

UNIVERSITY OF MISSOURI

COLLEGE OF AGRICULTURE

AGRICULTURAL EXPERIMENT STATION

RESEARCH BULLETIN 112

The Mode of Inheritance of Yearly Butterfat Production

An Analysis of the Progeny Performance of
Jersey Sires and Dams

(Publication Authorized November 14, 1927)



COLUMBIA, MISSOURI

NOVEMBER, 1927

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ABSTRACT.—A report is made of a study of the progeny performance of all Jersey sires having ten or more daughters in the Register of Merit. Conversion factors were used to convert all fat records to their "mature equivalent". Dam and daughter comparisons were made by groups according to the sire's progeny performance, using a modified method of partial correlation. The line of regression of the daughters on the dams was calculated for each sub-group. Because of the low correlation between the dams and daughters, these regression equations were found to be of little or no value as prediction equations of the daughter's production, knowing the sire's progeny performance and the dam's record of production. By means of genealogy charts, the ability of the sires and dams to transmit the favorable factors concerned in fat production through their sons to their granddaughters was studied. It was found that as sires are able to transmit the factors for superior yearly fat production to their daughters, they are also transmitting, to a high degree, the same factors to their sons. The sons in turn are transmitting the factors from their sires to their daughters, to a comparatively high degree. The dam's record of production, on the other hand, was found to be a rather poor index of her ability to transmit to her son and granddaughters.

ACKNOWLEDGMENT

It is a pleasure to acknowledge my indebtedness to Dr. L. J. Cole of the Department of Genetics, University of Wisconsin, for valuable suggestions and criticisms throughout the work, but especially for assistance in the presentation of the theory of the inheritance of fat secretion; to Professor A. C. Ragsdale of the Department of Dairy Husbandry, University of Missouri, for material assistance and suggestions throughout the study; to Miss M. E. West of the Department of Mathematics, University of Wisconsin, for assistance in its statistical treatment; to Mr. Warren Gifford of the Department of Dairy Husbandry, University of Missouri, for assistance in connection with the tabulation of the data; and to my other colleagues at the Missouri Agricultural Experiment Station.

The Mode of Inheritance of Yearly Butterfat Production*

C. W. TURNER

The Jersey breed was the first of the dairy breeds to receive systematic attention from breeders having in mind the improvement of their cattle through careful selection and discrimination against inferior animals at the time of registration.²³

The first step toward improvement was in the adoption of a scale of points in January 1834 by the Royal Jersey Agricultural Society. The first scale of points was subsequently revised in 1849, 1851, and 1856. During this period there must have been improvement in the cattle and also in the ideals of the breeders as indicated by the changes in the scale of points.

The second forward step in the improvement of the breed was taken in connection with the founding of the Jersey Herd Book in 1866. A requirement of the registration system adopted was that all calves must be registered in a preliminary form soon after birth, then upon calving for the first time registered heifers must be submitted for approval to a panel of judges, who, after careful examination, either accept or reject the animal for final registration.²⁵

The first systematic step looking toward improvement in the productive capacity of the Jersey breed on the Island was made in 1893 at which time the 24-hour butter test was initiated.²⁶ This test was continued until the war and undoubtedly played a part in calling attention to the dairy capacity of certain families of the breed.

It was not until 1912 that the so-called "milk records system" which is quite similar to the Register of Merit was adopted on the Island. This latter system of recording production is still in force.

In the United States the importance of production records of Jerseys was recognized by a few breeders at an early date.¹⁸ The first long-time production record is that of the cow Flora 113, credited with a private record of 511 pounds and 2 ounces of churned butter in 50 weeks. This record was made in 1853. It later became a common custom to publish private records in the agricultural journals. A compilation of these records was made in 1884. In 1885 the first official tests were made under authority of the American Jersey Cattle Club. Only records of 14 pounds

*A thesis submitted to the Graduate School of the University of Wisconsin in partial fulfillment of the requirements for the Degree of Doctor of Philosophy. Paper No. 78 from the Department of Genetics, Agricultural Experiment Station, University of Wisconsin.

of butter or more produced during 7 days were accepted. The Babcock test was accepted in 1896. It was at the annual meeting held May 6, 1903 that the Register of Merit test was finally established. Since that time 25,000 cows have been tested under this system.

It will be noted from the previous discussion that the dual aims of the breeders' organizations both on the Island and in this country have been improvement of the type of the cattle and improvement of their production at the pail. In the United States where the registry system does not require the examination of animals previous to final registry, the question of improvement of type is largely an individual breeder's problem. Improvement of the producing capacity of Jersey cows has been made possible through the intelligent use of Register of Merit and other tests of production.

A combination of good type and large fat production is the ideal toward which the best breeders are striving. Both are important but the production of milk and fat being the primary function of the dairy cow, a conformation which is closely associated with large milk and fat production should be the object in further improving the Jersey breed.

No short cut methods of improving dairy cattle have been devised by animal breeders. Rigid selection of animals which come up to the ideals of the breeders has been the method by which breed improvement has been made.

The object of this paper is to analyze the yearly fat production records contained in the Register of Merit³⁸ with the view of determining the most successful guides to follow in the selection of breeding stock. A genetic interpretation of the results and the suggested method of selecting breeding-stock is presented.

It was recognized at the outset of the work that there are a number of serious objections to the use of Advanced Registry data in the study of the inheritance and mode of transmission of the factors which combine to produce in the mature animal the potential possibilities for a certain production of milk and fat during a lactation period.

These objections may be grouped into two classes. The first of these classes of objections is due to the rules and regulations of the Register of Merit.³⁹ The second class of objections to Advanced Registry data may apply with equal force to milk and fat records of all kinds, namely, the difficulty of determining the full inheritance of the animals for the quantitative character being considered.

The minimum entrance requirements to the Register of Merit which automatically eliminate the lower grades of producers are a serious objection, indeed, to the great value which might be obtained from the records. The records may be further criticised in that there has been a

TABLE 1.—SUMMARY OF PRODUCTION OF REGISTERED JERSEY COWS IN AUTHENTICATED TESTS FOR 365-DAY PERIODS

Age class	Years 1900-1913 inclusive			Years 1914-1921 inclusive			Year 1922			Year 1923			Years 1900-1923 inclusive		
	No. rec-ords	Av. milk lbs.	Av. fat lbs.	No. rec-ords	Av. milk lbs.	Av. fat lbs.	No. rec-ords	Av. milk lbs.	Av. fat lbs.	No. rec-ords	Av. milk lbs.	Av. fat lbs.	No. rec-ords	Av. milk lbs.	Av. fat lbs.
Yearlings.....	110	6217	338	837	6537	355	156	7106	385	120	7377	407	1222	6663	362
Junior 2.....	536	6599	354	2293	7006	382	463	7630	416	354	7975	434	3646	7120	387
Senior 2.....	205	7130	384	1056	7328	401	225	8107	446	205	8269	450	1691	7522	411
Junior 3.....	233	7746	414	1038	8037	436	254	8503	464	212	8789	480	1737	8158	442
Senior 3.....	198	8008	434	794	8513	461	204	9387	508	144	9721	531	1340	8701	472
Junior 4.....	108	8172	450	870	8844	481	179	9696	515	158	10202	556	1315	9068	492
Senior 4.....	109	8881	482	700	9295	498	162	10006	534	137	10545	573	1108	9513	511
5 year.....	236	9190	489	1251	9534	505	236	10360	552	229	10691	573	1952	9728	517
6 year.....	177	9580	509	890	9965	518	196	10328	555	152	10742	571	1415	10051	527
7 year.....	138	9629	502	699	9920	525	127	10324	538	103	11276	588	1072	10065	526
8 Year.....	87	9454	488	478	10044	529	100	10599	554	54	11251	591	719	10140	532
9 Year.....	59	9288	487	296	9827	511	48	10594	546	49	11141	582	452	9981	521
10 Year.....	30	9807	491	170	9744	512	35	10008	510	27	10929	568	262	9909	515
11 Year.....	12	8437	438	96	10071	523	22	10098	540	12	12920	620	142	10211	527
12 Year and up.....	28	8209	436	106	9085	483	25	10340	533	18	9833	531	177	9200	487
All ages.....	2266	7993	427	11574	8445	452	2431	10078	487	1979	9501	512	18250	8580	460

change in the minimum entrance requirements. All records started before July 1, 1921 were subject to requirements varying from 250.5 pounds of fat at two years to 360 pounds of fat at five years. Since that time all records must exceed 290.5 pounds of fat at two years and 400 pounds of fat at five years. The influence of this 40-pound increase on the average fat production may be noted in Table 1. It is a fundamental principle of the biometric study of genetics that a random sample of the population to be considered should be obtained. While recognizing this objection, it should be pointed out that there are a large number of these records which, because of their high average merit, appear to be unaffected by the entrance requirements, therefore, represent data from which certain deductions may be safely drawn. The influence of the entrance requirements will be pointed out later in connection with the age conversion factors employed.

The expression of quantitative characters is greatly influenced by environment. This is especially true of the demonstration of the potential ability of the dairy cow to secrete milk and fat during a lactation period. The production of fat during a lactation period is influenced by the feed and management, not only during the lactation period, but also during the period of growth and development.*

Pregnancy, ^{2, 15} seasonal temperature, ³⁶ season of freshening,^{29, 42} frequency of milking³⁷ and other similar factors have an effect on maximum production. Probably few cows fully demonstrate their inheritance. Yet, under official test conditions of feeding, management, and verification of records there is a large group of production records which approach full demonstration of the inheritance of the quantitative character of yearly fat secretion.

The Change in Average Production with Time

In comparing yearly records made during a period of 25 years it is necessary to take into consideration the change in methods of feeding and management which has taken place. It is difficult to separate the improvement due to breeding from that of environment.† The follow-

*Graves and Fohrman²⁴ of the U. S. Bureau of Dairying recently presented data which clearly showed that the initial official records made by cows at various ages are, on the average, poorer than those of cows made at the same age but which had been previously tested. They conclude "that official testing develops the productive ability of dairy cows, and that the feeding and care, combined with the prolonged milking period during which the cow is encouraged to yield her utmost, have an appreciable and positive effect on her production during subsequent lactation periods."

The data might equally as well be taken to indicate that the breeders owning the better cows make a practice of testing their cows as two-year-olds and that the cows which make their initial records at more advanced ages are either cows of poorer quality or are owned by breeders who are taking up testing for the first time and are inexperienced in the feeding and managing of test cows and are unable to bring out fully their potential producing capacity.

†From the foregoing discussion it is evident that while environment influences the records of production of the cows studied, that influence cannot be accurately measured. It is necessary, therefore, in this study to consider the mature equivalent record of fat production as the result of inheritance,

ing summary of records by periods of test indicates that the combined influence of breeding, feeding, and management has brought about improvement in the records of Register of Merit Jerseys. The change in the entrance requirements in 1921 also caused a decided increase in average production.

This change in minimum entrance requirement July 1, 1921 quite likely accounts for most of the improvement noted in 1922 and 1923. Only half the records completed in 1922 were subject to the revised requirements while all records made in 1923 were subject to the increased entrance requirements.

This change in production which is due in part to improved feed and management, must be considered in comparing the production of the daughters of the older sires with those of younger sires. In the genealogy tables the improvement or decline can be noted. Unless there is some improvement from generation to generation in the production of the sires' daughters, it may actually indicate some slight decrease in productive ability.

The Change in Average Production with Age

It was observed at an early date that milk and fat production, on the average, gradually increases as the dairy cow becomes mature. The change in production with age was fairly well predicted when the graduated minimum entrance requirements to Register of Merit were established in 1903. The first data indicating the relationship which exists between age and fat production was presented by Pearl and Patterson³³ of the Maine Station, giving results of a study of early Jersey 7-day fat records, although Pearl³² had previously announced that milk production age curves were generally of logarithmic form. Later Pearl, Gowen, and Miner³⁴ presented data on 2153 yearly records showing that Jersey Register of Merit milk records also followed a similar course with age. The logarithmic equation which most closely fitted the observed results was:

$$y = 4586.5 + 307.55x - 12.65x^2 + 2216.62 \log x$$

in which y is the production at the age x .

Taking up the study of the relation of age to milk and fat secretion from the point of view that the rise and decline of milk secretion represents the rate of growth and senescence of the dairy cow Brody, Ragsdale, and Turner³ made a study of all available Jersey Register of Merit records numbering over 13,700 in addition to those of other breeds, totaling 46,000. This is by far the largest number of records that has been

realizing at the same time that under standardized conditions some records would be greater and others smaller than the observed. With large numbers considered there will be a tendency for the influence of environment to be neutralized.

compiled and shows accurately, it is believed, the relation of age to production of Advanced Registry cows.

These data show that milk and fat production gradually increase as the dairy cow becomes mature and then gradually decrease with the onset of old age; thus under similar conditions of feeding and management a heifer is expected to increase her yearly production at each succeeding lactation period until she reaches maturity.

Table 2 which follows shows the relationship between age and production for Register of Merit Jersey cows. These data are subject to the objection that the minimum requirements eliminate the poor producers and, therefore, the results may not be representative of the breed as a whole. It is also true that, due to declining productive ability cows as they grow older enter the Register of Merit with increasing difficulty. The result is that the cows of more advanced ages are more or less selected, since only cows of exceptional ability as producers are usually tested at advanced ages.

The values found in Table 2 are plotted in Fig. 1. The data presented show that fat production gradually increases up until between seven and eight years and then gradually decreases with the onset of old age.

