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The influence of days carried calf and dry period on milk and fat production in Tennessee DHIA herds

Clyde K. Chappell

To the Graduate Council:

I am submitting herewith a thesis written by Clyde K. Chappell entitled "The influence of days carried calf and dry period on milk and fat production in Tennessee DHIA herds." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Animal Husbandry.

Don O. Richardson, Major Professor

We have read this thesis and recommend its acceptance:

J.T. Miles, Joe A. Martin, E.W. Swanson

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

March 9, 1965

To the Graduate Council:

I am submitting herewith a thesis written by Clyde K. Chappell entitled "The Influence of Days Carried Calf and Dry Period on Milk and Fat Production in Tennessee DHIA Herds". I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Dairying.

Don O. Richardson
Major Professor

We have read this thesis
and recommend its acceptance:

J. T. Miles

Joe A. Martin

Eric W. Swanson

Accepted for the Council:

Hilton A. Smith
Dean of the Graduate School

THE INFLUENCE OF DAYS CARRIED CALF AND DRY PERIOD ON MILK AND FAT PRODUCTION IN TENNESSEE DHIA HERDS

A Thesis

Presented to

the Graduate Council of

The University of Tennessee

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

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by

Clyde K. Chappell

March 1965

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CHAPTER I

INTRODUCTION

A number of items influence production records of dairy cows. Most dairy farmers recognize some of these, while many are generally overlooked. Items usually accepted as influencing production records are: age, body weight, frequency of milking, quality and amount of feed, general care and management, and length of lactation. Other items, affecting production, that are often given little attention are: the length of dry period, the number of days open during lactation, and calving interval.

Conversion factors are available and in common use for age and milking frequency. Factors have been devised to adjust for the influence of days carried calf, but have not been widely accepted.

With the growth of artificial insemination the problem of sire selection committees has been compounded. They have a tremendous responsibility to dairy cattle owners since they are making selection for all stud patrons. As sire selection is so hazardous, it is very important to account for all possible variables which may influence production records in order to improve the accuracy of selection procedure. Owners have the same problem in selecting foundation or replacement animals. However, when considered on a herd basis, individual female selection will not exert nearly the influence on total potential improvement as male selection.

The purpose of this study is to attempt to evaluate the importance of dry periods, and days carried calf as they influence production in DHIA herds in Tennessee.

CHAPTER II

REVIEW OF LITERATURE

Influence of Dry Period on Production

It is generally agreed that cows should have a rest period of from six to eight weeks in order to produce at maximum levels during the next lactation. There, however, continue to be reports of individual cows completing phenomenal records without dry periods. This along with good production from individual cows at the time they should be dry, especially during base production periods, may cause dairymen to question the importance of the dry period. Further credence is given this idea as all investigators have not reported similar results.

In 1923 Hammond and Sanders (13) found that cows dry 80 to 119 days produced 14.2 per cent more milk, and cows dry 40 to 79 days gave 10.9 per cent more milk than did cows dry 39 days or less. A total of 408 records were used in this study. Sanders (27) found that it was necessary to add as much as 25 per cent to records of cows dry less than ten days prior to their second lactation to compensate for lost milk production. He also reported that cows with dry periods of more than 120 days should have their records reduced by 15 per cent to standardize their production.

Arnold and Becker (1) found that Jersey cows produced maximum yields following dry periods of from 31 to 60 days. They also reported that dry periods of over 91 days appeared to result in lower production.

Considering production following a 31-60 day dry period as 100 per cent, production was 92.38 per cent after a dry period of less than 30 days, 94.68 per cent with a 61 to 90 day dry period, and 88.77 per cent following a dry period of more than 91 days.

