# ANALYSIS OF THE BREEDING RECORDS OF THE OKLAHOMA A. AND M. COLLEGE DAIRY HERD 1938 TO 1949, INCLUSIVE

By

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# INTRODUCTION

The importance of a high breeding efficiency is likely to be overlooked by many dairymen if complete accurate records on reproductive functions are not kept. Reproductive trouble can be a serious problem by reducing the life time net profit from a dairy cow. The cow that produces a great quantity of milk in any one lactation may not be as profitable to its owner as another that produces milk in somewhat lesser quantity per lactation, but reproduces more regularly.

An analysis of the breeding records of the Oklahoma A. and M. College dairy herd was made by Teetes (13) in 1939 to determine its breeding efficiency. The work of Teetes covered the herd breeding records from 1926 to 1937, inclusive.

The study here reported was made on the breeding records of the college dairy herd from 1938 to 1949 inclusive, to bring the analysis up to date and to compare the breeding efficiency, during the periods studied. Breeding efficiency is expressed here in terms of services per conception, calving interval days, and number of days between the first service and conception for the first and subsequent conceptions.

The Oklahoma A. and M. College herd consists of four dairy breeds namely; Ayrshires, Guernseys, Holsteins and Jerseys. During the period of analysis the Jerseys were the greatest in number followed by the Holsteins, Ayrshires and Guernseys respectively.

All data included in this study were compiled from the records kept by the Oklahoma A. and M. College Department of Dairying on the

dairy herd. The data taken from these records included the name and breed of every female that was registered, date of birth, date of first service and age at first service. Also included were the number of services of each sire used in the herd, interval between first service and conception, calving interval days, date of calving, age at first and subsequent calvings, number of male and female calves dropped each calendar year, and reason for and age at disposal of all females.

The object of this study was to determine how the Oklahoma A. and M. College dairy herd compared with other herds in breeding efficiency, and to compare the herd with commonly accepted optimum breeding efficiency.

# REVIEW OF LITERATURE

In a study of the breeding records of the University of Minnesota dairy herd, covering a period of twenty-nine years, Eckles (4) found that 39.7 percent of the first services resulted in conception. The cows that did not finally become pregnant were excluded but difficult breeders were kept for extended periods. During the twenty-nine years the average abortion rate was 14.6 percent.

The conception rate on the dairy herd at the Huntley Field Station, as reported by Mosely, Stuart, and Graves (9), was 1.7 services per conception for 204 services and 120 conceptions.

Bowling, Putnam, and Ross (2) give results on conception by bulls of all ages bred to females of all ages. Their data showed that heifers being bred for first calving required a larger number of services per conception than did the females of any other group. The heifers averaged 2.79 services per conception, whereas the average for the second to the fifth conception was relatively constant, averaging 1.81 service per conception.

Taylor (12) found that, if cows after freshening were bred to freshen again within approximately twelve months the conception rate was higher than at any other time. He found that cows must calve approximately every twelve months to continue to be profitable producers. His results showed that the lowest number of services per conception was obtained if the animals were bred during the interval between three and four months following calving. There was no advantage of breeding heifers earlier than seventeen to eighteen months to improve the conception rate. He found that heifers of all ages

required more services per conception than older animals.

In studies on breeding efficiency by Jones, Daugherty and Haag (5) it was found that the greatest number of services was required with animals bred from two to three months after calving. They also found no particular breeding difficulty in animals held open for extended periods.

Miller and Graves (8), in a four year study of the U. S. D. A., Bureau of Dairy Industry herd, at Beltsville, Maryland, found that the heifers required 0.62 more services for conception than cows. They found that seventy-two per cent of the conceptions in all females occured on or before the third service.

Arnold, Becker and Spurlock (1) studied the records of 1,469 dairy cows in the dairy herds of Florida to determine the principle reason for disposal. This excluded cows sold for dairy or breeding purposes. They found that twenty-one per cent of the disposals were due to mastitis and udder trouble. Low production was given as the reason for disposal of 14.7 per cent, reproductive troubles 9.3 per cent and old age 2 per cent.

In Florida herds that raised their replacement cows the average life span was 6.6 years. This study included only the cows that attained an age of two years and entered the milking herd.

In two hundred and forty-nine Florida dairy herds, comprised of over 50.0 per cent purebred or grade Jerseys, Arnold, Becker and Spurlock (1) found that 11.9 per cent calved when under 24 months of age, 41.4 per cent between 24 and 30 months and 46.7 per cent when 30 months of age or over.

These workers found that the average period of time that Florida

dairymen have their cows dry is 55 days. They concluded from their studies that the practice of allowing a dry period from 31 to 60 days was conducive to optimum milk production.

Chapman and Casida (3) studied the service records of eight dairy herds and found that the average interval from parturition to conception varied from 120 to 180 days in the eight herds. In one herd, the average interval from parturition to first service was 120 days, and from first service to conception was 30 days.

Plum and Lush (10) in a study of purebred cows in Iowa cow-testing associations, found that the average age of heifers at first freshening was as follows: Ayrshires 28.3 months, Guernseys 25.5 months, Holsteins 27.2 months and Jerseys 25.5 months.

Seath, Staples and Neasham (11), studying the productive life of 138 Jerseys and 174 Holsteins in the Louisiana State University herd, found that - 19.6 percent of the cows had only one freshening before leaving the herd; 17 percent had two, and 17 percent had three. This gave 53.6 percent that left the herd before having freshened four times. The average number of freshenings was 3.78 for each breed.

Klein and Woodward (6) made a study of the influence of length of the dry period upon the quantity of milk produced in the subsequent lactation. For cows calving at twelve month intervals and with milk yields of 10,000 pounds, a dry period of 55 days was found to be the optimum length.

Mead and Regan (7) studied the production and breeding records of 1,200 Holstein cows in several California herds. They found that herds with the highest yearly production over a period of years were

those with heifers calving at 32.5 months.

Teetes (13) made a study of the data from the Oklahoma A. and M. College dairy herd from 1926 to 1937, inclusive. He found that the herd was somewhat infected with Bangs disease and was free of abortions only three years of the period studied, namely 1930, 1935 and 1937. The two years with the highest percentage of abortions were 1926 and 1927. He found that 64 per cent of all cows bred during the period studied required only one service per conception.

The average number of services per conception for all cows bred during the 12 year period was 1.72. The services required for all cows by breeds was as follows: Ayrshires required 1.5 services, Guernseys 1.65, Holsteins 2.1, and Jerseys 1.7 services per conception.

The herd average calving interval for the period studied was three hundred and ninety-three days, with the shortest average calving interval, (350 days) for any one year, occuring in 1931. The average age of first calving for each breed was as follows: for the Ayrshires two years, six months and ten days; for the Guernseys two years, five months and nine days; for the Holsteins two years, eight months and one day; and for the Jerseys two years, four months and seventeen days.