TABLE 2.—THE RELATION BETWEEN AGE AND YEARLY FAT PRODUCTION OF JERSEY COWS

Age (yrs.)	Jersey Cows		Weighted averages of all cows		Fat expressed as percentage of maximum production
	No. cows included	Fat per year <i>lbs.</i>	No. cows included	Fat per year <i>lbs.</i>	
1.7	947	353	1275	355.4	64.2
2.5	4090	383	15001	404.9	73.6
3.5	2263	443	8184	462.0	84.0
4.5	1687	486	6349	497.1	90.4
5.5	1487	502	4823	424.7	95.5
6.5	1067	516	3609	544.8	99.1
7.5	837	521	2579	549.4	100.0
8.5	565	524	1776	544.9	99.1
9.5	355	510	1121	533.2	97.0
10.5	200	509	609	526.4	95.8
11.5	108	513	333	507.9	92.4
12.5	58	453	179	485.3	88.3
13.5	31	470	91	469.8	85.5
14.5	13	447	33	440.7	80.2
15.5	8	451	22	434.8	79.1
16.5	5	465	10	463.6	----
17.5	1	590	5	432.4	----
18.5	1	413	2	412.0	----
20.5	----	----	1	375.0	----
Totals	13723	----	46002	----	----

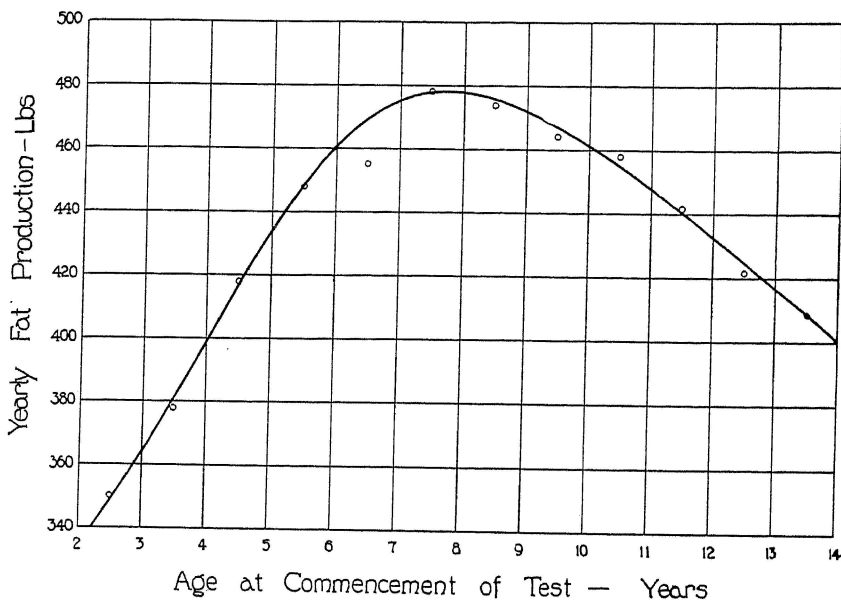


Fig. 1.—The relation between age and fat production of Jersey Cattle.

Converting Records to Their Mature Equivalent

While the production of milk or fat at maturity may be determined by the use of the equations calculated by Pearl and Gowen, it is a laborious process. A much more simple method of converting records to their mature equivalent was first used by the writer.⁴⁴ It consists in determining the age conversion factors from the ratio of the average production at maturity to the average production at various age intervals. These factors for age intervals of six months are presented in Table 3.

TABLE 3.—AGE CONVERSION FACTOR FOR JERSEY COWS

Age	Factor	Age	Factor
Yearlings	1.484	8½ to 9	1.000
2 to 2½	1.448	9 to 9½	1.004
2½ to 3	1.344	9½ to 10	1.008
3 to 3½	1.248	10 to 10½	1.012
3½ to 4	1.164	10½ to 11	1.025
4 to 4½	1.115	11 to 11½	1.038
4½ to 6	1.083	11½ to 12	1.052
5 to 5½	1.052	12 to 12½	1.065
5½ to 6	1.034	12½ to 13	1.093
6 to 6½	1.023	13 to 13½	1.096
6½ to 7	1.014	13½ to 14	1.110
7 to 7½	1.008	14 to 14½	1.127
7½ to 8	1.004	14½ to 15	1.147
8 to 8½	1.000	15 to 15½	1.164

To convert a record to its mature equivalent it is necessary only to multiply the fat production record by the age conversion factor for the

age at which the record was made. The product is the amount of fat that might be expected, on the average, of the cow tested at maturity and under similar conditions of feeding and management.

The use of a six months interval in the conversion factor has been criticised recently by Fohrman.¹⁴ He attempts to show the extent of the error by applying the conversion factor to a single arbitrary record and to the class leaders of the Jersey breed. It will be granted that there will be less individual variability if a monthly age conversion factor is used, and it may be of value to use a monthly interval up to three and one-half or four years when a comparison of one or two animals is to be made. When many animals are included in statistical studies of records the plus and minus deviations tend to be neutralized.

The use of great refinement of conversion factors may have a tendency to give a false appearance of great accuracy in its use to an individual record. Personally, the writer has grave doubt as to the justification of the use of a conversion factor to a single record. It is determined from the *average* change of production with age and its only justification is in its statistical use with numbers of records.

The use of initial records only in the determination of the relation between age and production from which conversion factors may be computed has little justification. If the first official record in fact does increase the cow's production during subsequent lactations, then a re-entry at maturity would include the amount caused by such development. The converted record based on a previous record should be the amount of milk or fat that might be expected, on the *average*, of the cow tested at maturity and under similar conditions of feeding and management. In other words, development by previous test is simply another factor in the full expression of the inheritance of the cow for fat production.

Converting 305-day Records to 365-day Records

The inauguration of the 305-day test in the Register of Merit makes it necessary to convert such records to a 365-day basis. If this is not done the complete ability of the cow is not expressed. Therefore, conversion factors for cows milked less than 365-days have been determined from data obtained in studies of the rate of decline of fat secretion of Guernsey cows during the course of the lactation period.⁴³ While such conversion factors are not entirely satisfactory in that they do not take into consideration the variation in the persistency of secretion of individual animals, it is believed to be better than to use the unconverted records. To exclude such records (the plan followed by Gowen²¹ of the Maine Station) would result in giving an advantage to sires which are producing daughters lacking in persistency of milk and fat secretion, whereas long con-

continued secretion is a character which should be encouraged. The conversion factor for 305-day tests, 1.15 gives remarkably accurate results when applied to the average 305-day Jersey records compared to the average 365-day record.*

A few records for one reason or another are not completed, but sufficient fat is produced for the cow to gain entrance to the Register of Merit. While some of these may have gone dry due to a lack of persistency of secretion and, therefore, should have had nothing added to their record, most of these short records are due to other causes and it is believed that one is justified in converting records over 180 days in length to a 365-day basis. Records which extended over 305-days and less than 365 days were not changed. The conversion factors used are presented in Table 4.

TABLE 4.—CONVERSION FACTOR FOR COWS MILKED LESS THAN 365-DAYS—FAT BASIS (Guernsey data)

Lactation Month	Days on test	Conversion factor
1	30	10.21
2	60	5.05
3	90	3.39
4	120	2.59
5	150	2.10
6	182	1.78
7	212	1.56
8	243	1.39
9	274	1.26
10	305	1.15
11	335	1.07
12	365	1.00

When a cow has more than one record, each record was converted to its mature equivalent 365-day record. Of these converted records, the largest one is thought to express best the animal's inherited producing ability. Therefore, only the largest converted record of each cow is used in this work.

*In a recent study by Copeland¹⁰ of 300 Jersey records, the following results were obtained:

No. of records	Production of cows during year	Ratio of 365-days Production to 305-days production
100	850 to 1141 lbs. fat	1.17
100	600 to 700 lbs. fat	1.15
100	400 to 500 lbs. fat	1.13
300		1.15

It will be noted that the factor for the high producers is slightly above 1.15 the factor used in this study and that of the low producers slightly below the average.

Comparison of Jersey Sires on Basis of Daughters' Production

One of the fundamental observations of genetics which will contribute greatly to practical breeding operations when its importance is realized, is an understanding of the reason why plants and animals do not always breed true to their appearance or performance. The appearance of an animal or the individual production record of a cow is, in itself, a poor index of the ability of the animal to reproduce animals of similar conformation or of similar producing ability. This has led to many disappointing results in breeding up dairy cattle.

The geneticist tests out the composition of the germ plasm of animals by examining the appearance and characters of the offspring. The dairy cattle breeder must follow the same practice if he desires to make the most rapid improvement either in conformation or production. The progeny test must be recognized as the greatest aid to the selection of breeding stock. With dairy cattle, the greater ease of securing a progeny test of sires as compared to the dams makes it possible to secure rapid improvement by the use of sires which have proven themselves capable of transmitting the desired characters to their progeny.

It is, therefore, of the greatest value to the breed to know as soon as possible the individual sires which have demonstrated by means of their daughters' fat production that they can transmit to a majority of their daughters the factors which enable them to be good producers. Such sires should be used for the upbuilding of the breed as long as they live.

Using methods already described, the average production of the daughters of all Jersey sires having 10 or more daughters in the Register of Merit has been determined and is presented in Table 5. The sires are listed alphabetically. The relative merit of the sires included is indicated by the percentage relation of each sire in comparison with the highest ranking sire. The year of birth of each sire is given to afford the reader some indication of the period during which the daughters were probably tested. This information should be correlated with the data on the change in average production of the Jersey cow during the past 25 years as shown in Table 1.

TABLE 5.—COMPARISON OF THE MATURE EQUIVALENT FAT PRODUCTION OF THE DAUGHTERS OF JERSEY SIREs AND OF THEIR DAMS

Percentage of highest sire's progeny performance (858)	Name and Number of Sire	Year of Birth	Number of yearly record daughters	Average mature equivalent fat (lbs.)	Daughters with mature equivalent records of					Number of pairs of dams and daughters compared	Average mature equivalent fat dams (lbs.)	Average mature equivalent fat daughters (lbs.)
					Under 400 lbs.	400 to 599 lbs.	600 to 799 lbs.	800 to 999 lbs.	Over 1000 lbs.			
72	Adelaide's Sultan 123005	1912	14	621	0	6	6	2	0	11	622	623
54	Aldan's Noble 89581	1909	10	460	2	8	0	0	0	10	539	460
61	Aldan's Lehigh 120836	1913	10	529	0	4	6	0	0	4	432	587
59	Altama Interest 98466	1910	20	505	2	16	2	0	0	18	535	494
64	Astor's Fairy Boy 113679	1913	15	547	0	12	2	1	0	4	500	623
55	Baronette's Golden Lad 67908	1904	13	476	1	11	1	0	0	2	444	424
51	Belvedere's Gamboge Majesty 97440	1909	13	491	2	10	1	0	0	7	529	470
58	Benedictine King 86100	1909	23	525	1	17	5	0	0	18	477	531
58	Benedictine's Plymouth Lad 91106	1910	10	501	0	8	2	0	0	7	562	519
52	Bermuda's Eminent 93798	1910	14	443	0	14	0	0	0	7	404	425
51	Biltmore's Torment 60761	1900	12	434	5	7	0	0	0	5	473	456
59	Blossom's Foxhall 82038	1908	10	503	1	7	2	0	0	3	477	506
56	Bluebell's Owl 79641	1906	14	482	3	10	1	0	0	3	471	505
67	Bonnetta's King 108980	1912	18	570	0	9	0	0	0	14	587	588
55	Brookwood Tormentor 141733	1915	10	568	0	7	3	0	0	6	628	509
66	Brown Lassie's Compass 71626	1905	16	468	2	14	0	0	0	5	516	469
59	Buttercup's Golden Lad 124256	1913	10	516	0	9	1	0	0	8	532	531
71	Buttercup's Oxford Eminent 140108	1914	10	612	0	6	4	0	0	5	568	617
80	Captain Hugo 72410	1905	11	513	0	10	1	0	0	2	440	506
63	Carry On of Ayredale 164012	1917	14	740	0	2	8	4	0	11	731	776
56	Champion of St. Cloud 70566	1914	11	478	0	11	0	0	0	0	0	0
69	Champion Torono's Son 104471	1910	16	588	1	9	6	0	0	13	615	590
53	Champion Torono's Son 11th 136233	1914	12	454	5	6	1	0	0	7	460	462
67	Chief Engineer 47148	1898	11	577	0	4	7	0	0	0	550	608
80	Chroma's Interested Duke 144111	1916	14	685	0	1	13	0	0	9	594	683
60	Cicero of S.B. 97904	1911	19	512	1	14	4	0	0	13	735	543
59	Combination of St. Savior's 88245	1904	16	507	2	8	6	0	0	2	555	535
75	Compounded Interested Prince Owl 137849	1914	14	640	0	7	5	2	0	5	627	695
72	Count's Foxy Lad of Waikiki 142808	1915	14	617	1	4	9	0	0	13	627	612

TABLE 5.—COMPARISON OF THE MATURE EQUIVALENT FAT PRODUCTION OF THE DAUGHTERS OF JERSEY SIRES AND OF THEIR DAMS (Continued)

Percentage of highest sire's progeny performance (858)	Name and Number of Sire	Year of Birth	Number of yearly record daughters	Average mature equivalent fat (lbs.)	Daughters with mature equivalent records of					Number of pairs of dams and daughters compared	Average mature equivalent fat dams (lbs.)	Average mature equivalent fat daughters (lbs.)
					Under 400 lbs.	400 to 599 lbs.	600 to 799 lbs.	800 to 999 lbs.	Over 1000 lbs.			
					64	Countess Bonny Lad 152269.....	1916	10	551			
80	College Farm Torono's Pogis 154199.....	1916	14	689	0	3	9	2	0	9	609	722
71	Creek Farm S Tormentor 139993.....	1915	10	612	0	6	4	0	0	10	552	597
71	Dairylike Majesty 198188.....	1915	81	610	0	40	39	2	0	6	528	617
86	Daisy's Golden Poppy 143372.....	1915	13	741	0	2	6	4	1	5	607	783
72	Darling's Interested Owl 123837.....	1913	15	623	0	7	6	2	0	7	539	660
67	Darling's Fancy Lad 134091.....	1914	12	578	0	8	4	0	0	8	558	561
68	Davis Majestic 122896.....	1914	13	583	0	8	5	0	0	7	497	611
53	Derry's Golden Jolly 82807.....	1902	13	458	3	9	1	0	0	1	376	386
55	Diploma's Bijou Boy 86292.....	1908	10	469	1	9	0	0	0	3	463	481
69	Dolly's Champion Knight 119967.....	1913	28	590	0	18	8	2	0	26	549	592
77	Dufrana's Poppy 164074.....	1917	11	658	0	4	6	1	0	5	606	662
59	Dulcet's Majesty 98230.....	1911	27	509	0	23	4	0	0	12	494	497
66	Ella's Majesty Oxford 99911.....	1911	13	565	1	8	4	0	0	1	384	708
56	Eminent 69631.....	1897	33	477	2	30	0	1	0	1	429	448
54	Eminent 6th 75752.....	1906	16	464	3	12	1	0	0	4	471	464
47	Eminent 10th 75753.....	1906	13	399	7	6	0	0	0	12	451	397
67	Eminent 19th 78620.....	1907	26	578	0	17	7	2	0	9	452	614
57	Eminent 25th 83638.....	1907	16	493	1	14	1	0	0	1	394	526
54	Eminent 2nd Fox 74177.....	1905	20	469	2	18	0	0	0	1	597	508
73	Eminent's Pilot 75364.....	1905	22	632	0	13	5	4	0	10	502	659
62	Eminent of St. Martin 73207.....	1906	18	530	1	13	4	0	0	4	420	558
64	Eminent's Fern King 110649.....	1912	15	547	1	10	4	0	0	5	587	613
61	Eminent's Raleigh 69011.....	1901	27	521	0	23	4	0	0	2	509	555
57	Eminent's Sensational King 107123.....	1911	11	492	0	10	1	0	0	1	835	502
64	Empress Lad of S. B. 77323.....	1906	11	549	2	6	3	0	0	---	---	---
73	Erdenheims Honor Bright 135355.....	1915	11	549	2	6	3	0	0	---	---	---
53	Eurybias Son 68790.....	1904	14	629	1	2	8	0	0	2	500	634
62	Ev-Ken of Dover 112708.....	1913	12	532	2	12	0	0	0	2	455	485
60	Fairview Jap 134386.....	1914	17	514	0	6	3	1	0	6	509	500
65	Fairy Glen's Raleigh 79438.....	1906	35	556	3	20	1	0	0	10	480	505
55	Fairy's Noble Boy 93378.....	1910	10	468	2	8	12	0	0	23	502	569
					3	8	0	0	0	6	514	473