As cows are dried off in preparation for a subsequent lactation, milk is lost from the present lactation. If dry periods are to be economical these losses must be compensated for in the next lactation. A study with these items in mind and for the establishment of the length of optimum dry period was undertaken by Klein and Woodward (17). Using records of cows with a 360 to 370 day calving interval, it was found that 55 days was the optimum dry period. This was accomplished by developing an average lactation curve for these cows. The 4 per cent FCM for each of the 11 months was expressed as a percentage of the total FCM production. A curve was fitted to these percentages and extrapolated through the 12th month. It was found that with shorter dry periods more milk was lost in the next lactation than was gained in the present lactation. With dry periods longer than 55 days, more milk was lost from the present lactation than was gained in the next lactation.

Goodwin and Erb (11) working with DHIA records found that cows dry 9 days or less before a record averaged 1,459 pounds less milk and 62 pounds less fat than cows dry 50 to 59 days. Morrow et al. (20) reported maximum yields following dry periods of approximately 65 days.

Swanson (29) working with identical twins handled all sets alike during the first lactation, except that one of each pair was dried off for an 8 week dry period. The other member of each pair was milked

continuously until calving. The dry cows were fed only roughage, while milking mates received concentrates in addition to roughage. All members received the same treatment in the second lactation as during the first lactation.

When second lactations were completed, the continuously milked twins had produced only 75 per cent of the normal twin's production. During the third lactation, or after the second year of continuous milking production was only 62 per cent of the normal twin's yield. However, a large part of this was due to one continuously milked twin milking only seven weeks of her third lactation. When the production of this set of twins is excluded, the production of the continuously milked twins was still only 70 per cent of the normal twin's production.

As it was not possible to continue through the third year because production of the continuous milked twins was too low, it appears that the effect of no dry period was accumulative. Sanders (27) points out that the accumulative effect of dry period appears to be more for young cows than older cows.

Other workers found that the length of the dry period had little influence on production. Thompson et al. (30) reported that the influence of the length of dry period on production was not statistically significant. Plum (23) found that only slightly more than 1 per cent of the variation in lactation records was due to the length of the dry period. Lee et al. (18) reported that the regression of FCM on dry period was only 0.9 pound of FCM per day of dry period. Smith and Legates (28) found that the length of the previous dry period accounted for less than

0.1 per cent of the variation in milk production and only 0.3 per cent of the variation in fat yield.

Dickerson (4) also reported little difference in production associated with dry period, except possibly with herds in the lowest production range. Sanders (27) observed that there was little difference noted in high and low producing herds when dry periods were less than 100 days. In this study the number of cows with dry periods exceeding 100 days were so small they were not conclusive.

Influence of Days Carried Calf on Production

To maintain the ideal calving interval of 12 months cows must carry a calf for more than 200 days. This means that these cows will be "open" or not bred for only 60-90 days. Days "Carried Calf" would be subtracted from total days in the lactation to obtain "days open".

A part of the reduction in production is due to nutrients supplied the developing fetus, but this amount is rather small. In the latter stages of pregnancy the pregnant dam may require only about 2 per cent more feed than a non-pregnant cow of the same weight (8). Several workers have indicated that mammary gland responses to endocrine stimuli following a dry period may be more important than nutritional status in controlling the response to dry periods of varying length (13, 29).

Various workers have reported that cows which were pregnant from five to eight months of the lactation period produced 250 to 2,500 pounds less milk than cows which were not pregnant during the 305 day lactation. Brody et al. (2) worked with one group of cows that were not

bred during lactation and one group in which cows were bred three to four months after calving. It was found that pregnancy did affect the rate of decline in production with advance in lactation, especially after the fifth month. The difference in production was about 450 pounds of milk in favor of the non-pregnant group. Ragsdale et al. (24) in a study of Guernsey Advanced Registry records found that production for cows bred in the third or fourth month of lactation was reduced by 480 to 800 pounds when compared to non-pregnant cows. Gaines and Davidson (9) reported a reduction of 256 pounds of FCM due to pregnancy. Gowen (12) reported 400 to 600 pounds reduction in milk yield. Other workers (26, 13, 10) reported that reduction in yield became more rapid between 16 and 20 weeks of pregnancy.