## HERD PLAN

The dairy herd at Oklahoma A. & M. College has been under the same herd management from the beginning of the period studied until March 1, 1949. The breeding program has been practically the same for the entire period studied. It has been planned to avoid June, July, and August calving as much as possible. The cows are placed on the breeding list to be bred two months after calving. All cows are due to be bred at first estrus after being placed on the breeding list with two exceptions, namely: those having first estrus periods during August, September and October, and cows on Register of Merit or Advanced Registry test. The latter may be delayed somewhat from the regular herd breeding policy, but are bred to meet the ten month calving requirements of their respective breed association. Generally the only cows that are bred during August, September and October are those that have had previous services and failed to conceive. In the case of these cows their breeding would not be interrupted during those three months. This breeding policy results in a somewhat larger percentage of the cows calving in the fall and early winter months.

By placing the cows on the list to be bred at first estrus two months after calving, most cows have an opportunity to freshen approximately every twelve months.

The herd was considered free from Bangs from 1938 to 1942. The first positive indication that the herd was infected with Bangs during the period studied occured during March, 1942. Since that date the herd has been considered infected.

Calfhood vaccination for the prevention of Bangs was begun in February, 1943, and all calves have been vaccinated since that date.

Open cows were vaccinated for the prevention of Bangs beginning in June, 1943, and continuing until the whole herd was vaccinated. This period of vaccinating adult cows ended approximately February 1, 1944.

The milking herd is fed a liberal supply of alfalfa hay of good quality at all times. An effort is made to feed silage the year around but in a few cases of shortage there has been some times during the summer months when it has not been fed. The cows are not pushed with heavy grain feeding for maximum production. A simple grain mixture is fed but is one that furnishes a balanced ration with the roughage fed.

## DISCUSSION OF THE BREEDING RECORDS

Dairy herds are improved by breeding and selection of the better animals for breeders. The practice of keeping heifers that have completed one lactation affords a better means of being sure that only the best cows are kept for herd replacements. Relatively close culling has been practiced at all times in the college herd. Cows producing below certain levels and those with poor type are regularly culled from the herd.

This study was made on the records of five hundred and seventy-three cows of the four breeds. The number of the respective breeds studied was as follows: One hundred and ninety-four Jerseys; one hundred and forty-eight Holsteins; one hundred and thirty Ayrshires; and one hundred and one Guernseys.

Table 1 shows the total number removed and reasons for removal of all registered females that left the herd during the period studied. In the classification of reasons for removal, what was considered as the chief cause is listed.

Of those cows disposed, the chief reasons for disposal were; for breeding purposes, as non-breeders, or as low producers. About 66 per cent of all cows removed from the herd were sold for these reasons.

More cows were sold for breeding purposes from all breeds than for any other single reason. A greater percentage of the Ayrshires were sold for breeding purposes than any other breed. The per cent removed for this reason are as follows: Ayrshires 67 per cent, Holsteins 46 per cent, Jerseys 38 per cent, and Guernseys 31 per cent.

Table 1 shows that there were thirty-four cows sold due to reacting

TABLE 1

REASONS FOR REMOVAL OF FEMALES FROM THE OKLAHOMA A. AND M. COLLEGE DAIRY HERD 1938 TO 1949, INCLUSIVE

| Reasons for Removal | Breeds | | | | |
|---|---|---|---|---|---|
| | Ayshire | Guernsey | Holstein | Jersey | All Breeds |
| Total Number Removed | 91 | 67 | 93 | 145 | 396 |
| For Breeding Purposes | 61 | 21 | 43 | 55 | 180 |
| Non-breeder | 6 | 3 | 9 | 24 | 42 |
| Low-producer | 7 | 12 | 8 | 13 | 40 |
| Poor type | 1 | 3 | 5 | 5 | 14 |
| Old age | | 2 | 4 | 5 | 11 |
| Reacted to Bang's test | 6 | 5 | 8 | 15 | 34 |
| Mastitis | 1 | 2 | 4 | 2 | 9 |
| Abnormal Udder | | 2 | 1 | | 3 |
| Broken down Udder | | 1 | 1 | | 2 |
| Hard Milker | | | 1 | | 1 |
| T. B. Suspicion | 1 | 2 | 1 | | 4 |
| Injuries | | 2 | 1 | 3 | 6 |
| Lumpjaw | | | | 1 | 1 |
| Died (Calves) | | 2 | 1 | 1 | 4 |
| Died (Heifers) | 2 | 6 | 2 | 3 | 13 |
| Died (Cows) | 4 | 4 | 4 | 13 | 25 |
| Unknown Reasons | 2 | | | 5 | 7 |

to the Bang's test. This is about 8 per cent of all cows removed. All but a few of these cows were sold before the advent of adult vaccination for the control of Bangs in June, 1943.

The raising of the level of production is often greatly retarded, in a dairy herd, if sufficient females are not raised to allow some selection in the replacement animals. The replacement problem can be serious where the productive life of the cow is short.

A study concerning the variations in the productive lives of seventy Ayrshires, forty-eight Guernseys, sixty-four Holsteins, and one hundred and seventeen Jerseys, that entered the college milking

herd, revealed information given in Table 2. As is shown in this table, 28.09 per cent of the cows had but one freshening before leaving the herd, 24.75 per cent of the cows had two, and 16.72 per cent had three. Thus 69.56 per cent left the herd before having freshened four times.

The average number of freshenings for all cows in the herd was 2.85 freshenings, and the average for each breed was as follows: Ayrshires 2.61; Guernseys 3.23; Holsteins 2.57; and Jerseys 2.97.

It is commonly considered that a cow is reproducing at her optimum efficiency if she conceives within eighty-three days from parturition and freshens at approximately three hundred and sixty-five day intervals. By using the number of services per conception as a means to show reproductive efficiency the cows that fail to show regular estrus periods are not considered. Since this is true, a study was made of the interval between calving and first service, and interval between first service and conception. Table 3 shows the average number of days from calving to first service and per cent of the herd that was bred within eighty-three days after parturition. The average interval from calving to first service for all breeds, during the period studied, was one hundred and fifteen days. There was an average of 28.37 per cent of the cows bred within eighty-three days after parturition. This means only about 28 per cent of the cows would have had an opportunity to calve at three hundred and sixty-five day intervals had they conceived to the first service.

The average interval, as shown by Table 4, from first service to conception during the period studied was thirty-eight days for all breeds. In comparison of Table 4 and 5 it will be noticed that

TABLE 2

NUMBER OF COWS DISPOSED OF WITH NUMBER OF LACTATIONS

| | Ayrshires | | Guernseys | | Holsteins | | Jerseys | | All Breeds | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. of cows | per cent | No. of cows | per cent | No. of cows | per cent | No. of cows | per cent | No. of cows | per cent |
| Entered the Milking Herd | 70 | | 48 | | 64 | | 117 | | 299 | |
| Left the Herd with one Lactation | 23 | 32.86 | 10 | 20.83 | 23 | 35.94 | 28 | 23.93 | 84 | 28.09 |
| Left the Herd with two Lactations | 13 | 18.57 | 17 | 35.41 | 11 | 17.19 | 33 | 28.20 | 74 | 24.75 |
| Left the Herd with three Lactations | 13 | 18.57 | 2 | 4.17 | 12 | 18.75 | 23 | 19.60 | 50 | 16.72 |
| Left the Herd Before Fourth Calving | 49 | 70.00 | 29 | 60.42 | 46 | 71.87 | 84 | 71.79 | 208 | 69.56 |

