observed decreases in milk production among cows in a pen barn following sudden temperature decreases. Kelley and Rupel (6) reported that cold weather caused a marked production decline in cows housed in a pen barn; however, no manure pack was allowed to accumulate and the cows were in warm milking facilities four hours daily.

Several studies have shown that more feed is consumed by dairy cows when in loose housing than when housed in conventional units. Davis (2) and Witzel (11) noted that more roughage was consumed by cows in open pens and Graves, et al. (4) found a higher average nutrient intake when cows were housed in pen barns. Woodward, et al. (12) concluded that although cows produced more milk in a loose housing system, the increase in milk did not cover the cost of increased feed consumption.

PROCEDURE

This study involved an analysis of the production records of 30 Guernsey cows of the University of Missouri Foremost Guernsey herd. These cows had a mean age of six years (2-12) at parturition when Trial I was initiated.

During the first lactation studied (Trial I) the cows were either housed and fed in a 42-cow tie-stall barn or were on pasture, depending upon the season. High-quality alfalfa hay, corn silage and concentrates were fed in the tie-barn. The cows were milked two times daily using two floor-type milking units.

During the following lactation (Trial II) nine cows were managed and fed in the same manner as the previous year with the exception of milking facilities. During Trial II, all cows were milked two times daily in a four-stall, walk through parlor with the milker operating two units. The milking was done by the same milker as had milked the cows in Trial I. However, in Trial II, he used a pipeline milker and milked into weigh-buckets.

The remaining 21 cows had access to loose housing (75 sq. ft./cow) with paved lots (200 sq. ft./cow). Good quality alfalfa hay and corn silage were fed ad libitum with 2.2 and 3.2 linear feet of bunk space per cow. Grain in addition to that fed in the parlor, was fed in the lots. Cows were on pasture when the season afforded it. The H. I. R. records were corrected to 305 days, two times, mature equivalent, and 4 per cent fat-corrected-milk.

Ostle (8) was the source for the statistical methods used. All weather information was derived from the U. S. Weather Bureau as compiled by the state climatologist of the Columbia, Mo., reporting station.

RESULTS AND DISCUSSION

Total Production Effects

The average production of the 30 cows was 12,000 pounds per cow when cows were milked and housed in the tie-barn (Trial I) and 11,025 pounds per cow when they were milked in the parlor (Trial II) as shown in Table I. This decrease amounted to 975 pounds per cow or 8.12 per cent and was significant ($P < 0.01$). Nine cows increased in production (1,100 lb./cow); whereas, 21 cows decreased (1,864 lbs./cow) when switched from tie-barn to parlor milking.

Days dry for the nine cows which increased in production averaged 51 days prior to Trial I (tie-barn) and 69 days prior to Trial II (parlor). The 21 cows which decreased in production were dry 76.4 and 75.2 days per cow before Trials I and II, respectively. A difference in body conditioning may be reflected in the production of the 9 cows which increased in Trial II.

Persistency Effects

As shown in Figure 1, when the production is plotted on a monthly basis, the level of production for the two trials was approximately the same initially; however, with advancing lactation the production per cow dropped significantly more ($P < 0.02$) when cows were milked in the parlor. The regression lines were plotted and b-values of -69.77 and -86.56 were determined for Trials I and II, respectively.

Utilizing a method described by Sturtevant (10) in which he expressed the decrease in milk yield each month as a percentage of the milk yield of the

TABLE I
Pounds Milk Production (305 D, 2X, M.E., 4% FCM)

	Location milked		Difference
	Trial I (Tie-barn)	Trial II (Parlor)	
30-cows	12,000	11,025	- 975
High 15-cows	13,428	12,083	-1,345
Low 15-cows	10,572	9,967	- 605
Youngest 15-cows (3.6 yr)	12,573	11,270	-1,303
Oldest 15-cows (8.4 yr)	11,379	10,736	- 643
9-cows	12,875	* 11,904	- 971
21-cows	11,625	10,648	- 977
30-control cows	** 10,341	10,576	+ 235
Sire A progeny (11)	11,941	11,806	- 135
Sire B progeny (10)	12,027	10,228	-1,799