67	Fancy's Pioneer P. S. 3195 H. C.	1909	10	584	0	6	3	1	0	1	651	681
54	Fancy's Red Flag 87222	1909	15	464	4	9	2	0	0	3	424	498
73	Fanny's Oxford Majesty 91781	1909	19	526	1	13	5	0	0	7	556	572
92	Favic's Prince 107961	1912	42	792	0	1	25	12	4	33	624	792
66	Feather's Raleigh 121428	1914	11	568	0	8	3	0	0	8	563	576
59	Fern's Lad of St. Martin 80126	1906	10	505	1	7	2	0	0	5	497	535
50	Fillmore's Foxglove 78878	1906	11	427	3	8	0	0	0	2	406	406
74	Financial Beauty's King 132904	1915	24	634	0	9	14	1	0	14	621	649
69	Financial Count 61316	1900	11	596	1	6	2	2	0	0		
63	Financial Countess Lad 86252	1908	27	544	0	20	7	0	0	10	567	564
69	Financial Fern Fontaine 132794	1914	13	592	0	4	9	0	0	10	597	596
68	Financial Fern Noble 113644	1912	21	583	0	14	7	0	0	16	616	596
63	Financial King's Eminent 94592	1910	27	543	3	18	5	1	0	4	381	501
68	Financial King's Stockwell 106574	1911	20	585	0	11	9	0	0	13	602	583
73	Financial Noble Count 132126	1915	20	626	0	7	13	0	0	12	556	616
66	Financial Raleigh 86298	1907	12	566	0	9	3	0	0	9	574	549
66	Financial Raleigh Grover 146595	1915	10	560	2	3	5	0	0	7	668	527
68	Financial Sensation 153793	1917	12	585	0	8	4	0	0	10	595	579
64	Financial Remus 104413	1910	13	552	0	10	3	0	0	6	555	513
71	Flora's Queen's Raleigh 130251	1914	27	607	0	14	12	1	0	26	581	610
64	Flying Fox's Eminent 78568	1907	12	551	1	9	2	0	0	10	452	574
58	Flying Fox's Victor 64768	1902	21	498	2	16	2	1	0	5	523	504
63	Fontaine's Caieat 81118	1907	18	531	2	10	6	0	0	11	530	524
64	Fontaine's Chieftain 97158	1907	32	562	5	16	10	1	0	14	479	612
61	Fontaine's Duke 61709	1901	11	524	0	8	3	0	0	7	631	535
60	Fontaine's Gamboge Knight 96186	1910	15	505	1	10	3	1	0	5	455	538
59	Fontaine's King 65641	1903	11	514	0	10	1	0	0	1	634	557
55	Fontaine's Lodestar 77305	1907	10	472	0	9	1	0	0	8	468	479
63	Fontaine's Raleigh 105374	1912	15	546	1	9	5	0	0	14	521	550
72	Forfarshire's King Dalton 95339	1908	13	530	2	7	3	1	0	6	533	604
63	Forfarshire's Love 124334	1911	11	612	0	5	6	0	0	6	556	640
67	Forfarshire's Noble Oxford 114886	1912	14	537	0	10	4	0	0	1	403	651
63	Foxhall's Champion 124108	1912	15	576	1	8	6	0	0	13	555	601
74	Foxhall's Fern Lad 99378	1910	10	636	0	4	4	2	0	5	579	640
66	Foxhall's Jubilee 76944	1905	25	567	0	17	8	0	0	15	531	554
52	Fox's Johnnie O'Dreamwold 68143	1903	13	443	5	8	0	0	0	3	418	445
53	Foxy's Brown Poet 82982	1907	16	458	3	13	0	0	0	10	465	468
60	Fussy's Fern Noble 129041	1913	10	516	0	10	0	0	0	6	524	522
72	Galway Fern Rioter 98284	1911	13	614	0	6	7	0	0	5	497	694
60	Gamboge Knight 95698	1903	52	514	4	39	9	0	0	5	488	542
77	Gamboge Knight's Fox 106160	1912	11	659	0	4	5	2	0	5	642	690
61	Gamboge Oxford Lad 62784	1903	25	520	4	16	4	1	0	8	486	528
85	Gamboge's Prince 105565	1911	27	731	1	3	15	7	1	4	561	643
70	Gamboge's Royal Heritage 126140	1913	14	598	0	9	4	1	0	1	507	681
65	Gamboge Vellum's Majesty 123063	1913	15	559	0	10	5	0	0	12	505	576
67	Garland's Majesty 147140	1915	14	571	0	11	2	1	0	8	475	578
67	Gedney Farm Girl's Oxford 75998	1907	39	577	1	26	10	2	0	31	504	589
69	Gedney Farm Napoleon Oxford 93795	1908	13	593	1	6	6	0	0	12	655	599
55	Gedney Farm Oxford Lad 71238	1900	24	473	2	20	2	0	0	2	550	483
62	General Cowslip P. S. 4743 H. C.	1905	18	538	1	14	3	0	0			
63	Gertie's Son's Boy 71825	1905	12	529	2	8	2	0	0	2	585	545

TABLE 5.—COMPARISON OF THE MATURE EQUIVALENT FAT PRODUCTION OF THE DAUGHTERS OF JERSEY SIREs AND OF THEIR DAMS (Continued)

Percentage of highest sire's progeny performance (858)	Name and Number of Sire	Year of Birth	Number of yearly record daughters	Average mature equivalent fat (lbs.)	Daughters with mature equivalent records of					Number of pairs of dams and daughters compared	Average mature equivalent fat dams (lbs.)	Average mature equivalent fat daughters (lbs.)
					Under 400 lbs.	400 to 599 lbs.	600 to 799 lbs.	800 to 999 lbs.	Over 1000 lbs.			
					56	Gertie's Sons Victor 123159	1912	23	484			
66	Gertie's Stoke Pogis 56492	1899	15	568	0	13	2	0	0	4	569	602
63	Gertrude's Jap 93947	1908	16	541	1	11	4	0	0	9	556	569
65	G. G. Chief of Ashburn 86044	1909	17	554	0	12	4	1	0	8	462	560
63	Glory's Noble 90655	1909	22	541	0	17	5	0	0	6	539	485
62	Golden Cicero 80272	1907	15	530	0	10	5	0	0	5	640	544
53	Golden Fern of Alden 114321	1911	11	452	1	10	0	0	0	2	540	498
63	Golden Fern of Linden 84011	1907	14	537	0	11	2	1	0	6	488	577
60	Golden Fern's Finance 104014	1912	13	518	0	12	1	0	0	---	---	---
73	Golden Fern's Noble Jr. 103786	1912	11	623	0	8	2	1	0	9	605	654
57	Golden Fern's Pilot 73492	1905	11	485	1	9	1	0	0	---	---	---
63	Golden Fern's Son 78687	1906	25	541	1	17	7	0	0	15	523	554
69	Golden Fern's Militiaman 147510	1915	14	593	0	9	5	0	0	13	535	599
69	Golden Glow's Chief 61460	1901	40	592	1	23	12	2	2	16	564	615
54	Golden Jolly's Masterpiece 86295	1905	18	466	2	15	1	0	0	6	469	510
53	Golden Jolly Oxford 116866	1913	15	454	2	13	0	0	0	7	539	554
66	Golden Lad of Summit 85396	1909	15	564	1	8	6	0	0	13	531	554
64	Golden Lily's Majesty 119596	1912	12	546	0	9	2	1	0	5	530	495
67	Golden Lucy's Eminent Lad 85639	1909	11	579	0	7	3	1	0	10	537	582
69	Golden Maid's Golden Fern 147475	1915	15	592	0	7	7	1	0	10	557	593
68	Golden Maid's Prince 94944	1910	10	584	0	7	3	0	0	3	488	626
56	Golden Maid's Viscount 113344	1911	11	492	0	11	0	0	0	4	466	446
61	Golden Spark of Montpelier 84576	1908	11	520	0	9	2	0	0	6	528	515
65	Golden Shylock 81862	1907	13	556	0	10	2	1	0	7	482	559
65	Golden Tycoon 104240	1911	30	555	1	21	7	1	0	10	513	550
65	Great Scot's Nobleman 125661	1914	18	564	0	12	6	0	0	11	537	569
61	Hawthorne's Prince 104887	1912	11	523	0	9	2	0	0	7	538	532
58	Hazel Fern Golden King 77872	1907	10	495	1	9	0	0	0	8	494	499
61	Hebron Victor 80100	1905	17	521	0	14	2	1	0	2	448	506
55	Hector Marigold 59121	1900	34	473	7	24	3	0	0	5	534	473
78	Heir of Crystal Springs 136987	1914	16	670	0	6	8	2	0	4	731	552
82	Hillside Torono 101729	1911	29	705	0	6	20	1	2	13	465	701

60	Hilltops' Happy Days 136444	1915	14	518	0	11	3	0	0	7	485	512
85	Holger 109744	1910	27	728	0	5	12	10	0	23	539	746
62	Hood Farm Figgis Torono 90517	1909	23	533	0	17	6	0	0	16	493	531
62	Hood Farm Pogis 9th 55552	1898	79	531	2	59	15	3	0	40	479	558
78	Hood Farm's Golden Fern's Lad 80437	1907	16	528	1	13	2	0	0	10	565	527
62	Hood Farm Torono 60326	1900	72	665	1	26	31	13	1	41	543	696
68	Hood Farm Torono 11th 78757	1907	14	534	2	8	4	0	0	4	465	582
55	Hood Farm Torono 20th 82854	1906	21	582	0	12	9	0	0	20	611	589
68	Hood Farm Torono 21st 83413	1908	14	471	1	12	1	0	0	7	403	474
81	Hood Farm Torono 35th 99265	1910	22	672	1	6	12	3	0	0	0	0
81	Hood Sophie's Tormentor 145709	1915	15	691	0	4	7	4	0	15	632	691
55	Ibsen's Glory 92986	1910	11	472	0	11	0	0	0	3	457	498
61	Idle Hour Blue Belle Prince 72292	1905	42	522	4	33	4	1	0	8	436	522
64	Illahee Stoke Pogis 79031	1910	10	553	0	7	2	1	0	7	460	496
67	Imported Champion Rower 167487	1908	17	579	1	9	6	1	0	1	589	640
69	Imported Blondes Golden Oxford 200863	1915	18	590	0	9	9	0	8	4	599	665
67	Imported Combination's Premier 150715	1910	31	572	1	18	11	1	0	5	564	567
58	Imported Cowslip's Golden Noble 120789	1909	26	496	5	19	2	0	0	6	500	446
67	Imported Fern's Oxford Noble 160983	1912	35	576	1	21	12	1	0	4	527	575
65	Imported Gamboge's Royal Majesty 149864	1909	17	558	0	12	4	1	0	6	627	617
63	Imported Golden Fern's Noble 145762	1909	65	537	3	42	20	0	0	18	620	548
58	Imported Golden Maid's Prince 93538	1900	42	497	6	33	3	0	0	1	380	408
61	Imp. Hauteville Fairy Boy 90952	1909	27	523	1	20	6	0	0	8	455	520
55	Imp. King of Hamble 65298	1901	19	472	1	16	2	0	0	6	469	495
63	Imported Oxford Majesty 134090	1906	48	540	3	32	12	1	0	4	474	536
81	Imported Oxford Majesty 2nd 152182	1915	13	698	0	1	11	1	0	11	533	706
63	Imported Oxford You'll Do 111860	1906	83	542	9	50	21	3	0	9	494	588
68	Imported Ramsgate Champion 93534	1908	16	585	0	10	6	0	0	7	513	533
53	Imported Stockwell 75264	1903	11	455	2	9	0	0	0	1	585	375
65	Interested Prince 58224	1899	46	557	1	30	14	1	0	29	529	563
67	Interested Prince 2nd 95708	1910	31	573	1	20	9	1	0	29	623	572
59	Interested Prince's Owl 98117	1911	30	505	0	26	4	0	0	19	496	504
64	Interested Veda's Prince 122951	1913	24	551	1	18	4	1	0	13	495	562
65	Irene's King Pogis 73182	1905	62	559	2	39	18	3	0	42	504	559
54	Island Lodestar 67638	1904	11	467	1	10	0	0	0	9	512	462
60	Ixia's Fancy Sultan 126788	1914	20	515	0	17	3	0	0	12	477	507
59	Ixia's Noble Raleigh 102596	1911	13	505	1	11	3	0	0	11	473	501
68	Jacoba's Emanan 84177	1908	11	582	0	7	4	0	0	9	623	573
64	Jacoba's Porterville King 125053	1913	13	554	0	10	3	0	0	10	650	557
61	Jacoba's Premier 89296	1909	14	521	1	10	3	0	0	5	562	557
69	Jacoba's Farm Boy 169934	1918	10	599	0	6	4	0	0	9	497	639
71	Jap's Sayda's Baron 142559	1915	11	609	0	4	7	0	0	12	468	482
58	Jessie's Fairy Lad 112740	1912	15	494	0	15	0	0	0	9	456	445
53	Jersey Crest Stockwell 133279	1915	10	452	3	7	0	0	0	1	404	395
49	Jubilee Foxhall 82299	1908	10	419	4	6	0	0	0	4	527	478
56	Jubille of Bois D'Arc 29041	1891	13	482	2	10	1	0	0	6	529	505
59	Karnak's Jap 84363	1908	11	510	1	9	0	1	0	23	548	533
61	Karnak's Noble 87952	1908	28	526	1	22	5	0	0	12	466	547
64	Keepsake's Golden Lad 71325	1904	14	546	0	13	1	0	0	8	504	501
54	King Fox 64667	1902	17	462	4	12	1	0	0	0	0	0
59	King Melia Ann of Albany 96033	1909	17	510	1	14	2	0	0	0	0	0