TABLE 3

AVERAGE INTERVAL BETWEEN CALVING AND FIRST SERVICE

| Conception | Ayrshires | | | Guernseys | | | Holsteins | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. of cows | Av. no. of days from calving to first service | Av. per cent bred within 83 days after calving | No. of cows | Av. no. of days from calving to first service | Av. per cent bred within 83 days after calving | No. of cows | Av. no. of days from calving to first service | Av. per cent bred within 83 days after calving |
| 1 | | | | | | | | | |
| 2 | 85 | 125 | 17.65 | 64 | 118 | 28.12 | 97 | 123 | 19.59 |
| 3 | 59 | 114 | 30.51 | 44 | 96 | 36.36 | 66 | 117 | 25.75 |
| 4 | 31 | 101 | 35.48 | 33 | 88 | 48.48 | 43 | 130 | 13.95 |
| 5 | 16 | 102 | 37.50 | 14 | 146 | 71.43 | 28 | 106 | 32.00 |
| 6 | 9 | 106 | 22.22 | 14 | 88 | 64.28 | 16 | 102 | 31.00 |
| 7 | 6 | 110 | 16.66 | 6 | 69 | 50.00 | 10 | 96 | 50.00 |
| 8 | 1 | 87 | | 2 | 125 | 50.00 | 3 | 113 | 33.33 |
| 9 | | | | 1 | 124 | | | | |
| Total & Av. | 207 | 115 | 25.60 | 178 | 105 | 41.01 | 260 | 120 | 23.85 |

| Conception | Jerseys | | | All Breeds | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| 1 | | | | | | |
| 2 | 139 | 128 | 14.38 | 385 | 124 | 18.75 |
| 3 | 101 | 120 | 34.00 | 270 | 114 | 31.48 |
| 4 | 60 | 110 | 35.00 | 167 | 109 | 32.33 |
| 5 | 34 | 97 | 41.00 | 92 | 108 | 42.39 |
| 6 | 23 | 110 | 30.00 | 62 | 102 | 37.10 |
| 7 | 18 | 107 | 28.00 | 40 | 99 | 35.00 |
| 8 | 12 | 105 | 42.00 | 18 | 107 | 38.89 |
| 9 | 5 | 109 | 40.00 | 6 | 111 | 33.33 |
| 10 | 3 | 101 | | 3 | 101 | |
| Total & Av. | 395 | 117 | 27.34 | 1045 | 115 | 28.37 |

TABLE 4

AVERAGE NUMBER OF DAYS BETWEEN FIRST SERVICE AND CONCEPTION

| Conception number | Ayrshires | | Guernseys | | Holsteins | | Jerseys | | All Breeds | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. of cows | Av. no. days between first service and conception | No. of cows | Av. no. days between first service and conception | No. of cows | Av. no. days between first service and conception | No. of cows | Av. no. days between first service and conception | No. of cows | Av. no. days between first service and conception |
| 1 | 101 | 33 | 77 | 35 | 112 | 98 | 153 | 43 | 443 | 53 |
| 2 | 71 | 20 | 55 | 28 | 83 | 41 | 120 | 30 | 329 | 30 |
| 3 | 46 | 21 | 34 | 22 | 55 | 44 | 77 | 32 | 212 | 32 |
| 4 | 24 | 39 | 31 | 39 | 34 | 21 | 42 | 26 | 131 | 26 |
| 5 | 14 | 69 | 18 | 14 | 22 | 37 | 25 | 48 | 79 | 47 |
| 6 | 7 | 6 | 11 | 8 | 14 | 49 | 22 | 19 | 54 | 24 |
| 7 | 3 | | 6 | | 8 | 69 | 15 | 36 | 32 | 35 |
| 8 | 1 | | 2 | | 1 | 25 | 7 | 11 | 11 | 9 |
| 9 | | | 1 | | | | 4 | 16 | 5 | 3 |
| 10 | | | | | | | 2 | 83 | 2 | 83 |
| Total and Average | 267 | 29 | 235 | 28 | 329 | 59 | 467 | 35 | 1298 | 38 |

TABLE 5

NUMBER OF SERVICES REQUIRED PER CONCEPTION GROUPED ACCORDING TO NUMBER OF CONCEPTIONS, BY BREEDS, AND ALL BREEDS

| conception number | Ayrshires | | Guernseys | | Holsteins | | Jerseys | | All Breeds | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. of cows | Services per conception | No. of cows | Services per conception | No. of cows | Services per conception | No. of cows | Services per conception | No. of cows | Services per conception |
| 1 | 102 | 1.94 | 77 | 1.69 | 112 | 2.98 | 155 | 2.22 | 446 | 2.25 |
| 2 | 73 | 1.63 | 56 | 1.57 | 83 | 2.19 | 121 | 1.87 | 333 | 1.90 |
| 3 | 46 | 1.69 | 35 | 1.51 | 56 | 2.62 | 78 | 2.06 | 215 | 2.04 |
| 4 | 24 | 1.83 | 30 | 1.56 | 34 | 2.20 | 47 | 2.14 | 135 | 1.97 |
| 5 | 16 | 2.31 | 18 | 2.00 | 22 | 1.69 | 26 | 2.31 | 82 | 2.07 |
| 6 | 7 | 2.14 | 12 | 1.58 | 14 | 2.00 | 22 | 1.68 | 55 | 1.80 |
| 7 | 3 | 1.66 | 6 | 1.33 | 8 | 2.50 | 15 | 2.13 | 32 | 2.03 |
| 8 | 1 | 4.00 | 2 | 1.00 | 1 | 9.00 | 7 | 2.28 | 11 | 2.73 |
| 9 | | | 1 | 1.00 | | | 4 | 1.25 | 5 | 1.20 |
| 10 | | | | | | | 2 | 5.50 | 2 | 5.50 |
| Total and Average | 272 | 1.60 | 237 | 1.60 | 330 | 2.09 | 477 | 1.66 | 1316 | 1.75 |

there is a direct correlation between the breed average number of services per conception and number of days between first service and conception for each breed.

The number of services per conception should be closely related to the calving interval. An examination of Figures 1 and 2 shows that the shortest average calving interval occured in 1942 with three hundred and ninety-six days and the lowest number of services per conception occured in 1944 with 1.37 services per conception. The greatest number of services per conception, 2.14, occured in 1945, with the longest calving interval occuring in 1949 with four hundred and thirty-three days. In computing the calving interval, all normal and premature calvings were included.

There is some relationship between the average calving interval (see Figure 3 and Table 6) and average number of days between calving and first service (Table 3). This latter table shows that there is a tendency for intervals to shorten as the cows progress in number of conceptions. This was true until the ninth lactation for the calving interval. For the average number of days from calving to first service there was no definite trend in the eight, ninth and tenth conception, due to the small number of cows included.