Sanders (26) found that the time of conception influenced first lactations and later lactations in the same manner, except when cows were bred back abnormally early (under 40 days) or extremely late (over 200 days). These extremes were found to be the only time that high and low producers were affected in a different manner. Working with nine North Carolina Institutional Holstein herds Smith and Legates (28) found that the number of days open during lactation significantly influenced production. They found that days open accounted for 6.5 per cent of the variation in first lactations, 4.3 per cent in second lactation, and 4.2 per cent for all lactations. These findings were based on 4,385 age corrected lactations of 305 days.

In a study of Holstein records at two Ohio Institutional herds Etgen (5) standardized 1,508 lactation records. For each additional day

open the average cow in this study produced an additional 8.33 pounds more milk and 0.26 pound more butterfat during that lactation. In a lactation this could amount to 1,832 pounds of milk and 58 pounds of butterfat. For two year olds the difference due to gestation between a cow that conceived at 85 days and one not bred during the 305 day lactation was 1,263 pounds of milk and 35 pounds of butterfat. For three and four year olds the difference was 1,887 pounds of milk and 67 pounds of butterfat. For cows five years old or over the difference was much more, amounting to 2,685 pounds of milk and 92 pounds of butterfat. Lee et al. (18) reported an increase of 8.2 pounds of milk and 0.3 pound butterfat production for each additional day that cows were open during lactation.

Influence of Season of Freshening on Production

The base building period in fluid milk markets, with some slight variations, is from early fall through the winter months. The marketing structure thus favors fall and winter calving. As a result, dairymen have sought to have a high percentage of their cows calve at the beginning or during this period. McDowell (19) investigating the relation of production to season of calving found that fall freshening cows produced the most milk. Using 10,870 Cow Testing Association (CTA) records with fall calving being represented by 100 per cent, winter, summer, and spring calvers were found to produce at the 96, 87, and 86 per cent levels, respectively.

Sanders (25) found that October to February were the best months for cows to calve. May to August were the poorest months. Beginning

with cows calving in October the production decreased uniformly for those freshening in successive months until April. The average production of cows calving in May dropped considerably and June calvers produced 12 per cent less milk than cows calving in October.

Working with 68,000 CTA records Cannon (3) reported June calving cows to be the lowest producers and November freshening cows the highest producers. November fresheners produced 17 per cent more milk than did cows freshening in June. Cows calving in May, June, and July were the lowest butterfat producers.

Frick et al. (7) using 22,212 DHIA records found that Ayrshires, Guernseys, Jerseys and Holsteins followed the same production pattern when season of calving was studied. They reported February the most favorable month for calving and July the least favorable. Cows calving in February produced 14 per cent more milk than cows calving in July. Cows calving in the months of June, July, August, and September were the lowest producers. This study was from records in Connecticut.

Turner (31) also reported that cows calving in fall and winter produced more milk than those calving in spring and summer. Morrow et al. (20) found that Ayrshire and Guernseys freshening in the fall and winter had higher total production. With Jerseys there was no significant relationship between month of freshening and milk production.

Two workers in different studies, Wylie (33) and Woodward (32), observed that the season of calving was less significant if adequate feed could be furnished during all seasons of the year. When records obtained from different states are combined geographic location may

tend to equalize the influence of season of calving. Woodward (32) studying DHIA records from 12 states found that the variation in production between groups calving in different months to be relatively low. Cows freshening in July had the lowest average production, and cows freshening in November had the highest average production. However, the difference between production in the two months was only 2.5 per cent.

Reports from workers in the South and far West of the United States may indicate that feed and climate may combine to give results different from those obtained from other areas of the Nation.

In a report on 2,900 Register of Merit records made by Jersey cows in Tennessee, Wylie (33) found that cows calving in July and March were comparable in production to cows calving from October through February. Butterfat production followed the same pattern.

A study in Western Oregon of 2,690 first-calf lactations by Oloufa and Jones (21), showed that season of calving did not appreciably effect the yearly butterfat production. The mean temperature in this area was 65 degrees Fahrenheit in July and 38 degrees Fahrenheit in December.