TABLE 5.—COMPARISON OF THE MATURE EQUIVALENT FAT PRODUCTION OF THE DAUGHTERS OF JERSEY SIREs AND OF THEIR DAMS (Continued)

Percentage of highest sire's progeny performance (858)	Name and Number of Sire	Year of Birth	Number of yearly record daughters	Average mature equivalent fat (lbs.)	Daughters with mature equivalent records of					Number of pairs of dams and daughters compared	Average mature equivalent fat dams (lbs.)	Average mature equivalent fat daughters (lbs.)
					Under 400 lbs.	400 to 599 lbs.	600 to 799 lbs.	800 to 999 lbs.	Over 1000 lbs.			
					61	King Melia Ann of Darby 102375	1911	11	524			
54	King Sappho King 65262	1902	25	461	5	18	2	0	0	5	440	426
51	Lad's Pogis of Hickory Lawn 108050	1912	14	440	4	10	0	0	0	3	470	436
56	Lady Letty 4th's Rioter 76533	1906	10	481	0	10	0	0	0	2	435	468
59	Lady Letty's Eminent 82309	1908	40	508	4	31	4	1	0	24	464	506
67	Lady Letty's Victor 65020	1902	41	573	1	25	15	0	0	25	531	592
60	Latoma's Golden Topper 84170	1908	10	513	0	9	1	0	0	5	455	486
70	Lass 89th of Hood Farm's Son 165860	1917	13	606	0	8	5	0	0	9	639	611
67	La Creole's Cicero's Chief 161236	1917	11	577	0	8	3	0	0	7	510	606
53	Le Cotil's Raleigh 120688	1912	14	452	1	13	0	0	0	7	486	439
60	Leda's King 96707	1911	17	519	1	14	1	1	0	11	530	504
68	Le Gros 102789	1911	21	581	0	12	8	1	0	13	551	603
70	Leo of Smith Farm 80490	1907	11	602	0	6	5	0	0	1	486	616
62	Lime Ridge Lass 30th's Pogis 107192	1912	17	536	0	15	2	0	0	16	528	500
56	Lookout Prince 115074	1913	27	480	3	21	3	0	0	24	424	487
56	Lookout Torono 78593	1906	31	483	6	21	3	1	0	24	442	455
59	Loretta's King 65050	1902	59	512	4	45	9	0	1	27	473	553
53	Loretta's D's Champion's Son 77002	1906	16	451	4	12	0	0	0	11	421	447
55	Loretta's King of Friendship 76500	1906	10	473	1	8	1	0	0	2	509	507
65	Lorna's Altana's Interest 108420	1912	14	565	0	10	4	0	0	7	473	589
66	Lou 2nd of Hood Farm's Torono 122663	1913	12	570	0	8	4	0	0	2	446	644
69	Lou's Torono 106614	1912	15	590	0	11	4	0	0	10	589	587
75	Lucille's Owl 148563	1915	10	642	0	3	6	1	0	1	503	614
75	Lucy's Interested Owl 158742	1916	15	646	0	7	6	2	0	11	528	664
58	Lucy's Prince P. S. 3939 H. C.	1910	10	495	0	9	1	0	0	1	415	426
72	Lucky Fern 126758	1914	13	525	0	6	7	0	0	10	552	641
62	Lulu's Ashburn Chief 126214	1914	12	535	0	9	3	0	0	6	444	532
57	Mabel's Poet 65780	1899	15	490	0	13	2	0	0	5	516	542
57	Mabel's Poet's Sultan 77854	1907	10	489	0	9	1	0	0	3	491	554
59	Mabel's Raleigh 77913	1907	14	505	2	10	2	0	0	5	529	535
57	Mabel's Raleigh P. S. 3722 H.C.	1917	17	492	0	16	1	0	0	3	474	571
66	Maestic Fern 84428	1908	27	563	0	18	9	0	0	12	521	557

66	Majesty's Gamboe Lad 119409	1913	12	570	1	6	5	0	0	12	570	570
59	Majesty's Intense 127191	1914	10	508	0	9	1	0	0	8	482	524
65	Majesty's Oxford Fox 134214	1915	18	557	1	11	6	0	0	16	514	562
76	Majesty's Heir Apparent 168268	1918	10	653	0	1	0	0	0	9	643	657
70	Majesty's Poet 84337	1909	10	602	0	5	5	0	1			
73	Majesty's Star 104594	1911	17	629	0	8	8	1	0	7	466	571
64	Majesty's Western King 113111	1909	16	545	1	9	6	0	0	5	477	547
55	Majesty's Wonder 90717	1909	15	470	2	12	1	0	0	5	452	469
59	Mansfield Noble Major 147149	1916	10	510	0	10	0	0	0	10	470	510
66	Maplewood's Interested Owl 151916	1916	11	573	0	6	5	0	0	1	689	649
66	Marguerite's Premier 137370	1915	18	577	0	11	7	0	0	10	528	580
60	Marigold's Exile King 63232	1901	14	512	0	11	3	0	0	10	524	513
59	Marigold's Jap 100085	1910	12	502	1	9	2	0	0	3	385	504
74	Marine's Lad 129781	1914	11	634	0	5	5	1	0	3	553	577
66	Marston's Interested Prince 71855	1905	11	571	0	7	4	0	0	11	511	571
59	Martha Bluebell's Odello 102298	1910	17	502	1	14	2	0	0	11	511	571
58	Master Fox 80051	1908	12	497	0	12	0	0	0	11	448	513
82	Matilda's Interested Owl 121648	1913	13	706	0	1	11	1	0			
60	Maud's Melia Rioter 75751	1906	18	516	1	14	3	0	0	11	570	700
76	McKay's Lad 104234	1911	12	663	0	6	2	4	0	7	445	550
59	Meridale's Interested Duke 111310	1911	13	509	1	11	1	4	0	5	602	695
74	Meridale Oxford Owl 118444	1913	13	633	0	5	8	0	0	10	448	526
80	Meridale Prince Darling 135643	1914	27	683	0	0	10	0	0	11	697	639
75	Meridale Sayda's Baron 132139	1914	11	643	0	4	13	3	1	21	537	654
59	Merry Maiden Prince 71597	1905	17	508	0	7	7	0	0	8	504	631
52	Minaret Exile 56933	1898	11	450	2	14	1	0	0	5	493	452
62	Mistletoe Pogis 75371	1906	10	530	0	9	1	0	0	10	524	451
52	Model's Oxford Lad 66518	1903	11	454	3	8	0	0	0	3	508	493
75	Model's Pilot of Waikaiki 152038	1916	18	640	0	8	9	1	0	6	540	465
63	Mona Rose's Glory 92531	1909	14	539	2	7	5	0	0	16	637	628
56	Mona's Eminent 84618	1908	13	484	3	7	3	0	0	9	585	573
56	Mona's Handsome Stockwell 90390	1909	14	488	1	12	1	0	0	3	381	554
67	Mon Plaisir's Majesty of F. 126484	1913	14	575	0	10	4	0	0	7	604	494
50	Morny Cannon's Bright Prince 107441	1910	12	427	4	8	0	0	0	13	584	574
77	Morocco's Pioneer 105679	1911	31	662	0	4	0	0	0	11	462	430
49	Mr. Inez Marigold Pedro 79701	1907	16	424	4	10	17	4	0	22	604	670
52	Naiad's Golden Lad 674775	1903	11	449	0	12	0	0	0	8	389	436
63	Nettina's Meridale Prince 114174	1912	19	542	1	11	0	0	0	3	450	451
70	Noble Duke of Oaklands 89682	1909	14	601	0	13	5	0	0	10	482	512
58	Nobleman of St. Cloud 76091	1907	17	501	3	8	5	1	0	4	530	630
54	Noble of Oaklands 95700	1905	44	464	7	12	2	0	0	4	472	478
66	Noble Lad You'll Do 169249	1918	11	563	0	32	5	0	0	8	518	443
68	Noble Peer 90653	1909	10	581	1	7	4	0	0	10	520	570
70	Noble's Aristocratic Boy 101939	1911	21	600	0	6	2	1	0	4	630	660
77	Noble's Sensational Lad 118536	1913	20	657	0	13	7	1	0	8	486	587
68	Noble's Fawn Prince 95705	1910	13	580	0	7	11	2	0	17	579	638
62	Noble's Jolly Sultan 97181	1907	27	529	1	19	5	0	0	2	571	608
59	Noble's Oxford Sultan 106403	1911	17	503	0	15	7	0	0	2	521	395
67	Noble's Raleigh 82757	1908	15	572	0	8	2	0	0	10	420	506
54	Noble Sultan 106673	1911	13	467	3	10	7	0	0	6	661	627
62	Nursie's Majesty 149002	1915	20	531	1	16	3	0	0	7	425	475
										16	484	542

TABLE 5.—COMPARISON OF THE MATURE EQUIVALENT FAT PRODUCTION OF THE DAUGHTERS OF JERSEY SIREs AND OF THEIR DAMS (Continued)

Percentage of highest sire's progeny performance (858)	Name and Number of Sire	Year of Birth	Number of yearly record daughters	Average mature equivalent fat (lbs.)	Daughters with mature equivalent records of					Number of pairs of dams and daughters compared	Average mature equivalent fat dams (lbs.)	Average mature equivalent fat daughters (lbs.)
					Under 400 lbs.	400 to 599 lbs.	600 to 799 lbs.	800 to 999 lbs.	Over 1000 lbs.			
					69	Oakwood D's Fox 126834	1913	24	592			
64	Octavia's Duke 102270	1910	13	551	0	10	3	0	0	12	531	555
64	Oise's Noble 95164	1910	10	550	1	6	3	0	0	5	467	606
52	Oonan Count 57470	1899	19	442	4	15	0	0	0	8	442	467
57	Oonan's 23rd Grandson 74887	1906	14	490	2	10	2	0	0	7	612	518
68	Ophelia's Challenger 120468	1913	15	586	0	8	6	1	0	13	520	605
63	Owl's Oxford Interest 121457	1913	18	544	0	15	3	0	0	18	508	544
85	Owl Interest Temistian 155070	1916	21	728	0	3	12	6	0	15	710	762
64	Owl of Belleview 106305	1911	17	552	1	10	6	6	0	15	584	554
70	Oxford Daisy's Flying Fox 83284	1908	41	601	2	23	14	2	0	34	627	606
64	Oxford Duke of O'Dreamwold 126888	1913	13	549	0	10	3	0	0	8	472	528
58	Oxford Handsome Prince 83338	1908	12	500	0	11	1	0	0	4	564	499
56	Oxford He'll Do 97973	1910	10	483	0	10	0	0	0	1	657	473
72	Oxford Lad's Owl of D. H. 147267	1916	31	621	0	15	12	4	0	16	562	649
68	Oxford Lad's Progress 92916	1909	16	585	0	11	4	1	0	12	586	595
74	Oxford's Fairy Boy 92821	1910	11	631	0	5	4	2	0	8	623	620
63	Oxfordshire 63548	1902	12	541	0	9	3	0	0	11	594	576
73	Oxford's Nunthorpe Fox 126475	1912	11	627	1	2	7	1	0	2	528	507
56	Oxford Victory 83122	1908	10	483	0	10	0	0	0	4	557	589
71	Oxford You'll Do Junior 102269	1910	15	608	0	7	6	2	0	14	661	639
77	Plymouth Lad's Majesty 91107	1910	18	658	0	5	10	3	0	10	552	561
62	Plymuth's Hallowee'n Fox 102320	1911	16	532	2	9	5	0	0	12	572	623
75	Pogis 75th of Hood Farm 94501	1909	20	647	0	8	10	2	0	13	463	547
64	Pogis 94th of Hood Farm 90492	1910	16	547	2	9	5	0	0	14	611	679
77	Pogis 95th of Hood Farm 92620	1909	26	660	0	8	14	4	0	13	633	716
82	Pogis 99th of Hood Farm 94502	1909	104	701	1	29	45	25	4	101	566	614
72	Pogis 99th of Hood Farm 7th 118462	1913	17	614	1	4	12	0	0	17	593	744
83	Pogis 99th of Hood Farm 21st 133582	1914	16	714	0	5	6	5	0	12	546	628
70	Pogis 99th of Hood Farm 28th 138349	1915	13	602	0	6	7	0	0	7	590	639
74	Pogis 99th of Hood Farm 53rd 168456	1918	12	638	0	5	7	0	0	10	469	642
72	Pogis 99th of Hood Farm 57th 170476	1918	10	614	0	5	5	0	0	3	590	639
68	Pogis Noble Prince 125032	1914	10	582	0	6	3	0	0	2	663	493