There was a total of five hundred and twenty-five records of first service on heifers for the twelve year period studied. The age at time of first breeding had the following ranges and averages for each breed: the Ayrshires ranged from fourteen to thirty-one months with an average of twenty-two months; Guernseys ranged from fourteen to twenty-eight months with an average of twenty months; Holsteins ranged from thirteen to thirty-three months with an


Fig. 1.- Herd Average Calving Interval


Fig. 2.- Yearly Herd Average for Number of Services Per Conception 1938 to 1949, Inclusive*

* Includes Fertile Cows Only


Fig. 3.- Herd Average Calving Interval By Lactations

TABLE 6

CALVING INTERVAL BY BREEDS, AND FOR ALL BREEDS

| Lactation | Ayrshires | | Guernseys | | Holsteins | | Jerseys | | All Breeds | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Av. days | No. | Av. days | No. | Av. days | No. | Av. days | No. | Av. days |
| 2 | 63 | 427 | 52 | 415 | 74 | 430 | 118 | 421 | 307 | 423 |
| 3 | 41 | 411 | 33 | 404 | 52 | 438 | 75 | 419 | 201 | 420 |
| 4 | 22 | 408 | 27 | 404 | 32 | 417 | 41 | 401 | 122 | 407 |
| 5 | 12 | 408 | 16 | 420 | 20 | 423 | 26 | 412 | 74 | 416 |
| 6 | 7 | 387 | 10 | 383 | 12 | 458 | 20 | 398 | 49 | 408 |
| 7 | 2 | 347 | 4 | 341 | 7 | 427 | 12 | 417 | 25 | 402 |
| 8 | | | 1 | 371 | 1 | 379 | 6 | 386 | 8 | 383 |
| 9 | | | 1 | 412 | | | 4 | 383 | 5 | 389 |
| Total and Average | 147 | 415 | 144 | 406 | 198 | 431 | 302 | 413 | 791 | 417 |

average of twenty-two months; and the Jerseys ranged from nine to thirty-one months with an average of nineteen months. The average ages obtained here were computed to the closest month in the case of each breed.

The ages of all females at first and subsequent calvings during this period was studied and the average age at all calvings was calculated for each breed as shown in Table 7. The average age of the Ayrshires calving for the first time was two years, seven months and twenty-five days; Guernseys two years, five months and twenty days; Holsteins, two years, nine months and five days; and Jerseys two years, five months and ten days. These average ages are from a month to three months older than those commonly considered to be optimum.

TABLE 7

AVERAGE AGE AT EACH CALVING, BY BREEDS

| Calving | Ayrshires | | Guernseys | | Holsteins | | Jerseys | |
|---|---|---|---|---|---|---|---|---|
| | No. | age Y—M—D | No. | age Y—M—D | No. | age Y—M—D | No. | age Y—M—D |
| First | 92 | 2—7—25 | 72 | 2—5—20 | 105 | 2—9—5 | 151 | 2—5—10 |
| Second | 62 | 3—11—27 | 53 | 3—6—24 | 74 | 4—0—16 | 118 | 3—7—12 |
| Third | 41 | 4—11—28 | 33 | 4—8—2 | 53 | 5—2—22 | 74 | 4—8—4 |
| Fourth | 22 | 6—1—27 | 27 | 5—7—2 | 32 | 6—4—18 | 43 | 5—7—7 |
| Fifth | 12 | 7—2—12 | 16 | 6—8—12 | 20 | 7—5—20 | 25 | 6—7—17 |
| Sixth | 7 | 8—2—28 | 10 | 8—0—29 | 12 | 8—6—15 | 20 | 7—8—9 |
| Seventh | 2 | 9—10—14 | 4 | 9—2—13 | 7 | 9—9—0 | 12 | 8—8—4 |
| Eighth | | | 1 | 10—9—0 | 1 | 10—1—28 | 6 | 9—9—4 |
| Ninth | | | 1 | 11—10—17 | | | 4 | 10—10—17 |
| Tenth | | | | | | | 1 | 11—11—22 |

Table 8 shows the distribution of ages at first freshing of all heifers with normal calvings during the twelve year period. The greatest number of Jerseys freshened at twenty-five months with a range from twenty-two to forty-five months; Holsteins, the greatest number freshened at twenty-nine, thirty and thirty-seven months with a range from twenty-two to forty-seven months; Guernseys, the greatest number freshened at twenty-six, twenty-seven, twenty-eight and thirty-one months with a range from twenty-four to thirty-eight months; Ayrshires the greatest number freshened at twenty-eight months with a range from twenty-four to forty-five months.

During the twelve year period studied the herd average calving interval was four hundred and seventeen days, and the average number of services per conception was 1.75 for all fertile cows. Holsteins required more services per conception than any of the other breeds. The average, by breeds, for services per conception were as follows: Ayrshires 1.60; Grernseys 1.60; Holsteins, 2.09; and Jerseys, 1.66; Table 5.

Contrary to common belief all breeds did not require more services per conception with heifers being bred for first pregnancy than for later pregnancies. Table 5 shows that the Ayrshires, Guernseys and Jerseys required more services per conception for the fifth conception than for the first. The Holsteins required more services for the eighth conception than for the first, the Jerseys required more in the eighth and tenth, but the number of cows involved was small and the figures are probably not significant. Table 5 and Figure 4 show that more services were required


Fig. 4.- Herd Average for Number of Services Per Conception Grouped According to Number of Conceptions*

* Includes Fertile Cows Only

TABLE 8

AGE AT FIRST FRESHENING FOR ALL NORMAL CALVINGS

| Months | Number of Ayrshires | Number of Guernseys | Number of Holsteins | Number of Jerseys |
|---|---|---|---|---|
| 22 | | | 1 | 1 |
| 23 | | | | 4 |
| 24 | 3 | 6 | 1 | 13 |
| 25 | | 5 | 4 | 21 |
| 26 | 2 | 8 | 3 | 19 |
| 27 | 6 | 8 | 3 | 8 |
| 28 | 12 | 8 | 5 | 17 |
| 29 | 8 | 5 | 10 | 11 |
| 30 | 10 | 6 | 10 | 7 |
| 31 | 9 | 8 | 6 | 6 |
| 32 | 8 | 6 | 9 | 7 |
| 33 | 6 | 4 | 8 | 7 |
| 34 | 4 | 1 | 7 | 2 |
| 35 | 3 | 3 | 5 | 2 |
| 36 | 5 | 1 | 4 | 7 |
| 37 | 3 | 1 | 10 | 7 |
| 38 | 3 | 2 | 4 | |
| 39 | 2 | | 4 | 2 |
| 40 | | | 1 | 1 |
| 41 | | | 1 | 1 |
| 42 | | | 2 | |
| 43 | | | 1 | 1 |
| 44 | 1 | | | |
| 45 | 1 | | | 1 |
| 46 | | | | |
| 47 | | | 1 | |
| Total | 86 | 72 | 100 | 145 |

for first conception than any other up to the eighth conception, and here the number of cows involved is small.