In two Georgia studies, Fosgate and Welch (6), and Lee et al. (18) found that cows calving in the winter and spring produced more FCM and more butterfat than cows calving in fall and summer. Johnston et al. (15) reporting on Jersey records made in Louisana over a ten year period found that cows freshening in early spring produced 12 per cent more FCM than cows freshening in late summer.

CHAPTER III

PROCEDURE

Source of Data

Data for this study were obtained from Tennessee DHIA records completed between October 1, 1959, and October 31, 1964. Lactation records from all Jersey herds participating in the machine processed record keeping program were considered for use. Records from herds completing fewer than ten lactations were not used. All abnormal lactations were discarded. Lactations of more than 305 days or less than 200 days were discarded.

A total of 5,318 lactation records were found to meet the requirements of this study. These lactations were completed in 84 different herds. Of this total, 36 herds were located in East Tennessee, 33 in Middle Tennessee, and 15 in West Tennessee. These herds were located in 33 different counties.

Method of Analysis

All records were corrected for age by the use of DHIA conversion factors developed by Kendrick (16). A number of investigators (3, 6, 7, 15, 18, 19, 20, 25, 31) have shown that season of freshening can influence production, and may affect the other variables if different breeding practices are followed in different seasons. An attempt was made to remove the effects of year and seasons in the analysis. This was accomplished by dividing the time period into year-season subclasses

based on freshening dates as shown in Table I.

To determine the effects of length of previous dry period and days carried calf on production of milk and fat, the nested analysis of covariance was completed using the method and program outlined by Heath (14) for electronic computers. The major classification in this analysis was herds with year-season subclasses nested within herds. Analysis of covariance (as outlined by Ostle (22)) was obtained for dependent variables, mature equivalent milk and fat, with independent variables, days carried calf, and preceeding dry period. The regression coefficients were derived from the within herd and year-season variances and covariances. Thus the effect of herds and year-seasons were removed from the regressions.

To determine if the effects of days carried calf and dry period were different for younger cows than older cows, the data were divided into first, second, third or later lactations. It was assumed that cows starting lactations at 36 months of age or less were beginning their first lactation. Cows beginning lactations at 37 months through 48 months of age were considered milking in their second lactation. Cows 49 months or older were considered milking in their third or later lactation. A few young cows were likely credited with two "first" lactations with this age division for various lactations. This division resulted in 1,600 first lactations, 1,031 second lactations, and 2,687 third or later lactations.

To determine the effect of dry period and days carried calf on cows at different production levels, the first lactation, second lacta-

TABLE I

YEAR-SEASON SUBCLASSES BASED ON FRESHENING DATES

Year-Season	Month	Year		Month	Year
1	October	1959	through	March	1960
2	April	1960	through	September	1960
3	October	1960	through	March	1961
4	April	1961	through	September	1961
5	October	1961	through	March	1962
6	April	1962	through	September	1962
7	October	1962	through	March	1963
8	April	1963	through	September	1963
9	October	1963	through	March	1964
10	April	1964	through	September	1964

tion, third or later lactations were further sub-divided into low, medium, and high production groups which should place 25 to 45 per cent of the records in each group. The production level groupings based on mature equivalent milk production were: (1) less than 7,000 pounds, (2) from 7,000 pounds to 8,999 pounds, and (3) 9,000 pounds and above. This division placed 480 first lactations in the low production group, 631 in the medium production group, and 489 in the high production group. Second lactation records were divided as follows: 305 in the low production group, 378 in the medium group, and 348 in the high group. Third or later lactations placed 703, 1,045, and 939 in the low, medium, and high production groups, respectively.

CHAPTER IV

RESULTS AND DISCUSSION

The average milk and fat production with standard deviations on a within herd and season basis are shown in Table II. Means for length of preceeding dry period and days carried calf along with standard deviations are also shown in Table II. Apparently a number of cows included in the first lactation group actually had two "first" lactations due to the arbitrary age groupings for the various lactations. This accounts for the average of six days for the preceeding dry period in the first lactation. This also distorts the average days dry for cows in all lactations.