* Housed and fed in tie-barn during Trials I and II

** Housed and fed in loose housing and parlor milked during Trials I and II.

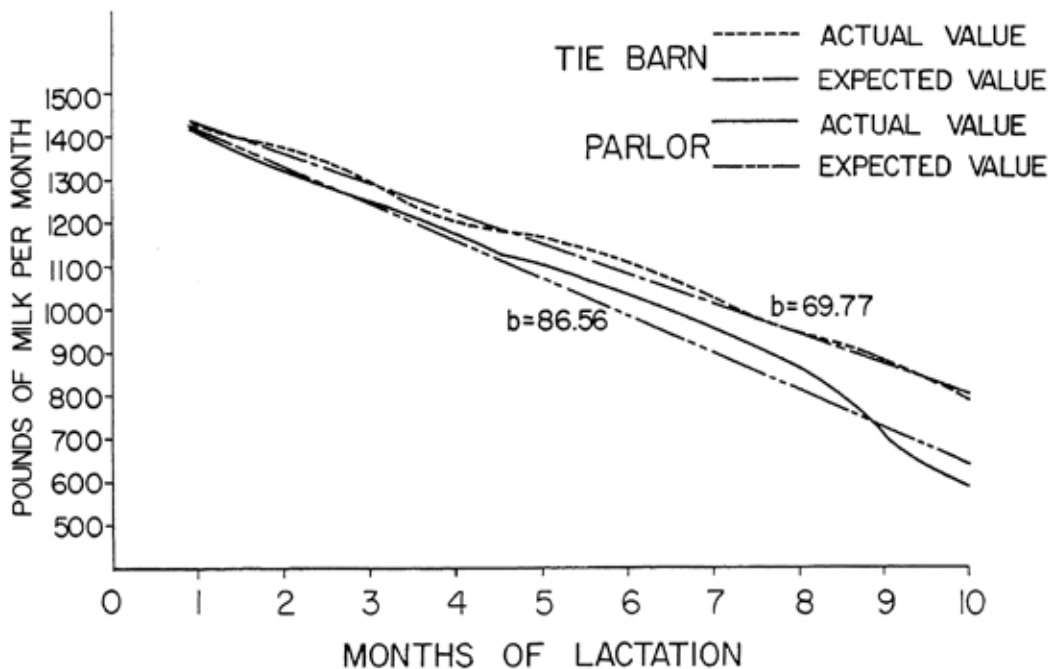


Fig. 1—Persistency curves, tie-barn vs. milking parlor.

preceding month, the persistency values for Trials I and II were calculated to be 93.5 and 90.9 per cent, respectively.

The mean daily milk production figures for the first and last three-month periods in Trial I were 45.5 and 29.1 pounds per cow, respectively, and 43.9 and 24.1 pounds per cow in Trial II. When the last three months production was calculated as a percentage of the first three months, the resultant values were 64.0 and 54.9 per cent, respectively, for Trials I and II. As shown in Figure 2, the persistency of cows when milked in the parlor (Trial II) was lower than it was when they were milked in the tie-barn (Trial I). One possible explanation for the observed lack of persistency is that cows are not treated and milked with the same degree of individuality in a parlor as in a tie-barn. When cows are stanchioned and milked in the same order each day, the milker soon becomes accustomed to the individual variations with which cows milk. Quarters that milk slowly are remembered, which results in the milker doing a better job of milking. In the parlor milking, the cows tend to become more of a number and less of an individual. Some quarters may not be entirely milked out, which accelerates involution and results in decreased persistency.

Effect of Level of Production Upon Increase (Decrease)

The mean production per cow in Trials I and II was computed. The 15 cows having the highest (average age 5.1 years) and the 15 having the lowest (average age 7.0 years) production were grouped together. A significant relationship ($P < 0.01$) was found between the level of production and the amount of increase or decrease in milk production per cow in Trial II as compared to Trial I ($r = 0.258$).