Bulls vary in their breeding efficiency as do the females in the herd. Table 9 shows the variation among sires used in the herd during the period studied. The services reported here include

TABLE 9

REPRODUCTIVE EFFICIENCY OF SIRES WITH ELEVEN OR MORE SERVICES IN THE HERD

| Breed and Name | No. of services | No. of conceptions | percent conceptions |
|---|---|---|---|
| (A) Sycamore High Noon | 33 | 21 | 63.63 |
| (A) Strathglass Buster Douglas | 111 | 27 | 24.36 |
| (A) Professor of Oklahoma | 11 | 9 | 81.81 |
| (A) Strathglass Brown Echo | 60 | 43 | 71.66 |
| (A) Shirly Ayr Novel | 67 | 54 | 80.59 |
| (A) Desert Crest Hi Ho | 148 | 88 | 59.46 |
| (A) Desert Crest Country Gentlemen | 28 | 13 | 46.43 |
| (G) Tri Aqua | 36 | 16 | 44.40 |
| (G) Gaylord's Sequel of Fortune | 98 | 60 | 65.30 |
| (G) Medow Lodge King's Mohican | 184 | 102 | 55.60 |
| (G) Gaylord's Nobleman | 14 | 9 | 64.20 |
| (G) Medow Lodge Ambassador | 77 | 43 | 55.80 |
| (H) Pabst Sir Belmont Bess | 221 | 111 | 50.20 |
| (H) Skylark Butter Boy Fobes | 187 | 65 | 34.76 |
| (H) Sooner Hartog Pontiac | 127 | 51 | 40.15 |
| (H) Sooner Pontiac Deacon | 26 | 12 | 46.15 |
| (H) Mt. Rega Piebe Homestead | 29 | 9 | 31.03 |
| (H) Pabst Remer Pride | 54 | 20 | 37.04 |
| (H) Sooner Pontiac Valiant | 131 | 46 | 35.11 |
| (J) Sooner Sybil Volunteer | 110 | 61 | 55.45 |
| (J) Sooner Sybil Combination | 35 | 23 | 62.16 |
| (J) Bachauderie's Volunteer | 35 | 27 | 77.14 |
| (J) Sooner Afterglow's Flag | 43 | 20 | 46.50 |
| (J) Sooner General | 26 | 17 | 65.38 |
| (J) Draconis Royal Standard | 184 | 102 | 55.43 |
| (J) Advancing Ronald | 300 | 129 | 43.00 |
| (J) Sooner Draconis Standard | 107 | 47 | 43.90 |
| (J) Sparkling Right Royal | 91 | 30 | 32.80 |

all services on fertile and non-fertile cows. All bulls are included in Table 9 except those with less than eleven services in the herd. There was considerable variation in the breeding efficiency of the bulls used. The highest per cent of conceptions for any of the bulls

was 81.81 per cent. The lowest conception rate of any bull was 24.36 per cent. Thirty-two per cent of the bulls listed had over a 60 per cent conception rate. Table 10 shows the average per cent conception for all the bulls used during the period studied, by breeds, and average for all breeds. The avera e per cent conception for all bulls was 48.51 per cent on 2,657 services. The average by breeds was as follows: Ayrshires 55.43 per cent; Guernseys 56.11 per cent; Holsteins 40.10 per cent and for the Jerseys 48.75 per cent.

TABLE 10

VARIOUS DATA ON THE SERVICES OF ALL BULLS USED, 1938 TO 1949, INCLUSIVE

| Breeds | number of services | number of conceptions | per cent of conceptions resulting from first service | services per conception |
|---|---|---|---|---|
| Ayrshire Bulls | 478 | 265 | 55.43 | 1.80 |
| Guernsey Bulls | 417 | 234 | 56.11 | 1.78 |
| Holstein Bulls | 798 | 320 | 40.10 | 2.49 |
| Jersey Bulls | 964 | 470 | 48.75 | 2.05 |
| All Bulls | 2657 | 1289 | 48.51 | 2.06 |

Figure 5 illustrates the irregularities for number of services per conception occuring during the twelve year period. The years during which each breed required the greatest number of services per conception did not follow the same pattern. As shown in Table 11 and Figure 5 the year that each breed required the greatest number of services per conception was as follows: Ayrshires in 1941; Guernseys in 1947; Holsteins in 1945 and Jerseys in 1946. The year that each breed required the lowest number of services per conception was : Ayrshires in 1945; Guernseys in 1944; Holsteins in 1938; and Jerseys in 1938. It is interesting

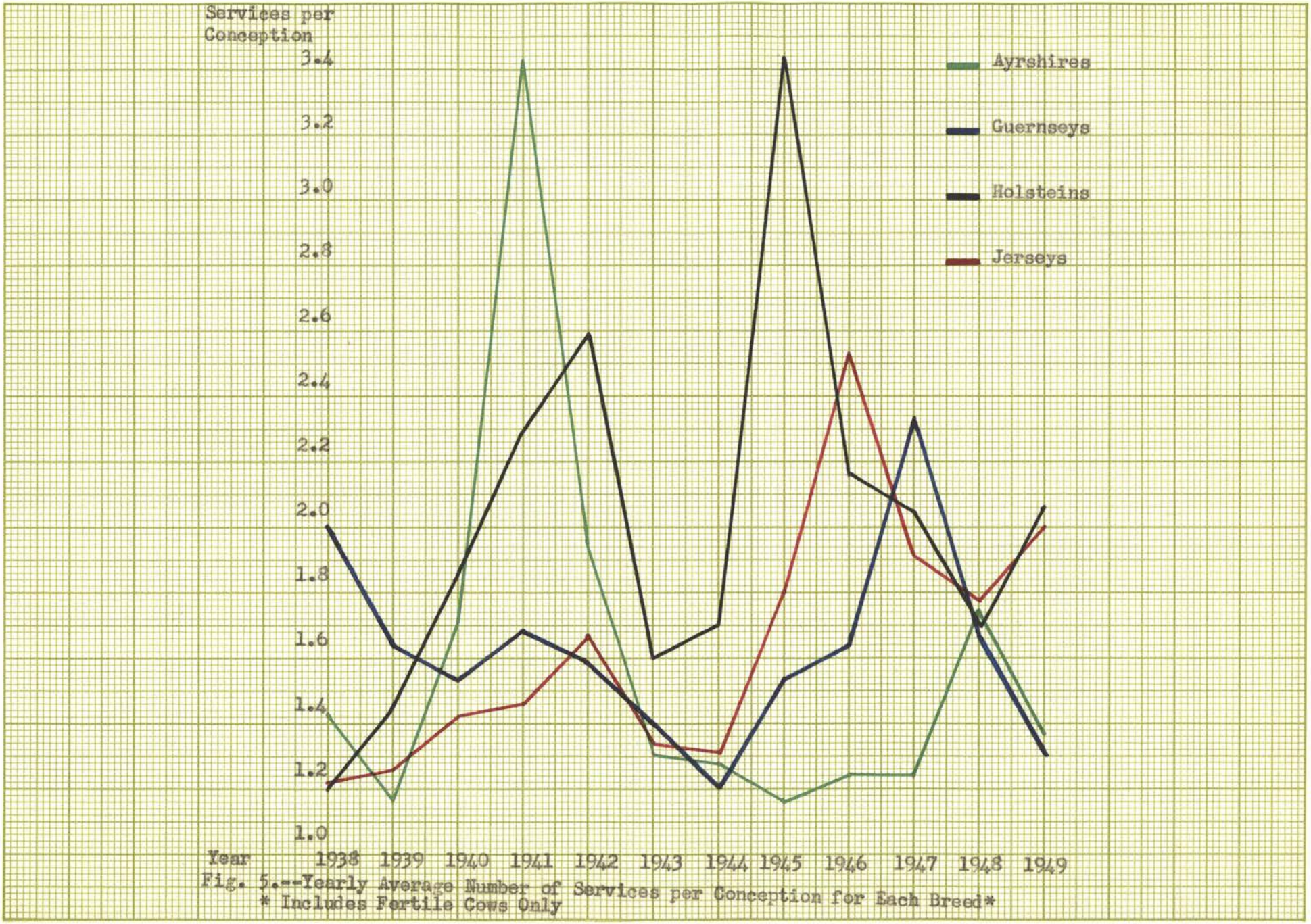


Fig. 5.--Yearly Average Number of Services per Conception for Each Breed*
* Includes Fertile Cows Only