The means for milk and fat production, for days carried calf, and preceeding dry period for various production levels within lactations are presented in Table III. Little difference is noted between lactations in production, in days carried calf, and in preceeding dry period, except that cows in first lactation would have no preceeding dry period. The small average preceeding dry period for first lactation was explained in the discussion of Table II. It has been felt by some that Mature Equivalent factors, used under Tennessee conditions, are incorrect. However, the very similar mature equivalent production levels for all age classes in Tables II and III indicate that these factors are applicable to Tennessee conditions.

TABLE II

MEANS AND STANDARD DEVIATIONS OF MILK AND FAT, DRY PERIOD AND DAYS CARRIED CALF FOR ALL LACTATIONS AND FOR FIRST, SECOND, THIRD OR LATER LACTATIONS

		Means All Lactations	Standard Deviation	Means First Lactation	Standard Deviation	Means Second Lactation	Standard Deviation	Means Third Lactation	Standard Deviation
Milk	(lb)	8,229	1,565	8,084	1,460	8,202	1,526	8,326	1,544
Fat	(lb)	415	78	425	70	415	74	417	78
Preceeding Dry Period	(Days)	39	a	6	a	49	29	56	62
Days Carried Calf		145	63	141	63	153	60	144	29

a Standard deviations are not shown because the distribution of length of dry period was not normal.

TABLE III

MEANS FOR MILK AND FAT, DAYS CARRIED CALF, PRECEEDING DRY PERIOD FOR VARIOUS LACTATIONS AND PRODUCTION LEVELS

	First Lactations			Second Lactations			Third or Later Lactations		
	High	Medium	Low	High	Medium	Low	High	Medium	Low
$\bar{X}$ M.E. Milk (lb)	10,356	7,937	5,962	10,514	8,008	5,805	10,256	7,971	5,916
$\bar{X}$ M.E. Fat	514	406	311	516	414	302	513	401	300
$\bar{X}$ Days Carried Calf	139	145	137	151	161	144	139	148	146
$\bar{X}$ Preceeding Dry Period	0.5	0.6	0.7	48	52	45	58	55	52
Number (days)	489	631	480	348	378	305	939	1,045	703

Influence of Days Carried Calf on Production

The analysis of covariance for milk on days carried calf for all lactations is presented in Table IV. After removing the influence of herds and the influence of seasons within herds, it was found that for each day cows carried calf during the lactation they lost 0.585 pound of milk. This was found to be significant at the 10 per cent level. The regression measured on total herds represented in Table IV would indicate a loss of only 0.239 pound for each day of pregnancy during lactation. This indicates that differences among herds tend to mask the true relationship of days carried calf and production. This is probably caused by variations in management practices among herds.

Corresponding information for fat is presented in Table V. For each day cows carried calf during lactation they lost 0.0358 pound of fat. This was found to be significant at the 5 per cent level.

Linear regression coefficients between milk and fat production and days carried calf were established for all lactations and for low, medium, and high producing groups in each lactation. This information is presented in Table VI. It is very evident that the low production groups did not follow the expected pattern in either milk or fat production. These groups showed an increase in milk and fat production rather than a decrease. The regressions for the low production group in the second lactation for milk and fat and in the third lactation for milk were different from zero at the 10 per cent level of probability. Third lactation fat production in the low group was significant at the 1 per cent level. These positive regressions were probably due to

TABLE IV

ANALYSIS OF COVARIANCE FOR ALL LACTATIONS MILK ON DAYS CARRIED CALF

Source	Df	Days Carried Calf Sums of Squares	Sxy	Milk Sums of Squares	Means Square Due To Regression	Means Square About Regression	F Value
Total	5,317	419,097	100,313	215,427,328	24,010	40,520	
Among Herds	83	173,926	195,451	77,888,060	219,640	947,176	
Among Seasons Within Herds	309	49,767	19,212	16,934,527	7,417	54,958	
Error	4,925	195,404	-114,351	120,604,742	66,918	24,480	2.734

b = - .585

P < 10

TABLE V

ANALYSIS OF COVARIANCE FOR ALL LACTATIONS FAT ON DAYS CARRIED CALF

Source	Df	Days[a] Carried Calf Sum of Squares	Sxy	Fat Sums of Squares	Means Squares Due To Regression	Means Squares About Regression	F Value
Total	5,317	419,097	41,107	54,574,358	4,032	10,265	
Among Herds	83	173,926	100,341	20,206,428	57,889	245,714	
Among Seasons Within Herds	309	49,767	10,687	4,593,487	2,295	14,906	
Error	4,925	195,404	69,921	29,774,443	25,019	6,042	4.141