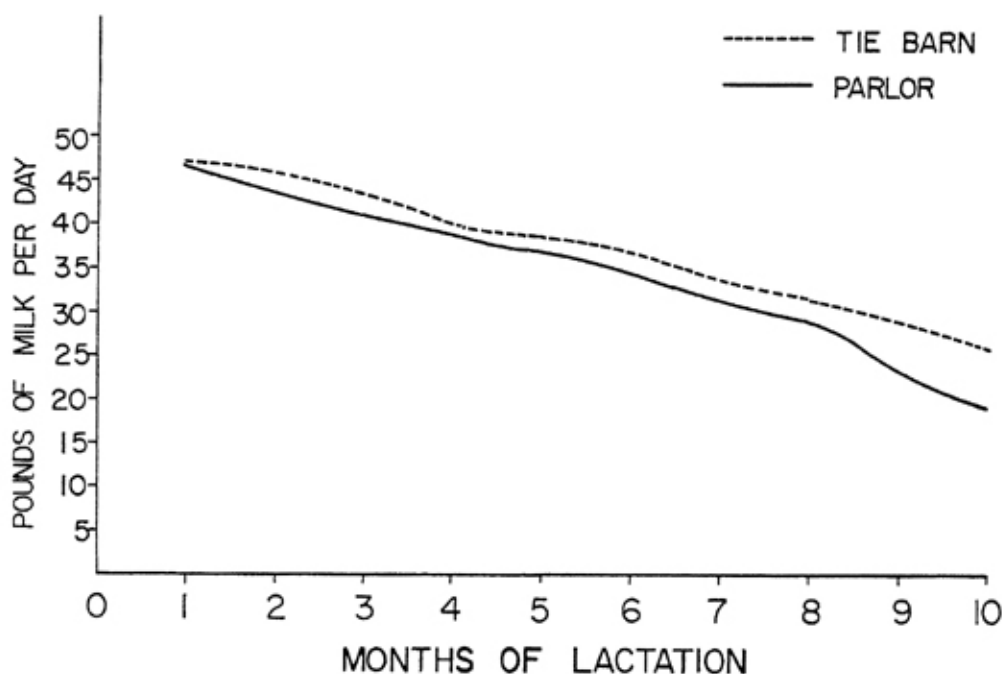


Fig. 2—Mean overall persistency curves

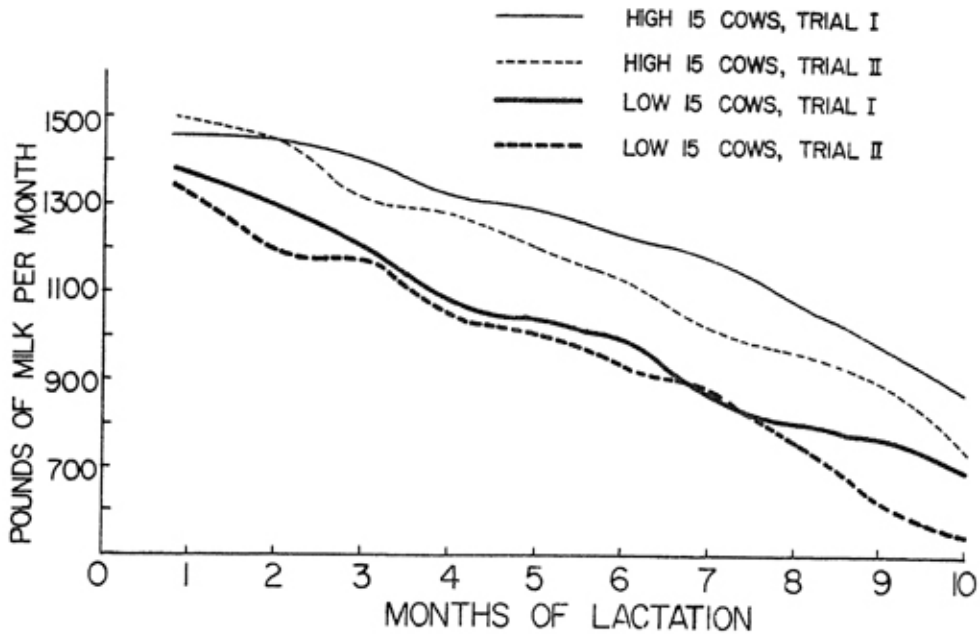


Fig. 3—Persistency Curves of High and Low Producing Cows.

The 15 cows having the highest milk production averaged 13,428 and 12,083 pounds of fat-corrected-milk in Trials I and II, respectively (10.0% decrease in Trial II). The 15 cows having the lowest production averaged 10,572 and 9,967 pounds of fat-corrected-milk in Trials I and II, respectively (5.7% decrease in Trial II). This suggests that higher producing cows are affected more by changing from tie-barn to parlor milking facilities.

The difference in production may be explained in part by the changes in persistency (Figure 3). The 15 highest producing cows had persistency values of 94.5 and 91.1%; whereas, the 15 lowest producing cows were 92.9 and 90.8% persistent in Trials I and II, respectively. The greater persistency decrease among the higher producing cows in Trial II was largely responsible for the overall significant ($P < 0.02$) persistency decrease.

Lactation Trends

An analysis of the production records from the 30 cows revealed a significant correlation ($r = 0.548$) between the amount of milk produced in Trials I and II by any respective cow. This is in agreement with Lasley's (7) report that the repeatability estimate for milk production in dairy cattle is 53. This demonstrated good milk production repeatability even though the environment and management conditions were different.

Effect of Sire on Progeny Production and Persistency

The progeny of two sires represented 21 of the 30 animals studied. Sires A and B had 11 and 10 daughters in the study. The coefficient of relationship for the two sires was computed to be 15.6 percent.