TABLE 11

VARIOUS DATA CONCERNING COWS CALVING IN THE COLLEGE HERD 1938 TO 1949, INCLUSIVE*

| Year | Ayrshires | | | | | | | Guernseys | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. of cows calving | No. of services per conception | Calving interval | No. of first calf heifers | No. of abortions | Sex of calf M | Sex of calf F | No. of cows calving | No. of services per conception | Calving interval | No. of first calf heifers | No. of abortions | Sex of calf M | Sex of calf F |
| 1938 | 7 | 1.43 | 445 | 5 | | 5 | 2 | 9 | 2.00 | 542 | 6 | | 4 | 5 |
| 1939 | 7 | 1.17 | 374 | 4 | | 4 | 3 | 11 | 1.64 | 412 | 4 | | 5 | 6 |
| 1940 | 14 | 1.71 | 453 | 8 | | 9 | 5 | 17 | 1.53 | 424 | 7 | | 9 | 8 |
| 1941 | 19 | 3.42 | 475 | 8 | 1 | 8 | 11 | 19 | 1.68 | 362 | 3 | | 9 | 11 |
| 1942 | 22 | 1.95 | 415 | 9 | 3 | 10 | 10 | 17 | 1.59 | 390 | 5 | 3 | 10 | 7 |
| 1943 | 16 | 1.31 | 403 | 8 | 1 | 9 | 7 | 10 | 1.40 | 357 | 2 | 2 | 6 | 4 |
| 1944 | 26 | 1.28 | 426 | 13 | 1 | 14 | 11 | 15 | 1.20 | 448 | 6 | 1 | 11 | 4 |
| 1945 | 19 | 1.16 | 457 | 6 | | 10 | 9 | 19 | 1.53 | 399 | 5 | | 13 | 6 |
| 1946 | 21 | 1.24 | 409 | 4 | 2 | 10 | 10 | 10 | 1.64 | 383 | 5 | | 5 | 5 |
| 1947 | 21 | 1.24 | 414 | 6 | | 13 | 9 | 18 | 2.33 | 471 | 6 | | 6 | 11 |
| 1948 | 24 | 1.74 | 443 | 9 | 1 | 13 | 11 | 24 | 1.67 | 410 | 8 | 1 | 14 | 8 |
| 1949 | 32 | 1.37 | 395 | 9 | 11 | 17 | 14 | 29 | 1.31 | 400 | 9 | 1 | 14 | 17 |
| | Holsteins | | | | | | | Jerseys | | | | | | |
| 1938 | 10 | 1.20 | 381 | 4 | | 4 | 5 | 28 | 1.22 | 385 | 11 | 1 | 16 | 11 |
| 1939 | 17 | 1.44 | 409 | 8 | | 7 | 10 | 30 | 1.26 | 450 | 7 | 1 | 16 | 16 |
| 1940 | 19 | 1.84 | 390 | 9 | 1 | 9 | 10 | 37 | 1.42 | 425 | 13 | | 17 | 21 |
| 1941 | 17 | 2.29 | 445 | 3 | 1 | 9 | 7 | 35 | 1.46 | 420 | 10 | 1 | 16 | 19 |
| 1942 | 22 | 2.59 | 427 | 7 | 3 | 11 | 9 | 42 | 1.66 | 376 | 13 | 4 | 17 | 25 |
| 1943 | 21 | 1.60 | 455 | 10 | 5 | 6 | 15 | 31 | 1.34 | 379 | 12 | 12 | 14 | 16 |
| 1944 | 20 | 1.70 | 410 | 4 | 4 | 10 | 8 | 32 | 1.31 | 401 | 9 | 6 | 14 | 14 |
| 1945 | 30 | 3.43 | 426 | 12 | 1 | 16 | 14 | 25 | 1.80 | 383 | 7 | 5 | 13 | 10 |
| 1946 | 25 | 2.16 | 398 | 9 | 4 | 9 | 14 | 23 | 2.52 | 438 | 7 | 4 | 14 | 9 |
| 1947 | 27 | 2.04 | 408 | 11 | 1 | 14 | 16 | 40 | 1.92 | 425 | 17 | 3 | 21 | 16 |
| 1948 | 35 | 1.70 | 431 | 11 | | 24 | 14 | 33 | 1.78 | 407 | 10 | 3 | 17 | 15 |
| 1949 | 38 | 2.06 | 470 | 10 | 2 | 24 | 12 | 32 | 2.00 | 456 | 2 | 6 | 18 | 17 |

*Calves with sex undetermined were not included, and where number of calves exceed number of calvings twins were involved.

to note (Figure 5) that the conception rate for the Holsteins and Jerseys was never as good during any other part of the period studied as it was in 1938. The herd average number of services per conception was 1.72 for 1948 with a range of minus .05 to plus .06 services per conception for all breeds. This was the only year that all breeds came that close to being the same average conception rate.

There were only two years of the period studied when the calving interval was less than four hundred days. These occured in 1942 and 1943. It will be noticed that the per cent of abortions (Figure 6) was on the increase during those two years. However the calving interval days does not follow the same pattern as the per cent of abortions curve. The year of 1949 had the longest calving interval and second highest per cent of abortions.

Abortions as used here includes calves that were born dead up to within ten days of normal parturition, and were listed in the herd book as premature or abortions. As shown in Figure 6 the herd was not completely free of abortions at any time during the twelve year period. Those abortions occuring from 1938 through 1941 were not attributed to Bang's infection. The highest percentage of abortions occured in 1943 following the outbreak of Bang's disease in March of 1942. The abortion rate decreased from the high of 25.64 per cent in 1943 to a low of 4.31 per cent in 1948 but increased to 15.38 in 1949.

The number of services per conception for all cows conceiving in the herd is shown in Table 12. This table shows that a few cows are retained in the herd that require a large number of services per conception. Almost without exceptions these animals kept are considered important cows for the foundation herd. Foundation animal is referred to here as being one from which offspring are desired.