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63	Pogis of Galiad 84397	1908	11	539	1	6	4	0	0	10	509	531
76	Poppy's George 150537	1915	16	650	0	7	7	2	0	4	616	714
77	Poppy's Maiden's Rosaire Lad 154477	1917	11	753	0	1	5	5	0	9	699	759
88	Poppy's St. Mawes 115434	1911	24	663	0	10	9	5	0	23	650	733
82	Poppy's St. Mawes Prince 126055	1911	11	703	0	4	4	2	1	8	595	707
60	Premier of Fairview 116508	1912	14	513	1	12	1	0	0	4	565	498
55	Pretty Maid's Figgis Fox O'D 89351	1909	16	473	5	10	1	0	0	4	446	512
63	Pride's Olga 3d's King 83683	1908	17	538	0	14	2	0	1	9	472	556
52	Pride's Olga Rosaire's Son 84768	1907	17	448	5	12	0	0	0	6	444	487
62	Prince Jonquil 85334	1908	11	535	1	8	2	0	0	8	498	519
59	Prince Mel Figgis 75071	1906	11	503	1	9	1	0	0	---	---	---
61	Prince of River Ridge 128249	1914	38	526	0	33	5	0	0	3	603	515
68	Queen's Raleigh 88322	1909	34	581	0	22	11	1	0	26	490	598
69	Queen's Raleigh's Aristocrat 108060	1912	11	590	0	7	4	0	0	2	720	692
70	Queen's Fairy Boy 108321	1912	13	601	0	7	6	0	0	3	521	572
68	Queen's St. L. Rioter Boy 138159	1914	12	582	1	6	5	0	0	12	543	582
63	Raleigh's Fairy Boy 83767	1905	54	542	5	35	13	1	0	19	542	573
65	Raleigh's Fairy Boy 4th 101482	1911	21	559	1	15	5	0	0	19	512	564
74	Raleigh's Fairy Boy 9th 113825	1913	15	635	0	9	5	1	0	8	693	663
62	Raleigh's Lookout Torono 136362	1914	15	535	0	11	4	0	0	15	424	535
56	Raleigh's Noble 90478	1910	13	482	3	8	2	0	0	5	455	523
62	Raleigh's Plymouth Noble 104107	1911	11	535	1	8	2	0	0	2	545	535
70	Raleigh's Poet 102464	1911	10	603	0	6	4	0	0	5	581	593
78	Raleigh's Torono 108456	1901	31	671	0	13	12	3	0	15	665	641
81	Rinda Lad of S. B. 89518	1909	48	695	1	16	17	10	4	35	581	736
56	Rioter B. K. Helma 66053	1902	11	481	2	7	2	0	0	---	---	---
61	Rioter Jersey Lad 58001	1898	24	521	0	20	4	0	0	10	477	539
70	Robert You'll Do 120790	1911	13	606	0	7	5	1	0	7	509	619
69	Rockwood Laddie 82915	1908	13	599	0	8	4	1	0	4	574	540
66	Rosaire's Fern Lad 98590	1910	15	564	1	8	6	0	0	7	503	623
77	Rosaire's Olga Lad 87498	1909	51	662	0	21	18	10	2	47	670	665
74	Rosebud's Fern Lad 70045	1904	11	635	0	5	5	1	0	1	406	590
62	Rose's King Banner 75839	1906	10	532	0	7	3	0	0	5	445	577
70	Rowena's Interested Fern 72009	1905	16	599	1	8	7	0	0	2	577	713
67	Royal Majesty 79313	1903	45	579	0	26	17	2	0	9	507	656
67	Royal Majesty of St. Cloud 89541	1909	83	573	3	52	22	5	1	41	516	595
59	Royal Majesty of Sunshine 143784	1916	21	504	2	19	0	0	0	6	424	504
61	Roycraft Eminent 103231	1911	24	525	0	20	4	0	0	16	504	562
58	Sayda's Heir 45360	1896	14	498	2	11	0	1	0	2	483	465
66	Sayda's Heir 3rd 74817	1902	62	565	1	35	25	1	0	36	532	581
86	Sayda's Oxford Owl 121234	1913	12	569	0	8	4	0	0	12	534	569
86	Sayda's King of Meridale 121724	1914	22	740	0	1	16	5	0	18	517	745
63	Salada's Lodestar 137337	1914	14	540	0	11	3	0	0	14	466	540
61	Sampson Exile 72702	1902	10	527	0	8	2	0	0	7	595	532
69	Sans Aloï 81012	1907	18	593	0	9	9	0	0	5	452	661
62	Sans Aloï Nieces King 146291	1915	13	532	1	8	4	0	0	10	492	523
67	Sans Pear of Sheomet 118282	1912	23	578	0	17	6	0	0	16	615	613
67	Saucom's Golden Prince 142483	1916	31	571	0	22	9	0	0	17	475	572
51	Scott's Champion 105387	1911	11	439	4	6	1	0	0	2	594	403
63	Sea Lad P. S. 4720 H. C.	1910	10	543	0	8	2	0	0	3	541	533
62	Sensational Fern 75024	1906	24	530	4	12	5	2	0	5	570	560

TABLE 5.—COMPARISON OF THE MATURE EQUIVALENT FAT PRODUCTION OF THE DAUGHTERS OF JERSEY SIRES AND OF THEIR DAMS (Continued)

Percentage of highest sire's progeny performance (858)	Name and Number of Sire	Year of Birth	Number of yearly record daughters	Average mature equivalent fat (lbs.)	Daughters with mature equivalent records of					Number of pairs of dams and daughters compared.	Average mature equivalent fat dams (lbs.)	Average mature equivalent fat daughters (lbs.)
					Under 400 lbs.	400 to 599 lbs.	600 to 799 lbs.	800 to 999 lbs.	Over 1000 lbs.			
					56	Sensational Fern 24th 104762	1911	10	482			
68	Shannon Raleigh 105825	1911	16	585	1	6	9	0	0	5	670	654
80	Sibley's Choice 83040	1907	23	690	1	7	8	7	0	18	634	693
71	Sibley's Interested Prince 108578	1911	16	613	1	8	6	1	0	12	540	618
86	Sibley's Interested Owl 134069	1914	10	740	0	1	6	3	0	9	654	737
75	Silver Chimes of S. B. 96021	1910	41	647	0	17	6	3	0	38	589	648
67	Sir Oxford's Majesty 105869	1912	13	579	0	11	2	0	0	13	490	540
65	Skamokawa Chief 124964	1913	21	560	0	16	5	0	0	3	590	560
82	Sophie 19th's Son 148887	1916	11	701	0	2	7	0	0	9	647	728
80	Sophie 19th's Tormentor 113302	1913	76	683	0	20	44	12	0	70	668	686
68	Sophie 19th's Tormentor 5th 144980	1916	20	582	0	14	5	1	0	12	455	607
69	Sophie 19th's Tormentor 7th 150813	1916	10	592	0	5	5	0	0	1	517	572
90	Sophie 19th's Tormentor 19th 160249	1917	17	772	0	1	10	5	1	8	636	778
76	Sophie's Adora's Son 143346	1915	14	655	0	5	8	1	0	14	690	655
71	Sophie's Climax 139809	1915	16	607	0	8	8	0	0	15	573	610
72	Sophie's Emblem 135038	1915	19	620	0	8	10	1	0	19	639	620
75	Sophie's Gilsland Tormentor 123534	1914	14	640	0	6	5	3	0	10	615	677
64	Sophie's Pogis 125595	1914	19	553	0	13	6	0	0	8	490	518
65	Sophie's Pogis B. 155856	1916	10	556	0	7	3	0	0	1	612	487
76	Sophie's Premier 111613	1912	29	653	2	9	12	6	0	18	574	620
74	Sophie's Torono 110518	1911	16	653	0	7	6	2	1	16	660	653
74	Sophie's Torono 4th 125234	1914	14	632	0	5	8	1	0	2	629	593
67	Sophie's Torono 23rd 167335	1918	16	634	0	6	9	1	0	7	560	632
74	Spermfield Owl 57088	1899	48	579	2	25	19	2	0	37	532	592
73	Spermfield Owl 2nd 93634	1909	27	629	0	9	17	1	0	24	523	639
79	Spermfield Owl's Progress 163331	1917	16	678	0	1	13	2	0	15	716	687
83	Spermfield's Prince Interest 95697	1910	49	709	0	7	33	9	0	45	634	718
55	Springvale Stoke Pogis 54779	1898	11	474	1	10	0	0	0	2	614	492
80	Sprite's Baron 161874	1917	15	684	0	4	9	2	0	10	514	683
75	St. Mawes 72053	1904	21	640	0	12	7	2	0	4	621	535
86	St. Mawes Golden Poppy 125510	1913	23	738	0	5	11	6	1	14	526	751
100	St. Mawes Lad 130501	1914	21	858	0	3	6	6	6	21	775	858

78	St. Mawes Noble 132488	1914	15	665	0	5	9	1	0	7	512	678
86	St. Mawes of Ashburn 115996	1913	22	741	0	5	11	4	2	17	600	785
60	St. Lambert of Winona 79567	1907	12	516	0	12	0	0	0	---	---	571
63	St. Omers Torono 81219	1906	41	543	2	28	11	0	0	12	456	571
67	Stockwell's Fern Laddie 104236	1911	11	571	0	7	4	0	0	10	586	586
55	Stockwell's Trinity Prince 79317	1906	17	471	3	14	0	0	0	2	478	498
59	Stoke Pogis of Prospect 29121	1890	10	593	1	5	2	2	0	---	---	---
67	Sultana's Fawn Prince 90064	1909	11	489	1	9	1	0	0	1	440	454
61	Sultana's Golden Jolly 86180	1908	21	521	0	17	4	0	0	5	511	557
62	Sultana's Jersey Lad 55391	1899	16	535	0	14	2	0	0	4	510	576
57	Sultana's Oxford Lad 76506	1907	10	492	3	4	3	0	0	6	527	486
71	Sultana's Virginia Lad 82703	1907	25	613	1	11	12	10	0	14	585	621
53	Sultana's Alice's Lad 116964	1912	11	455	1	10	0	0	0	2	450	415
53	Sultan of Oaklands 78475	1904	22	458	5	16	1	0	0	3	435	511
71	Sultan of Rockland 121150	1913	19	609	0	19	10	0	0	16	608	604
80	Susy's St. Mawes 135577	1915	10	683	0	3	6	1	0	10	688	683
76	Susy's St. Mawes Poppy 146965	1915	11	656	0	0	9	2	0	4	513	790
76	Sybil's Gamboge 174663	1914	48	650	1	18	23	5	1	8	523	684
60	Theda's Duke of Portage 41762	1894	10	515	0	9	1	0	0	---	---	---
68	The imported Cid 199361	1914	27	587	1	12	14	0	0	1	636	731
70	The Imported Jap 75265	1904	49	600	5	23	15	7	0	40	534	613
78	The Jap's Owl 138146	1914	11	667	0	3	6	2	0	10	601	653
70	The King of Cloverland 115137	1912	12	598	0	7	3	2	0	11	669	606
58	The Owl of Meridale 85853	1907	14	496	3	9	2	0	0	13	554	484
70	The Owl's Double Grandson 80314	1907	10	604	0	6	3	1	0	6	629	630
61	The Owl's Oxford Prince 85699	1905	15	520	1	12	2	0	0	7	512	537
63	The Plymouth Lad 89792	1905	16	543	0	11	5	0	0	4	468	588
53	The Warden 77015	1907	35	456	7	25	3	0	0	19	401	470
65	Thompson Farm Sans Aloï 132155	1913	12	559	0	9	3	0	0	7	459	557
81	Tiddlewinks Raleigh 158391	1917	16	694	0	5	7	4	0	10	523	700
53	Togo's Noble Lord 96421	1910	13	457	2	11	0	0	0	7	522	480
57	Tom You'll Do 113062	1913	20	490	2	17	1	0	0	9	487	515
65	Torono Pogis 78657	1907	28	559	1	19	6	2	0	26	559	561
56	Topsy's Fontaine Prince 95704	1910	10	479	1	9	0	0	0	3	458	469
57	Tormentor of Kawkawlin 42880	1894	16	490	0	14	2	0	0	3	504	503
60	Torono 25204	1890	17	516	0	13	4	0	0	---	---	---
68	Torono of Bath 115553	1912	19	587	1	9	7	2	0	11	542	614
83	Valentine's Ashburn Baronet 100044	1911	23	710	1	3	14	5	0	18	518	708
49	Valentine's Count 69878	1904	17	420	9	8	0	0	0	14	431	424
56	Valentine's Oonan 58076	1899	20	478	2	16	2	0	0	10	490	484
67	Vermont Owl 110939	1911	24	575	1	15	8	0	0	---	---	---
58	Viola's Bright Prince 97182	1907	10	501	1	8	1	0	0	---	---	---
66	Viola's Foxy Eminent 90972	1909	13	566	0	9	4	0	0	2	522	602
57	Viola's Golden Jolly 79314	1904	16	486	4	8	4	0	0	5	511	498
62	Viola's Golden Prince 111186	1912	34	536	2	25	7	0	0	23	444	544
72	Viola's Oxford Lad 89600	1910	14	616	1	6	5	2	0	11	461	609
54	Violet's Oakland Count 80974	1908	12	465	3	8	1	0	0	8	489	445
69	Village Knight 120791	1911	17	593	2	6	8	1	0	14	564	592
79	Washington Eminent Melian 124751	1912	14	678	0	6	5	3	0	8	470	716
72	Winnie Pedro's King 72947	1905	12	621	0	5	7	0	0	7	549	571
69	Xenia's Sultan 224118	1918	12	589	0	8	4	0	0	2	706	569

TABLE 5.—COMPARISON OF THE MATURE EQUIVALENT FAT PRODUCTION OF THE DAUGHTERS OF JERSEY SIREs AND OF THEIR DAMS (Continued)

Percentage of highest sire's progeny performance (858)	Name and Number of Sire	Year of Birth	Number of yearly record daughters	Average mature equivalent fat (lbs.)	Daughters with mature equivalent records of					Number of pairs of dams and daughters compared	Average mature equivalent fat dams (lbs.)	Average mature equivalent fat daughters (lbs.)
					Under 400 bs.	400 to 599 lbs.	600 to 799 lbs.	800 to 999 lbs.	Over 1000 lbs.			
					59	You'll Do Financial Warder 137540	1913	10	507			
64	You'll Do Oxford 98772	1910	19	550	0	13	6	0	0	15	568	596
68	You'll Do's Fontaine 150686	1913	11	581	0	7	4	0	0	1	472	484
61	You'll Do's Golden Noble 160958	1917	12	520	0	11	1	0	0	2	450	492

The Influence of the Number of Daughters on the Sire's Average

It would be expected that as the number of tested daughters of a sire increased, the greater would be the reliability of the average as indicating the transmitting ability of the sire. In this and preceding studies, 10 daughters has been taken as the minimum number for a sire to be considered. Recently Davidson¹⁹ presented a study of this problem using Register of Merit records. He concludes that "on the average, the first six tested daughters of a Jersey sire is the smallest number of tested daughters the average of whose production closely approximates the average production of the first fifteen tested daughters of the sire."

While the average of the first six daughters may be considered as a minimum number, there is still considerable variability and larger numbers of daughters are desirable especially when the average is used in comparisons of the production of sire's daughters with son's daughters to be made later in this study. However, after the number of daughters reaches 15 to 20 the addition of further daughters is not of as great importance as the probable error decreases as the square root of the number of daughters. The probable error of the average of a sire with 16 daughters is only twice as great as that of one with 64 daughters.