Production

The daughters of Sire A produced an average of 11,941 pounds of milk during Trial I, and 11,806 pounds of milk during Trial II, or a decrease of 135 pounds per cow. Sire B daughters produced an average of 12,027 pounds in Trial I, and 10,228 pounds in Trial II or a decrease of 1,799 pounds per cow. This suggests that temperament or related inherited factors may play an important role in the readjustment necessary when milking management and housing conditions are changed on lactating dairy cows.

Persistency

As shown in Figure 4, there were important differences in the persistency values computed for the progeny of sires A and B. There was little change in the persistency of Sire A daughters in Trials I and II (92.6 and 92.4%); whereas, the persistency of Sire B daughters decreased from 94.8 to 91.4%, respectively.

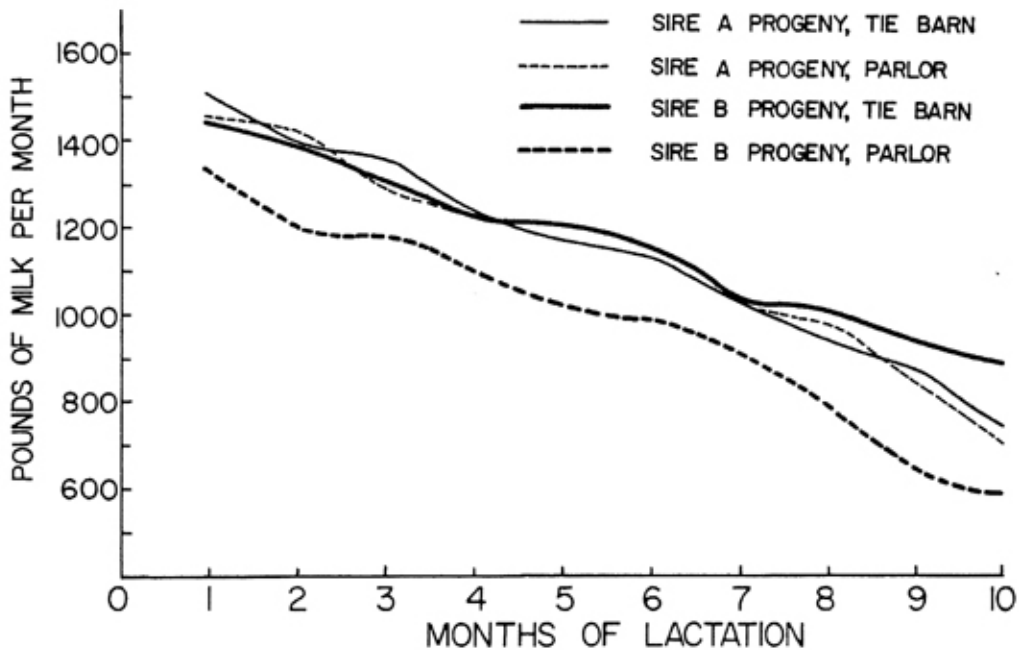


Fig. 4—Persistency Curves of Sire Progeny.

Effect of Age

Cows were grouped according to age with the 15 younger animals averaging 3.6 years (2.2-5.4 yrs.) and the 15 older cows averaging 8.4 years (5.5-12.6 yrs.). The group of older cows produced 11,379 and 10,736 pounds in Trials I and II; whereas, the younger cows produced 12,573 and 11,270 pounds, respectively. The older cows had a lower average total production than the younger group and also decreased less (-643 vs. -1,303) when switched from tie-barn to parlor milking facilities.

Effect of Housing and Feeding Facilities in Trial II

All cows were milked and housed in tie-barn facilities during Trial I. In Trial II all animals were milked in a milking parlor, with 9 of the 30 animals being housed in a tie-barn and 21 kept in loose housing. The average production in Trial II decreased 977 and 971 pounds per cow, respectively, for animals housed in loose housing and tie-barn facilities. This suggests that housing and/or feeding were not major contributing factors to the overall decrease in production encountered with the switch from tie-barn to parlor milking facilities.

Effect of Temperature

A study of the temperature data revealed little differences in the temperature by month, season, or year between Trials I and II. Therefore, it was assumed that weather had no effect on the results.

Effect of Loose Housing and Parlor Milking

In an attempt to assess the influence of annual differences in milk production (possible combined effects of temperature, rainfall, pasture season and quality, forage quality, and other related factors), 30 cows having been housed in loose housing and milked in parlor facilities two consecutive years were selected at random. The average milk production of these 30 cows was 10,341 pounds in 1961, and 10,576 pounds in 1962, which corresponded to the years that Trials I and II were conducted. From these data, it was concluded that year or season effects were not contributing factors to the observed 975 pounds per cow decrease in milk production when cows were switched from tie-barn to parlor milking.

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