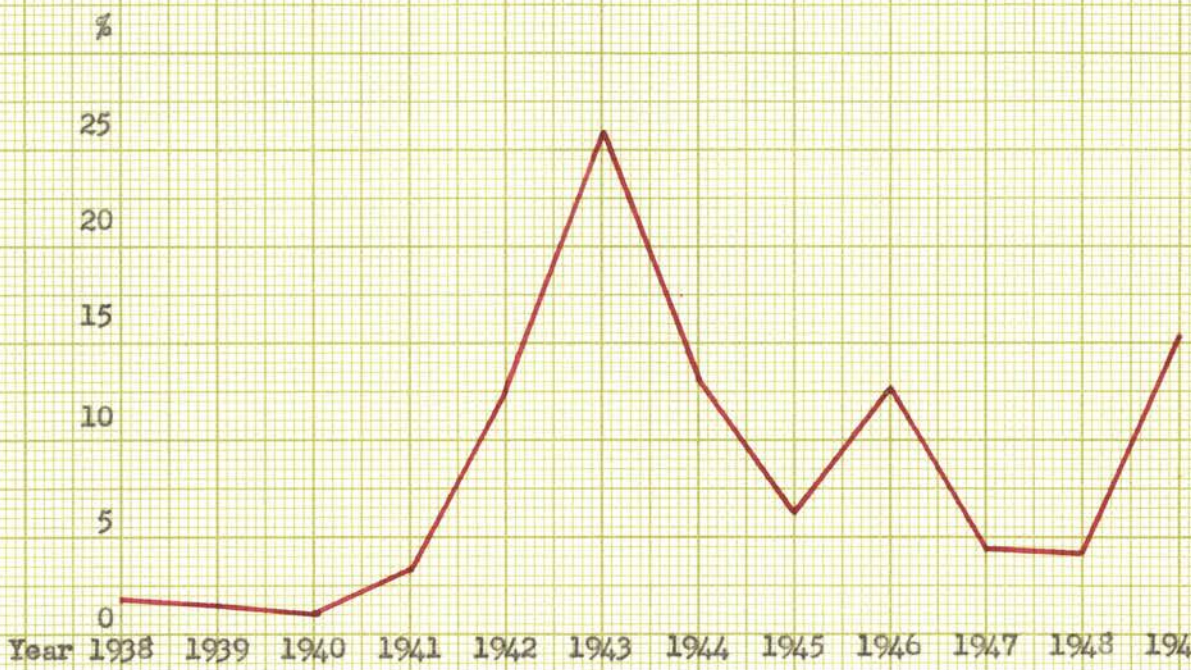


Fig. 6.--Percentage of Abortions Per Year in the Herd 1938 to 1949, Inclusive*

* Calves Born up to within Ten Days of Time of Normal Parturition, and were Dead, were Classed as Abortions

TABLE 12

NUMBER AND PERCENTAGE OF CONCEPTIONS REQUIRING FROM 1 TO 12 SERVICES

| Number of cows | Number of services | per cent of total conceptions |
|---|---|---|
| 782 | 1 | 59.74 |
| 282 | 2 | 21.54 |
| 131 | 3 | 10.01 |
| 58 | 4 | 4.43 |
| 29 | 5 | 2.22 |
| 14 | 6 | 1.07 |
| 5 | 7 | 0.38 |
| 2 | 8 | 0.15 |
| 3 | 9 | 0.23 |
| | 10 | |
| 2 | 11 | 0.15 |
| 1 | 12 | 0.08 |
| Total 1309 | | 100.00 |

Table 12 shows that 59.74 per cent of the cows conceived on the first service, and that about 91 per cent have conceived by the third service. This table indicates that few cows are kept in the herd that require over three services per conception, and that only 0.8 per cent remain after the fifth service, that finally conceive.

A dairy herd in which the heifers are culled after entering the milking herd, is apt to have a high percentage of first calf heifers. Table 13 shows the number and percentage of heifers in the herd for the twelve year period. The average per cent of heifers in the herd for the period studied was 33.54 per cent. The per cent of heifers ranged from 22.72 per cent in 1949 to 48.14 per cent in 1938.

The herd average length of dry period is probably directly related to the average level of production in most dairy herds. A

TABLE 13

NUMBER OF COWS CALVING IN THE HERD WITH NUMBER AND PERCENTAGE OF COWS WITH FIRST LACTATION

| Year | Total Number of Cows Calving | Number of Cows with first Lactation | Per cent of Cows with first Lactation |
|---|---|---|---|
| 1938 | 54 | 26 | 48.14 |
| 1939 | 65 | 23 | 35.38 |
| 1940 | 87 | 37 | 42.52 |
| 1941 | 90 | 24 | 26.67 |
| 1942 | 102 | 34 | 33.33 |
| 1943 | 91 | 32 | 35.16 |
| 1944 | 90 | 32 | 35.55 |
| 1945 | 93 | 30 | 32.26 |
| 1946 | 80 | 25 | 31.25 |
| 1947 | 106 | 40 | 37.73 |
| 1948 | 116 | 38 | 32.76 |
| 1949 | 132 | 30 | 22.72 |
| Total Number and Average Per cent | 1106 | 371 | 33.54 |

study of the records showed that the average dry period for all cows in the college herd was ninety days, (Table 14 and Figure 7). This is somewhat longer than the interval that is commonly considered optimum. The average dry period for consecutive lactations is shown in Table 14 for each breed and all breeds and is as follows: Ayrshires 97 days; Guernseys 92 days; Holsteins 82 days; and Jerseys 91 days. Note that the Holsteins had the longest average calving interval and the shortest average dry period, (Table 5 and 14)

The number and sex of all calves born in the herd is shown in Table 11. There were one thousand and eighty-one calves born

TABLE 14

AVERAGE NUMBER OF DAYS DRY BY BREEDS, AND ALL BREEDS

| Lactation | Ayrshires | | Guernseys | | Holsteins | | Jerseys | | All Breeds | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number of dry periods | Average number of days dry | Number of dry periods | Average number of days dry | Number of dry periods | Average number of days dry | Number of dry periods | Average number of days dry | Number of dry periods | Average number of days dry |
| 1 | 60 | 88 | 50 | 84 | 72 | 73 | 111 | 89 | 293 | 84 |
| 2 | 41 | 105 | 33 | 88 | 49 | 92 | 68 | 92 | 191 | 94 |
| 3 | 21 | 96 | 27 | 98 | 33 | 77 | 41 | 93 | 122 | 90 |
| 4 | 11 | 112 | 15 | 119 | 19 | 77 | 20 | 83 | 65 | 95 |
| 5 | 7 | 106 | 10 | 91 | 10 | 137 | 19 | 86 | 46 | 101 |
| 6 | 2 | 73 | 4 | 72 | 7 | 73 | 12 | 105 | 25 | 88 |
| 7 | | | | | 1 | 95 | 6 | 90 | 7 | 91 |
| 8 | | | | | | | 4 | 123 | 4 | 123 |
| Total and average | 142 | 97 | 139 | 92 | 191 | 82 | 281 | 91 | 753 | 90 |