The Influence of the Minimum Entrance Requirements on the Sire Average

In the Register of Merit, the minimum entrance requirements cause the elimination of the daughters of sires which are incapable of meeting these production requirements. The effect on the sire's average is undesirable from a breeding standpoint. It is hoped that the time is not far distant when the full benefit of production tests will be secured by the elimination of all entrance requirements. It will mean the more rapid elimination of the poor sires. Under present conditions the average productions of the poor sires are artificially increased.

The effect of the requirements is apparent in the distribution of the daughters of the sires ranking high in Table 5, as compared to those of lower rank. The normal distribution of daughters when selection or elimination is not practiced should be symmetrical about the average. This difference is shown in the case of Fauvic's Prince and The Warden. The distribution of the 33 daughters of Fauvic's Prince which average 788 pounds of fat is as follows: None in the class under 400 pounds of fat, one in the 400 to 599 pound fat class, 18 in the 600 to 799 pound fat class, 12 in the 800 to 999 pound fat class, and 2 in the 1000 pound fat class. This distribution would indicate that the minimum entrance requirements had little effect on the entrance of the daughters of Fauvic's Prince into the Register of Merit.

The distribution of the daughters of The Warden, sire of 35 daughters averaging 456 pounds of fat, presents a contrasting picture. There are seven in the class under 400 pounds of fat, 25 in the 400 to 599 pound fat class, three in the 600 to 799 pound fat class and none in the other classes. In Fig. 2 is presented a graphic demonstration of the difference in the distribution of the daughters of the two sires. It indicates that, in the case of the daughters of The Warden, there was a considerable number which either failed to meet the requirements or were not tested, possibly because it was expected that they would be unable to meet the requirements. In all cases where there is a reasonably large number of daughters which do not show a normal distribution but are bunched in the lower classes, it indicates that the average mature equivalent production of the sire is higher than it should be.

The Relation of the Dam's Production to the Sire Average

The average fat production of a sire's daughters is influenced to a greater or less degree by the quality of the dams to which the sire is bred. As a detailed analysis of the data from this point of view will follow no further discussion is given here.

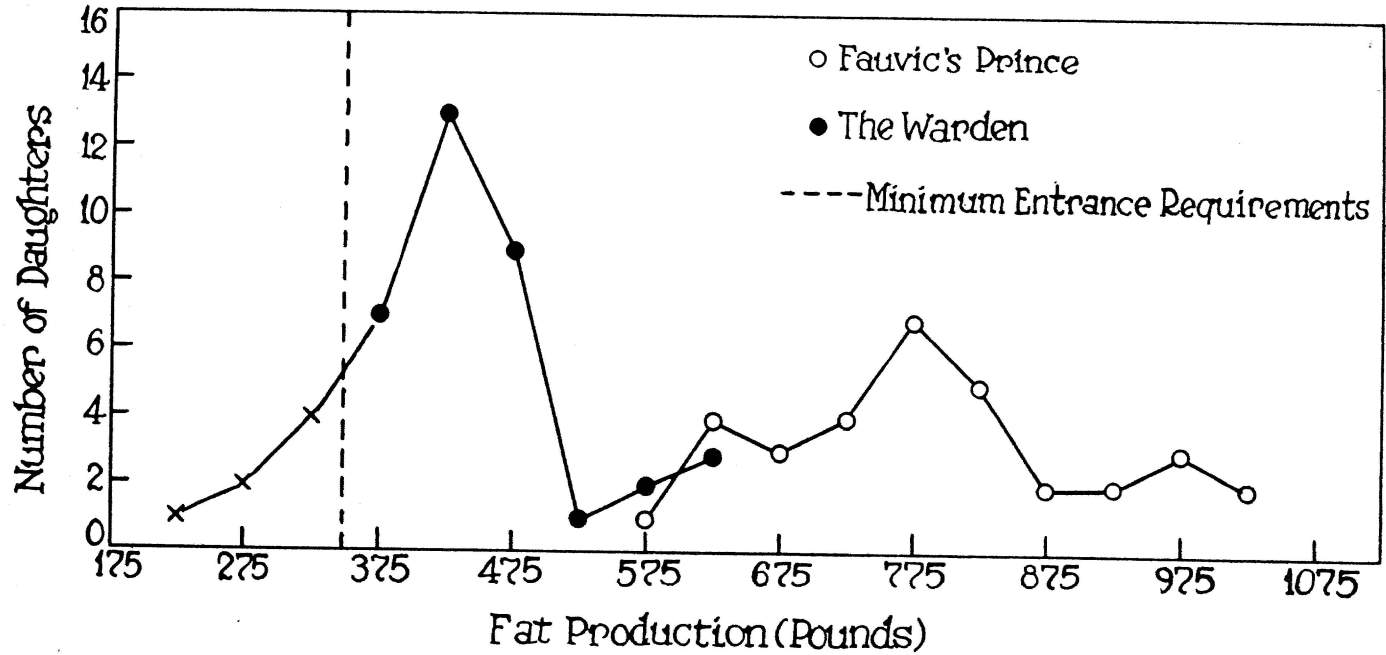


Fig. 2.—The influence of the minimum entrance requirements on the frequency distribution of the daughters of two sires is shown. It will be noted that the minimum entrance requirements had little effect on the one sire whereas in the case of the other there was a considerable number of cows which either failed to meet the requirements or were not tested.

PART I.—BREEDING FACTS AND BREEDING THEORY

Before discussing the facts of breeding developed by the analysis of Register of Merit data it is thought advisable to review briefly the results of previous work relating to the inheritance of milk and fat production. From these results and an understanding of the present knowledge of genetics and cytology, a theory will be advanced as to the mode of inheritance of milk and fat production. The results obtained in the study of Jersey Register of Merit data will then be analyzed in the light of the theory.

While the theory might more logically follow the discussion of the results, as it was formulated on the basis of this and other studies, the reader can best judge for himself the validity of the theory if presented in connection with the results obtained. It was decided to present the theory first and then the supporting evidence. It is important to distinguish between the facts and the theory.

Finally, it should be stated that the writer was hesitant in formulating a theory of the inheritance of milk and fat production based upon data which are recognized as being deficient in many ways. Further, the matings were uncontrolled and information of great genetic value furnished by critical crosses unavailable. On the other hand, a theory is of great value even though further research may prove it incorrect in that the data may be analyzed more critically and all possible observations bearing on the subject may be examined in the light of the theory.

Space will not permit more than a reference to the great mass of genetic and cytological facts being accumulated which indicate that the hypothetical factors, genes, or determiners of heredity are borne on the chromosomes.* The presence of these genes on the chromosomes determines the presence of the character in the adult animal. The "character" which is visible in a physical sense is the resultant of the presence and activity of a gene or genes in the cells of the developing organism and is not the gene or factor itself. Thus a "character" may be the resultant of one gene or of many genes acting together. On the other hand, a single gene may influence many characters.

The character which concerns us here is the lactation milk and fat secretion of the dairy cow. It is probably the resultant of many genes. Two of the most obvious elements affecting yearly fat production are the milk yield and the percentage of fat. The percentage content of the solids-not-fat in milk must also be considered in an analysis of the inheritance of the character which we term lactation milk and fat secretion.⁵⁶

In addition to the characters which are distinctly related to the mammary gland there are many characters which indirectly influence

*The reader is referred to T. H. Morgan's excellent monograph entitled "The Theory of the Gene," Yale Univ. Press.⁵¹

milk and fat secretion. Body size appears to influence maximum production.⁴⁶ Then there is the character of persistence of milk and fat secretion which may depend upon something in the nature of a hormone.⁴⁸ In other words, lactation milk production is the resultant of the harmonious functioning of many parts of the body. In speaking of "lactation fat production" as a character it is only for the sake of convenience of expression for it is believed to be the resultant of many characters, each of which in turn may be dependent upon one or more genes for its expression.

As the genes are carried on the chromosomes it is of interest to determine their number and distribution in the reproductive cells of the male and female. Two cytologists, Wodsedalek⁵⁴ and Masui,³⁰ have made studies of the chromosome number of cattle. While their counts are not in entire agreement, they will serve our purpose. Wodsedalek counted 38 chromosomes in the female and 37 in the male, while Masui found only 33 in the male. As the chromosomes are extremely minute, it is difficult to make accurate counts. The essential results, however, are similar in that both observers found a large number of chromosome pairs and an additional odd pair of chromosomes commonly called the X or sex chromosomes. It will be provisionally assumed that Wodsedalek's counts are correct. He found that the female was the result of the union of an egg containing 19 chromosomes one of which was an X or sex chromosome, and a sperm containing 19 chromosomes one of which was a sex chromosome also. The female, therefore, contains 36 chromosomes sometimes called autosomes and two sex chromosomes making a total of 38. The male is the result of a union of a sperm containing 18 chromosomes, and lacking an X or sex chromosome with an egg containing 18 chromosomes and a sex chromosome making a total of 37. In other words, both sexes contain the same number of autosomes (36), but the female also contains two sex chromosomes and the male one. Thus, the sperms are of two kinds, one-half of those produced will contain an X sex chromosome and will be female producing, the other half will lack a sex chromosome and will be male producing. This being true any gene carried on the sex chromosome X can be transmitted by the males to their daughters only and not to their sons. Such genes are called sex-linked genes. The relation of sex-linked genes to the transmission of the character for milk and fat production to male and female will be taken up later.

It is clear from the above discussion that the sire and dam contribute the same number of chromosomes to the female offspring and differ in their contribution of chromosomes to the male only in the sex chromosome X. Each pair of chromosomes (one of which comes from the male and one from the female) contains the same number of genes. Genes which

occupy corresponding positions on the chromosome pair and influence the same character are called "allelomorphs." Of the two genes called the allelomorphic pair, one comes from the male and the other from the female. If the pair of genes one of which comes from the sire and the other from the dam are of the same kind, the son or daughter is called pure for that particular factor. On the other hand, the genes may be different. In the latter case the result of their activity in the production of the character may be either a suppression of the activity of one gene and the expression of the other or both may become active and cause the production of a character intermediate between the characters produced by the genes when pure for the contrasting characters.

When one character is expressed and its allelomorph is suppressed, the former is called a *dominant* character and the latter is called a *recessive* character. When an intermediate character is produced, in addition to a lack of dominance, the results may be due to a blending inheritance caused by a series of genes all of which affect the same character.

The usual theory of multiple factors in blending inheritance assumes a lack of dominance and that each gene is equal to every other gene in its influence on the character affected. Shull²⁶, however, states that "the postulation of lack of dominance which has always been made the basis of the multiple factor interpretation of inheritance of size or of other blending characters is wholly unnecessary." He is also doubtful of the equality of the influence of the several genes in all cases.

Blending inheritance may, therefore, be assumed to be caused by genes of unequal influence, some of which may be dominant, others recessive, and some lacking dominance. The usual appearance of blending in the character would then be due to the fact that only rarely are all the genes present in the parental stock in a homozygous or pure form (either dominant or recessive).

A Theory of the Mode of Inheritance of Milk and Fat Secretion

In formulating the following hypothesis to explain the mechanism of the inheritance of milk and fat secretion the reader should keep clearly in mind that it is only a theory. Naturally the writer believes it best explains the facts derived from the study of cross-breeding and Advanced Registry data.

There are three parts to the theory:

(1) **Milk and fat secretion of the dairy cow is influenced by many genes.**—Yearly milk production is dependent upon the ability of the cow to consume large quantities of feed and to make the nutrients available to the secretory cells of the mammary gland. It is dependent upon a large mass of secretory tissue in the mammary glands and upon storage

space for the milk as it accumulates. It is dependent upon the rate of decline of milk secretion after maximum production is passed.

It will be noted that much depends upon body size and udder size. The inheritance of body size in rabbits and other animals studied has indicated a multiple factor, blending type. Castle⁵⁶ is of the opinion that there may be as many as 22 size factors concerned in the cross of Polish and Flemish rabbits. These rabbits, however, show a very wide variation in size, a much greater comparative variation than is found in dairy cattle, especially within a single breed.

The extreme variation in fat production in dairy cattle from about 100 pounds of fat up to 1200 pounds of fat is an exceptionally wide range and indicates that many genes are probably concerned. Any estimate of the number, however, is pure speculation at this time. Recently Wilson⁵³ suggested a theory of the inheritance of milk production in which four factors are postulated. This is a revision of his previous theory in which he interpreted milk production as being governed by a single pair of genes.⁵²

Von Patow⁵⁰ in Germany analyzed the records in a certain herd accumulated during a period of fifty years. When the records were brought to what he considered a comparable basis it was found that they formed a symmetrical frequency curve. (See table following.) Von Patow interpreted these results as indicating that milk production was governed by at least three pairs of genes. Although he is uncertain whether the genes lie on the same chromosome or not, he is of the opinion that they are not sex-linked genes. While von Patow does not follow the method suggested by Castle in estimating the number of genetic factors concerned in blending inheritance, the underlying idea is the same and is subject to the criticism pointed out by Shull.⁴¹ In conclusion all that may be safely said at the present time is that many genes are concerned in the inheritance of milk and fat production.