$b = -0.0358$[b]

$P < 5$

a Days carried calf is in 10 day units

b Expressed on a per day basis

TABLE VI

LINEAR REGRESSION COEFFICIENTS OF MILK AND FAT PRODUCTION ON DAYS CARRIED CALF FOR THE VARIOUS LACTATIONS AND PRODUCTION LEVELS

Lactation	Milk Production				Fat Production			
	High	Medium	Low	All	High	Medium	Low	All
First	-1.10	+0.35	+0.48	-0.42	-0.084[a]	+0.041	+0.032	-0.022
Second	-3.33[c]	+0.55	+1.78[a]	+0.46	-0.224[c]	-0.036	+0.102[a]	+0.013
Third or Later	-0.93	-0.84[b]	+1.08[a]	-1.72[c]	-0.092[b]	-0.046[a]	+0.091[c]	-0.088[c]
All				- .59[a]				-0.036[b]

a Probability less than 0.10

b Probability less than 0.05

c Probability less than 0.01

a high incidence of short lactations in these low producing groups which would result in a postive relationship between days carried calf and length of lactation. A slight gain in production was also noted in milk at the medium level in both first and second lactations.

As would be expected total milk and fat production followed a related pattern at all levels. Loss in milk and fat was highest in the high producing group. Cows in the first lactation high production group lost 1.1 pounds of milk for each day carried calf during lactation. The highest loss was in the second lactation high production group. Cows in this group lost 3.33 pounds of milk and 0.224 pound of fat for each day of pregnancy during lactation. These values were significant at the 1 per cent level. However, it should be noted that the second lactation as a group did not follow the general pattern of other lactations in this study.

Assuming that cows were pregnant for 220 days during lactation, those with third or later lactations compared to non-pregnant cows would lose 378 pounds of milk and 19 pounds of fat. Results presented by Etgen (5) indicated that Holstein cows in a similar age group lost 2,685 pounds of milk and 92 pounds of fat. Lee et al. (18) reported figures very close to these. However, both of these workers reported on Holstein records from a small number of well managed, closely supervised herds at the 12,000 pound production level.

Gaines and Davidson (9) reported that cows lost 256 pounds of FCM during the first five months of pregnancy. This was similar to the findings in this study. Gowen (12) reported a loss of 400 to 600

pounds in milk yield for Guernseys due to pregnancy during lactation. When all records in all lactations in this study are considered, the loss in milk due to 220 days pregnancy would be 130 pounds of milk and 7.9 pounds of fat.

It was found that less than 1 per cent of the variation in milk and fat production was due to days carried calf. However, Smith and Legates (28) in a study with high producing Holstein herds reported that 4 to 6 per cent of the variation in milk and fat production was caused by variation in days open. This difference may be partially explained by differences in production levels.

Although very little of the variation was controlled in this study, it is believed that days carried calf is an important consideration for sire selection committees. This is especially true when attempting to evaulate production records in high producing herds.

Dry Period Influence on Production

Linear regression coefficients of milk and fat production on dry period are presented in Table VII. In this portion of the study the second lactation did not follow the expected pattern in the regression of milk and fat production on dry period, especially in the high producing group. The third and later lactation group did follow the expected pattern of gaining in production due to the dry period. Considering all production levels cows in the second lactation gained 2.95 pounds of milk and 0.116 pound of fat for each day dry preceeding lactation. These gains were not significant.