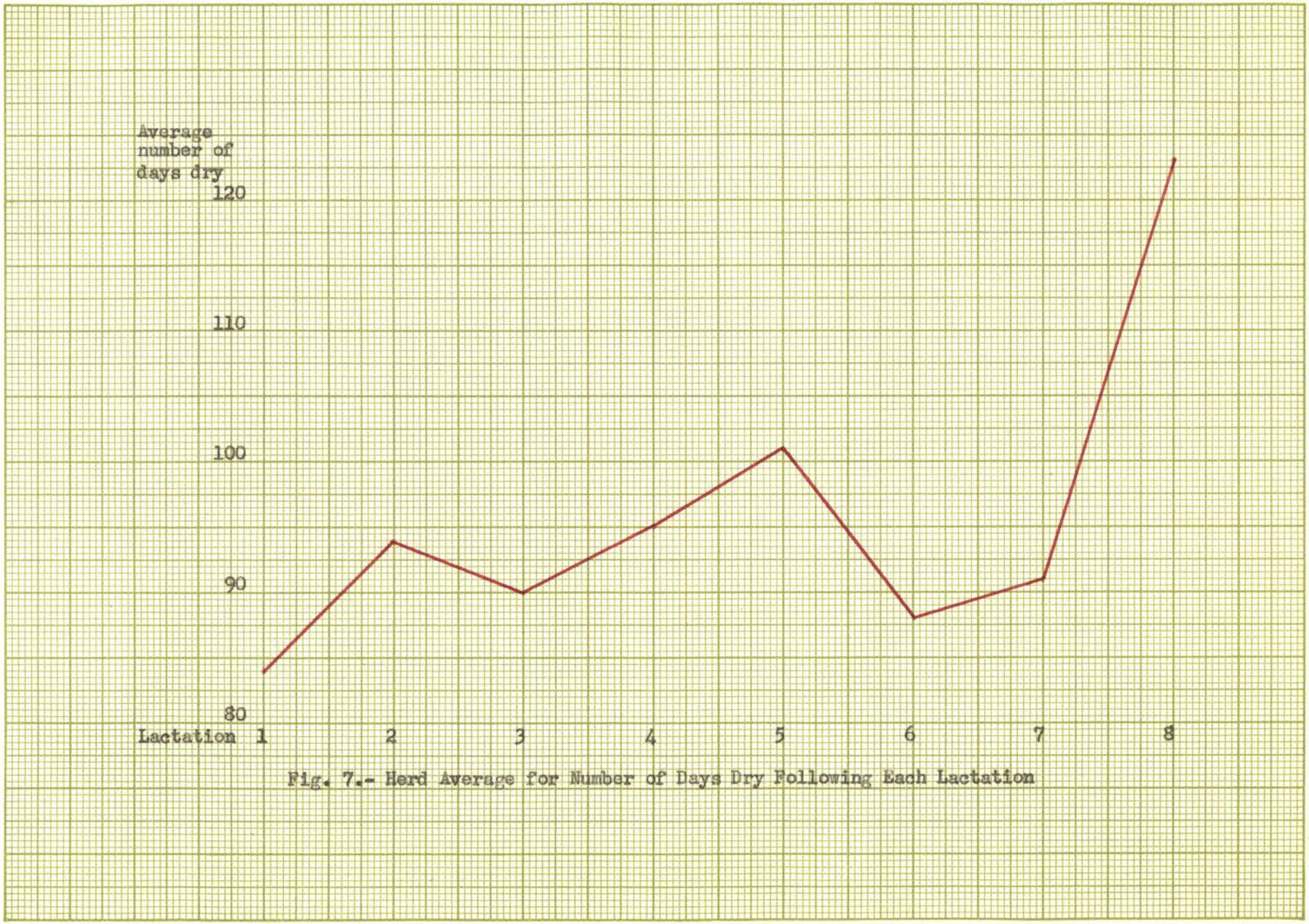


Fig. 7.- Herd Average for Number of Days Dry Following Each Lactation

during this twelve year period. The per cent female calves for all breeds was 47.33 per cent or a sex ratio of 100 males to 91 females. The number of calves and per cent female calves born in each breed are as follows: Ayrshires produced two hundred and twenty-four calves with 45.53 per cent females; Guernseys produced one hundred and ninety-eight calves with 46.46 per cent females; Holsteins produced two hundred and seventy-seven calves with 48.37 per cent females; and the Jerseys produced three hundred and eighty calves with 49.21 per cent females.

Table 13 shows the total number of cows calving in the herd each calendar year. Although the trend has not been consistent, there has been a general increase in number of cows in the herd, with the greatest number for any one year calving in 1949.

The date of disposal of all registered females was tabulated and the average age at time of disposal was calculated. The average ages of the females when leaving the herd were as follows: Ayrshires, four years, and eighteen days; Guernseys, four years, and twenty-nine days; Holsteins, four years, five months, and nine days; Jerseys, four years, four months, and seventeen days.

# SUMMARY

A study was made on the records of five hundred and seventy-three cows of the four breeds in the Oklahoma A. and M. College dairy herd. The number of cows in the respective breeds studied were as follows: One hundred and ninety-four Jerseys; one hundred and forty-eight Holsteins; one hundred and thirty Ayrshires, and one hundred and one Guernseys.

The herd was never free of abortions during the twelve year period studied. The highest per cent abortions occured in 1943 with 25.64 per cent following the outbreak of Bang's disease in March of 1942. The herd has not been free of Bang's infection since that date and the per cent abortions were higher in 1949 than they had been since the peak year of 1943.

Calfhood vaccination for the prevention of Bangs has been practiced in the herd since February 1943. Open cows were vaccinated for the prevention of Bangs beginning in June 1943, and continuing until all the herd was vaccinated.

It was found that 69.56 per cent of all cows that entered the milking herd left the herd before having freshened four times. The average number of freshenings for all cows in the herd, that had one or more freshenings, was 2.85. The average for each breed was as follows: Ayrshires, 2.61; Guernseys 3.23; Holsteins 2.57; and Jerseys 2.97.

The average interval from calving to first service for all breeds, during the period studied, was one hundred and fifteen days. The average interval from first service to conception for all breeds

was thirty-eight days. The average length of dry period was ninety days.

There was a total of five hundred and twenty-five breeding records of first service on heifers for the twelve year period. The age at first breeding had the following averages: Ayrshires twenty-two months; Guernseys, twenty months; Holsteins, twenty-two months; and the Jerseys, nineteen months.

The average age for Ayrshires calving for the first time was two years, seven months and twenty-five days; Guernseys, two years, five months and twenty days; Holsteins, two years, nine months and five days; and the Jerseys, two years, five months and ten days.

During the twelve year period, the herd average calving interval was four hundred and seventeen days, and the average number of services was 1.75 per conception. The services per conception by breeds were as follows: Ayrshires 1.60; Guernseys 1.60; Holsteins 2.09; and Jerseys 1.66. The Ayrshires, Guernseys, and Jerseys required more services per conception for the fifth conception than for the first.

The average per cent conception for all bulls was 47.51 per cent on two thousand, six hundred, and fifty-seven services on fertile and non-fertile cows. The average by breeds was as follows: Ayrshires 55.43 per cent; Guernseys, 56.11 per cent; Holsteins 40.10 per cent; and for the Jerseys 48.75 per cent.

Of all cows that conceived 59.74 per cent conceived on the first service.

There were one thousand and eighty-one calves born during this twelve year period. The sex ratio of calves for the entire herd was

five hundred and sixty-four males to five hundred and seventeen females. In no breed were there more females born than males.

The average age of all registered females that left the herd during the period studied, was as follows: Ayrshires, four years, and eighteen days, Guernseys, four years and twenty-nine days; Holsteins four years, five months and nine days; Jerseys, four years, four months and seventeen days.

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