VARIATION IN MILK PRODUCTION BY CLASSES (Von Patow)

Milk Production Range of Product kg.	Milk Production Class Av. kg.	Actual Frequency No. of Cows	Normal Frequency Curve
3.95 to 5.25	4.60	6	4.9
5.25 to 6.55	5.90	26	29.6
6.55 to 7.85	7.20	69	74.1
7.85 to 9.15	8.50	107	98.8
9.15 to 10.45	9.80	70	74.1
10.45 to 11.75	11.10	24	29.6
11.75 to 13.05	12.40	8	4.9
		316	316.0

(2) **Many of the genes favoring high production are dominants.**—Because in certain types of multiple factor inheritance there appeared to be a lack of dominance displayed by the genes concerned, it has come to be more or less accepted as fact that in all types of multiple factor inheritance there is a lack of dominance. As Shull⁴¹ points out this is wholly unnecessary. Blending inheritance may be caused by genes some of which are dominant, others recessive, and yet other lacking dominance. In the case of milk and fat production the theory is advanced that while there may be some genes influencing this character which lack dominance the great majority display at least partial dominance.*

The following evidence is presented which points in that direction. A number of cross-breeding experiments of cattle of high milk production with cattle of lower milk production indicate the tendency. These experiments are summarized by Cole⁹ as follows:

"Gowen¹⁹ from a comparative study of four Angus cross-bred daughters with their dams, as well as from data taken from Advanced Registry records, concluded that high milk yield is dominant over low yield. This dominance is not complete, the yield of the crossbreds really being intermediate, but nearer to that of the high yielding line. This holds true also when high producers are bred to low—in each case the production of the daughters appears to be nearer to that of the higher parent. Similar results have been obtained in our Angus x Jersey cross-breeding experiments at Wisconsin and have been reported also by Castle, for the Bowlker Holstein-Friesian x Guernsey cross-bred herd and by

INHERITANCE OF MILK YIELD

	Holstein-Friesian x Guernsey	Red Danish x Jersey (1st 10 weeks)
	lb.	kg.
Pure-bred high parent.....	9475	895.7
Pure-bred low parent.....	5593	711.5
Cross-breds.....	8663	832.4
Difference between parent breeds.....	3882	184.2
Intermediate of parent breeds.....	7534	803.6
Excess of cross-breds over intermediate.....	1129	28.8
Percentage increase of cross-breds of interbreed difference	29	15

*The following pertinent quotation from Jones²⁷ is of extreme interest in this connection. "Partial dominance in qualitative characters is a normal occurrence. The consensus of opinion at the present time is that there may be, in reality, no cases of perfect dominance. In those cases in which the heterozygote cannot be distinguished from the pure dominant, it is assumed that the similarity is only apparent and not real. The heterozygote merely approaches the condition of the dominant type more or less closely. However much it may be true that perfect dominance rarely or never occurs, the fact and universality of partial dominance can hardly be denied.

"All the evidence at hand leads to a seemingly logical conclusion, one necessary to the conception of dominance as an explanation of heterosis, which is, that many factors in the 1n condition have more than one-half the effect that they have in the 2n condition."

Ellinger¹² in the cross of Red Danish with Jersey. It may be of interest to give the figures in the last two cases:

"It will be seen that the two cases are in substantial agreement, though the percentage excess yield of the cross-breds over the intermediate of the parent is nearly double in the Holstein-Friesian x Guernsey cows what it is in the Red Danish x Jersey cross."

While data from cross-breeding is of considerable interest in connection with our problem, it cannot be considered as critical proof of the partial dominance of the milk and fat secretion of the high producing parent. The first difficulty is the lack of a measure of the sire in the cross. It is hoped that the method later to be described will be of value in arriving at a measure of the potential transmitting ability of sires intended for such cross-breeding experiments in the future.

The second objection which may be raised to the assumption of dominance is that the increase in production of the cross-breds above the mid-parental production is due to heterosis. Castle⁸ the chief proponent of the heterosis theory states that "the zygote is not a mere summation of the factors contained in the two gametes, but that the cross-bred state itself is a source of metabolic energy in the zygote."

While it cannot be denied that the latter is possible, the dominant factor theory is in conformity with the modern concepts of genetics and appears to the writer the more rational explanation.

A third point that may be brought forward as an objection to the theory of dominance is that in a population the frequency distribution would be asymmetrical or seriously skewed such as is illustrated by the 3:1 ratio in simple dominance. On the contrary no such distribution is found. Where there is no selective elimination a fairly normal distribution usually occurs (See Tables 6 to 13). In advanced registry data, with

TABLE 6.—FREQUENCY DISTRIBUTION WITH 18 PAIRS OF DOMINANT FACTORS

Class	Distribution <i>per cent</i>	Calculated normal frequency distribution
1	0.56	1.09
2	3.35	3.52
3	9.48	8.50
4	16.86	15.31
5	21.07	20.54
5.54		21.42
6	19.67	20.76
7	14.21	15.68
8	8.45	8.96
9	4.16	3.80
10	1.60	1.20
11	0.46	0.29
12	0.10	0.05
13	0.02	0.01
	99.99	

minimum entrance requirements, the lower side is cut off in part and it is then more difficult to determine the type of distribution.

This appeared to be a serious objection to the theory of dominance. In order to determine the type of distribution curve of F_2 individuals when each gene shows dominance and when a number of genes influence the same character, the following study was made.

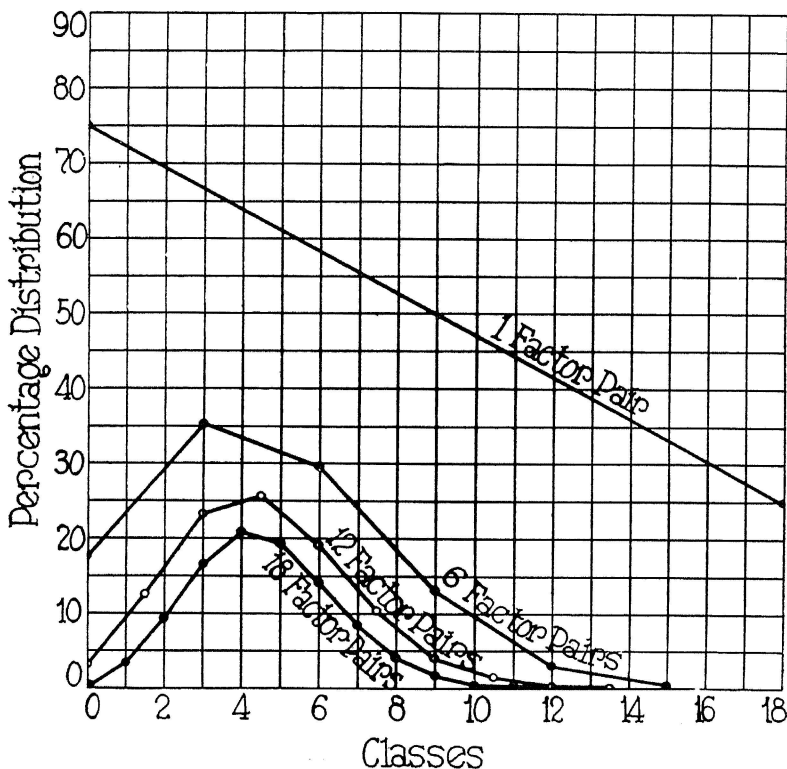


Fig. 3.—The figure shows the gradual change in the frequency distribution of a population as the number of independent dominant factor pairs increases in multiple factor inheritance. It will be noted that as the number of factors exceeds six the curve assumes more and more the appearance of a normal distribution. The 18 factor pairs are especially interesting and significant as the dairy cow is believed to have 18 pairs of autosomes and consequently 18 independent linkage groups.

The formula devised by Jones²⁷ for determining the distribution into categories with different numbers of dominant factors present either in a homozygous or heterozygous condition was applied.

It was found that as the number of factor pairs was increased the frequency distribution assuming complete dominance, took on more and more the appearance of a normal frequency distribution. The percentage

frequency distributions for 1, 6, 12, and 18 factor pairs are presented in Fig. 3. The 18 factor pairs are especially interesting and significant as the dairy cow with 18 pairs of autosomes would have 18 possible independent linkage groups.

The percentage frequency distribution with 18 factor pairs was compared with a calculated normal frequency curve. The agreement is remarkably good as shown by Fig. 4 and Table 6.

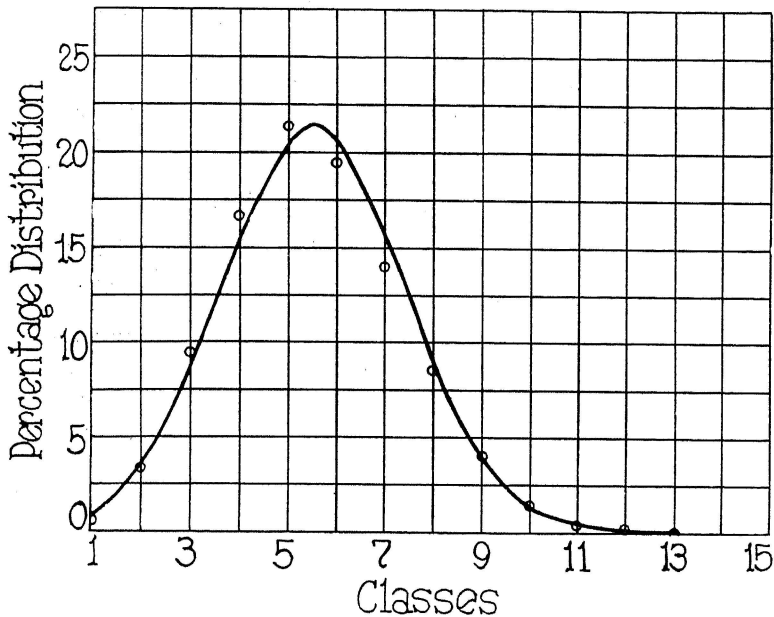


Fig. 4.—The comparison is made between the calculated frequency distribution (shown by the circles) with 18 dominant independent factor pairs and a normal frequency distribution (shown by the continuous line). It will be observed that while the calculated curve is slightly skewed it is so close to a normal distribution that under actual conditions the frequency distribution of cattle ranked according to their production would be quite similar either with or without dominance. Therefore, the symmetrical frequency distribution does not offer critical evidence for the absence of dominance of factors favoring high fat production.

It may be concluded that when it is assumed that there are 18 independent dominant factors concerned in milk and fat production, the frequency distribution of a cow population would be so nearly normal that it could not be distinguished from the frequency distribution which would be obtained where dominance is lacking. Therefore, the type of frequency distribution obtained does not alone offer critical evidence for either dominance or lack of dominance.

Wilson in formulating his theory previously mentioned makes the following statement: "We do not know whether the low yielding or the

high yielding factors are dominants or recessives, nor whether some of each kind may be dominants, some recessives; but since breeders have little difficulty in breeding low-yielders, but great difficulty in breeding high yielding cows, we shall assume that the high-yielding factors are the dominants."

Von Patow in analyzing and explaining the results obtained in the study of herd records assumes lack of dominance for he gives the double recessives ($aa = bb = cc = 0$) a value of 0, and the heterozygous genes ($Aa = Bb = Cc = 1$) a value of one each. In other words, it is assumed that the duplicate factors have cumulative effects as was postulated by Nilsson-Ehle in explaining the 63:1 F_2 ratio of red by white wheat.

If it were true that there is a lack of dominance and that duplicate genes have a cumulative effect, the production of the cow should give an excellent measure of her transmitting ability.

The comparison of the breeding results when it is assumed that there is a dominance or a lack of dominance will best illustrate the difference in the relation between production records and transmitting ability in the two types. The effect of a lack of dominance will be treated at this time while the breeding results obtained with dominance will be pointed out later in illustrating the theory of inheritance being advanced.

A simple trihybrid ($A = B = C = 125$ pounds of fat) will be used with their recessives ($a = b = c = 25$) following closely the values given later for the genes assuming dominance.

The genotypes and phenotypes of several cows will serve to illustrate the essential breeding facts where dominance is lacking.

Cow I. AABBCc would produce 750 pounds of fat. As she is homozygous she would produce similar eggs ABC. Her transmitting ability to her daughters would be 375 pounds of fat. Her progeny performance above that value would depend upon the sire to which she is mated. Thus if the eggs of the composition ABC were mated with sperm of the composition abc, the daughter AaBbCc would produce 450 pounds of fat.

Cow II. AABbCc would produce 550 pounds of fat. She would produce four kinds of eggs, ABC—375, ABc—275, AbC—275, Abc—175 with an average transmitting ability of 275 pounds of fat.

Cow III. AaBbCc would produce 450 pounds of fat. She would produce eight different combinations of eggs ABC—375, ABc—275, AbC—275, aBC—275, Abc—175, abC—175, aBc—175, abc—75. The average transmitting ability would be 225 pounds of fat.

Cow IV. aaBbCc would produce 350 pounds of fat. She would produce four kinds of eggs aBC—275, aBc—175, abC—175, abc—75 with an average transmitting ability of only 175 pounds of fat.

Cow V. aabbcc would produce 150 pounds of fat. She would produce only a single type of egg abc—75 pounds of fat.

The most striking fact brought out in the above comparison is the relation of the phenotype to the genotype. It will be noted that in each case the average transmitting ability of the dam is one-half her record of production.

It is of interest in this connection to compute the theoretical simple correlation coefficient of the parent and offspring (dam and daughter or sire and daughter) when the following assumptions are made: (1) No dominance, (2) Complete determination by heredity. (3) No correlation between dams, and (4) No correlation between sires and dams.

Let 0 = Daughters, 1 = Dams, and 2 = Sires

Then by assumption $r_{21} = 0$, $r_{12} = 0$, and $r_{0.12} = 1$

$$\Delta = \begin{vmatrix} 1 & r_{01} & r_{02} \\ r_{01} & 1 & 0 \\ r_{02} & 0 & 1 \end{vmatrix}$$

$$r^{20.12} = \beta_{01} r_{01} + \beta_{02} r_{02}$$

$$\text{Solving for the beta's } \beta_{01} = \frac{r_{01}}{1} \text{ and } \beta_{02} = \frac{r_{02}}{1}$$

Substituting:

$$r_{0.12} = \frac{\sqrt{r_{01}^2 - r_{02}^2}}{\sqrt{2} r_{01}} = 1 \text{ since } r_{01} = r_{02}$$

$$r_{01} = \frac{1}{\sqrt{2}} = 0.709$$

Under the above conditions, the simple correlation of either parent and offspring will be 0.709.

It is of considerable interest, therefore, to note the simple coefficient of correlation of the records of dams and daughters in the various breeds studied.

Holstein data (Gowen)²⁰ 611 pairs of dams and daughters for milk yield..... $r = 0.497 \pm 0.021$

Guernsey data (Gowen)²² 2928 pairs of dams and daughters for milk yield..... $r = 0.36 \pm 0.02$

Guernsey data (Turner)⁴⁷ 2279 pairs of dams and daughters for fat yield..... $r = 0.30$

Jersey data (Turner)⁴⁹ 3707 pairs of dams and daughters for fat yield..... $r = 0.346 \pm 0.011$

Ayrshire data (Gifford)¹⁶ 1033 pairs of dams and daughters for fat yield..... $= +0.25 \pm 0.02$

Red Poll data (Agar)¹ 96 pairs of dams and daughters for fat yield..... $r = +0.235 \pm 0.06$

By substituting other values in the equation $r_{0.12} = \sqrt{r^2_{01} - r^2_{02}} = 1$, it is relatively easy to determine the simple coefficient of correlation when instead of complete determination by inheritance 0.9, 0.8, etc., of the relation is so determined. The results are shown in the following table:

RELATION OF SIMPLE PARENT OFFSPRING CORRELATION TO COMPLETENESS OF DETERMINATION BY INHERITANCE

Determination by inheritance	Simple coef. of correlation
Complete	0.709
0.9	0.638
0.8	0.567
0.7	0.496
0.6	0.425
0.5	0.354
0.4	0.283
0.3	0.212

As would be expected, as the degree of determination by inheritance decreases, the simple correlation becomes less and less. It will be noted that with as low as 0.7 determination by inheritance, the correlation is about 0.5 and that 0.5 determination gives a simple correlation of 0.354.