Computations could not be made for all lactations, because cows in

TABLE VII

LINEAR REGRESSION COEFFICIENTS OF MILK AND FAT PRODUCTION ON PRECEEDING DRY PERIOD FOR THE VARIOUS LACTATIONS AND PRODUCTION LEVELS

Lactation	Milk Production				Fat Production			
	High	Medium	Low	All	High	Medium	Low	All
Second	-2.69	+1.33	+3.12	+2.95	-0.144	+0.065	+0.118	+0.116
Third and Later	+1.91	+0.40	+2.23[a]	+4.27[b]	+0.024	+0.050	+0.054	+0.176[b]

a Probability less than .05

b probability less than .01

first lactation had no dry period, thus in considering all lactations figures would be completely distorted. In the third or later lactations the expected pattern was followed. In these lactations cows gained 4.27 pounds of milk and 0.176 pound of fat for each day dry prior to lactation. These figures were found to be significant at the 1 per cent level. Cows in the third or later lactation had a mean of 56 days as a dry period. This is considered at or near the optimum number of days for cows to be dry. On the basis of this dry period, cows in this lactation would produce 239 pounds of milk and 9.8 pounds of fat in excess of the production of cows with no dry period, assuming that extremely short dry periods fit the linear regression equation derived in this study.

In this study less than 1 per cent of the variation in milk production was due to dry period. Smith and Legates (28) reported less than 0.1 per cent and Plum (23) reported slightly more than 1 per cent of the variation was controlled by the dry period.

Goodwin and Erb (11) reported quite different results in that cows dry less than nine days produced 1,459 pounds of milk less than cows having an optimum dry period. Thompson et al. (30) and Dickerson (4) found that dry period had little influence on production.

CHAPTER V

SUMMARY AND CONCLUSIONS

This study consisted of an analysis of 5,318 mature equivalent DHIA records of Jersey cows from Tennessee herds enrolled in the machine processed record keeping program. The object was to evaulate the influence of dry periods and days carried calf on production. Lactation records were divided into first, second, and third or later lactations for additional analysis. Records were also divided into groups according to production levels for analysis.

In the portion of this study devoted to days carried calf and its influence on production, it was found that there were deviations from the expected pattern. This was especially true in the low production groups. Without exception, these groups gained production due to pregnancy rather than the expected loss. This could be in part due to short lactations in the low producing groups. Cows in the high group of the second lactation lost 3.33 pounds of milk and 0.224 pound of fat for each day of pregnancy. Both milk and fat regressions were found to be significant at the 1 per cent level. All classes (first, second, third or later lactations) in the high production groups lost milk at the rate of 1.10, 3.33, and 0.93 pounds per day for each day of pregnancy during lactation. Losses for fat for the same groups were 0.084, 0.224, and 0.092 pound per day. Fat loss in the first lactation was found to be significant at the 10 per cent level, and at the 5 per cent level in

the third or later lactation. Combining all lactations, the loss in milk was significant at the 10 per cent level, and the loss in fat was significant at the 5 per cent level.

Although the regressions in some cases were significant, it was found that less than 1 per cent of the variation in milk production in these herds was due to days carried calf.

In the dry period study, cows in the high production group of the second lactation lost rather than gained production due to dry period. Considering all levels of production in the second lactation, it was found that the gain was 2.95 pounds of milk and 0.116 pound of fat per day due to dry period. A gain of 4.27 pounds of milk and 0.176 pound of fat per day of dry period occurred for cows in the third or later lactation. Regression coefficients for the third or later lactation were found to be significant at the 1 per cent level. However, less than 1 per cent of the variation in milk and fat production was due to the dry period.

Upon the basis of the results found in this study, one would conclude that DHIA records as reported in Tennessee were influenced very little by days dry and days carried calf. Less than 1 per cent of the variation in milk and fat production was due to dry period and less than 1 per cent of the variation in milk and fat production was due to days carried calf. The small percentage of extremely short dry periods would probably explain the much smaller per cent of variation due to dry period in this study than was found in controlled studies involving very short dry periods.

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