Fohrman¹³ has recently reported an interesting study of advanced registry records to determine if possible the relative influence of inheritance and environment under average official test conditions. Correlations were made of the relation between the initial records grouped by 6 month age intervals with subsequent reentry records of the same cows. It is assumed that the variation of this correlation from plus one should measure the extent to which environment interferes with the complete expression of the inherited ability. The average coefficient of correlation of the Jersey records studied was +0.607.

If 0.6 represents the determination by inheritance then the simple correlation of dams and daughters would be +0.425 with the assumptions previously mentioned except complete determination by inheritance.

It is more difficult to determine the effect of the correlation between the dams and sires which appears to exist. In the Guernsey breed Gowen²² found this correlation to be $+0.342 \pm .019$ indicating that there is a tendency for breeders to mate the better dams with the better sires (based on progeny performance). The writer has found a similar correlation between the dams and sires in the Jersey breed. Such a correlation would have a tendency to increase the simple correlation between parent and offspring. A 0.35 sire-dam correlation would increase the dam and daughter correlation from 0.709 to approximately 0.8.

The simple correlation of dams with daughters does not take into consideration the influence of the sires. The method of partial correlation of three variables is suitable under these conditions.

The equation of partial correlation is as follows:

$$r_{0,1,2} = \frac{r_{10} - r_{20} r_{12}}{\sqrt{1 - r_{21}^2} \sqrt{1 - r_{20}^2}}$$

It is the coefficient of correlation of dams and daughters holding the sires constant. Substituting the values for *r* with the assumptions previously mentioned in the above equation, it will be found that the partial correlation coefficient of dams and daughters with the sires held constant is 0.5 The difference between simple and partial correlation cannot be too strongly emphasized. The writer pointed out the necessity of holding the sires constant in correlating the production of the dams and daughters in connection with a statistical analysis of the Guernsey Advanced Register.⁴⁷

Because the sire does not give milk, it is impossible to determine the dam and daughter correlation with the sire held constant by the usual methods. The progeny performance of the sire minus the daughter concerned gives an approximate value that may be used. For the Guernsey milk data Gowen²² recently found this value to be 0.25 ± 0.02 compared to $r = +0.36 \pm 0.02$. Thus there is a considerable difference between the theoretical partial correlation of dams and daughters of 0.5 and the actual partial correlation of 0.25 determined.

The writer is inclined to the opinion that the above difference in the parent offspring correlation is in part an indication of partial dominance.* Wright⁵⁵ in his study of the biometric relations between parent and offspring indicates the influence of dominance in such cases. The correlation between zygotic formulae with dominance and without dominance varies with the gametic ratio as follows:

TABLE 7
(After Wright)

Gametes		Correlation between zygotic formula with dominance and without dominance	Parent offspring partial correlation without dominance	Parent offspring with varying degrees of dominance
A	a			
9/10	1/10	0.426	0.5	0.213
3/4	1/4	0.632	0.5	0.316
1/2	1/2	0.817	0.5	0.409
1/4	3/4	0.926	0.5	0.463
1/10	9/10	0.970	0.5	0.485

*Factors mentioned in connection with simple correlation should also be considered.

It may be noted from the last column that with varying degrees of dominance, the parent offspring correlation may be expected to vary from 0.213 to 0.485 as the degree of partial dominance decreases. It will be further noted that the relation is inverse—the parent offspring correlation increases as the degree of dominance decreases. The above theoretical considerations as to the effect of dominance on the parent offspring correlation adds further weight to the theory of partial dominance in connection with the factors concerned with milk and fat secretion.

(3) **All genes do not have the same effect.**—As previously stated, the usual theory of multiple factors in blending inheritance assumes that each gene is equal to every other gene in its influence on the character affected. From the nature of the widely varying characters which in their summation we call “lactation milk and fat secretion” it seems improbable that all genes affecting all the associated characters would be equal.

It is interesting to note that in Wilson's theory it is assumed that the four dominant genes “produce individually 20, 15, 10, and 5 lbs. of milk collectively 50 lbs., and that the four corresponding recessives produce individually 4, 3, 2, and 1 lb. collectively 10 lbs. On this assumption there should be 16 grades of milk yield.”

While von Patow gives a uniform value to each gene as an illustration, he is of the opinion that all the genes are probably not of equal value.

Implications of the Theory

A definite example may make clear the mechanism of inheritance following the above hypothesis. It would be desirable to indicate the large number of genes which are probably concerned but when that is done, the possible combinations of genes in segregation becomes too great to handle in a limited space. If only 10 or 15 pairs of genes are considered, the possible number of combinations runs into the thousands.

To simplify the illustration a trihybrid will be used A, B, C and their recessives a, b, c bearing in mind that actually it is believed that many more genes are involved. Further, the genes favoring high production will all be considered as dominants although recognizing the possibility that some may be recessives, and some lacking dominance. The value in terms of butter fat assigned to each dominant gene and each recessive gene is quite arbitrary. It is clear that every cow in a natural condition must produce sufficient milk to raise her calf, if not she could not perpetuate herself. Therefore, a pure recessive cow a b c must produce sufficient milk to raise a calf. Further she should do this with her first calf at two years. With only three factors, it will be assumed that each gene ($a = b = c = 50$ lbs. of fat) will produce 50 pounds of fat or collectively 150 lbs. of fat. The three dominant genes will be assigned a value of 250 lbs.

each (A = B = C = 250 pounds of fat). It should again be pointed out that it is very probable that the genes are of unequal value. As the final result would be approximately the same, it will be easier in the example to use equal values.

With three pairs of genes there will be 27 different combinations. They are given in the accompanying table with the production assigned to each combination. The number of different combinations of genes in the eggs of each class of animals is also given. Thus where the pairs of genes are similar AA BB CC the eggs will all be similar ABC; where one pair of genes differ AA BB Cc there are two possible eggs produced A B C and A B c; where two pairs of genes are heterozygous AA Bb Cc there are four possible eggs produced, A B C, ABc, AbC, Abc; and where the three pairs of genes are heterozygous, Aa Bb Cc, there are 8 possible eggs produced, ABC, ABc, AbC, Abc, aBC, aBc, abC, abc.

TABLE 8.—THE NUMBER OF COMBINATIONS WITH THREE PAIRS OF GENES

Combination of genes	No. of combinations of eggs	Yearly fat production lbs.	Various kinds of eggs produced followed by fat production in lbs.
AA BB CC	(1)	750	ABC—750
AA BB Cc	(2)	750	ABC—750, ABc—550
AA BB cc	(1)	550	ABc—550
AA Bb CC	(2)	750	ABC—750, AbC—550
AA Bb Cc	(4)	750	ABC—750, ABc—550, AbC—550, Abc—350
AA bb CC	(1)	550	AbC—550
AA Bb cc	(2)	550	ABc—550, Abc—350
AA bb Cc	(2)	550	AbC—550, Abc—350
AA bb cc	(1)	350	Abc—350
Aa BB CC	(2)	750	ABC—750, aBC—550
Aa BB Cc	(4)	750	ABC—750, aBC—550, ABc—550, aBc—350
Aa Bb CC	(4)	750	ABC—750, aBc—550, AbC—550, abc
Aa BB cc	(2)	550	aBc—550, ABc—350
Aa Bb Cc	(8)	750	ABC—750, ABc—550, AbC—550, Abc—350 aBC—550, aBc—350, abC—350, abc—150
Aa Bb cc	(4)	550	ABc—550, Abc—350, aBc—350, abc—150
Aa bb CC	(2)	550	AbC—550, abC—350
Aa bb Cc	(4)	550	AbC—550, Abc—350, abC—350, abc—150
Aa bb cc	(2)	350	Abc—350, abc—150
aa BB CC	(1)	550	aBC—550
aa BB Cc	(2)	550	aBC—550, aBc—350
aa BB cc	(1)	350	aBc—350
aa Bb CC	(2)	550	aBC—550, abC—350
aa Bb Cc	(4)	550	aBC—550, aBc—350, abC—350, abc—150
aa Bb cc	(2)	350	aBc—350, abc—150
aa bb CC	(1)	350	abC—350
aa bb Cc	(2)	350	abC—350, abc—150
aa bb cc	(1)	150	abc—150
27	64		

Let us now study the production (the phenotype) and the transmitting ability (genotype) of a number of cows.

Cow I. AA BB CC would produce 750 pounds of fat. She would produce eggs all of which are similar, ABC. Her ability to transmit production to her daughters would be equal to her own production. No matter what the contribution of the sire may be, her daughters would be capable of producing at least 750 lbs. of fat. Thus if ABC from dam were mated with abc sire, the daughter Aa Bb Cc would be a producer of 750 pounds of fat. However, there is only one cow in 64 in the illustration which is able to do this, and with a larger number of genes the possibility of obtaining a homozygous dominant animal greatly decreases.

Cow II. AA Bb Cc would produce 750 pounds of fat. She would produce four kinds of eggs, ABC—750, ABc—550, AbC—550, Abc—350 with an average transmitting ability of only 550 pounds of fat. Her daughters' production would tend to average 550 pounds of fat. It may be more if the sires contributed one or more dominant genes to supplement the dam's contribution. This effect will be discussed later.

Cow III. Aa Bb Cc would also produce 750 pounds of fat. She would produce eight different combinations of eggs, ABC—750, ABc—550, AbC—550, Abc—350, aBC—550, aBc—350, abC—350, abc—150 with an average transmitting ability of only 450 pounds of fat. Under ordinary conditions the tendency is for cows to be heterozygous for many of the genes and approach the condition illustrated by this cow.

Cow IV. aa Bb Cc would produce 550 pounds of fat. She would produce four kinds of eggs, aBC—550, aBc—350, abC—350, abc—150 with an average transmitting ability of only 350 pounds of fat.

Cow V. aa bb cc would produce 150 pounds of fat. She would produce only one kind of egg abc. Therefore, her transmitting ability would be similar to her own production.

An examination of the table will show that of the 27 combinations of genes, only eight produce and transmit the same production. The average production indicated by this group is 550 whereas the average transmission to the 64 combinations of eggs would be only 450 pounds of fat.

From the standpoint of the breeder of dairy cattle, it is extremely important to determine the genotype of his cattle. The best method is to determine the transmitting ability or the performance of the progeny. The limited number of daughters of the average cow, however, practically eliminates the progeny performance test. The cow's own record of production or her phenotype has been used as a substitute. The preceding discussion indicates why the record of production may not be a good indication of her average transmitting ability. On the average, the record of production of a cow is considerably higher than her transmitting ability.

It is rather common observation that the exceptionally high producing cows seldom are transmitters of exceptional production. How

may this be explained in the light of the theory? Only when the cow is relatively pure or homozygous for the dominant genes can she transmit uniformly her own production. Occasionally such a cow may be produced. Far more often the exceptional producer is the result of a favorable combination of dominant heterozygous genes. For example, (ABcdEFg x abCDeFG = Aa BbCcDdEeFfGg.) Such a cow would be an exceptionally high producer but would on the average transmit production much inferior to her record when mated with average transmitting sires.

The Potential Transmitting Ability of the Sire Explained

As the sire does not produce milk, the only record of his transmitting ability is through the performance of his daughters. As already pointed out in the case of the cow the most common kind of sire would be of the composition AaBbCc. He would produce sperms with eight different combinations of factors or genes as follows:

ABC	—	ABc	—	AbC	—	Abc	—	aBC	—	aBc	—	abC	—	abc	Av. 450
750		550		550		350		550		350		350		150	lbs. fat

His *potential transmitting* ability to his daughters is 450 pounds of fat. His progeny performance will be equal to or greater than his potential transmitting ability depending upon the composition of the eggs with which the sperms are mated. If the sire is mated with a group of cows which are recessive for all factors concerned with milk secretion, the progeny will be equal to the sire's potential transmitting ability. This can be demonstrated by mating the eight possible combinations of sperms with recessive eggs, abc. In this case the daughter's average production would be 450 pounds of fat, similar to the sire's potential transmitting ability. It is important that all possible combinations of sperms from the sire be included to get his actual transmitting ability. Two or three daughters do not give a fair indication of the sire's worth. It also explains why considerable variation in the progeny performance should be expected even when the dams do not influence the daughters.

It is of interest to determine next the influence of dams which have one dominant factor upon the same sire's progeny performance. In this case the dominant character in the egg is effective when it is mated with its recessive allelomorph from the sperm and the progeny performance is increased. It appears from this that the only time when the dams can favorably influence their daughters' production is when they contribute one or more dominant allelomorphic genes to the sire's recessive genes. Or if one wishes to think of it from the standpoint of the dam, the only time the sire can cause an improvement over the dams to which he is bred is when he contributes one or more dominant genes to supplement recessive genes in the egg. If either the sire or dam is inferior in transmitting ability, the greater will be the apparent influence of the other parent. (See Table 9.)

In this study, because of the relative ease of determining the progeny performance of the sire, and thereby obtaining a rough measure of his transmitting ability, the sire has been given credit for that part of the daughter's production which might more correctly be considered to come jointly from the sire and dam due to the fact that both sire and dam may contribute like genes either one of which will serve the function of the other in so far as the daughter's productive ability is concerned.

TABLE 9.—INFLUENCE OF SPERM AND EGG UPON DAUGHTERS

Sperm	Egg	Daughter	Sperm	Egg	Daughter
ABC	+ abc	= AaBbCc	ABC	+ Abc	= AABbCc
ABc	+ abc	= AaBbcc	ABc	+ Abc	= AABbcc
AbC	+ abc	= AabbCc	AbC	+ Abc	= AAbbCc
Abc	+ abc	= Aabbcc	Abc	+ Abc	= AAbbcc
aBC	+ abc	= aaBbCc	aBC	+ Abc	= AaBbCc
aBc	+ abc	= aaBbcc	aBc	+ Abc	= AaBbcc
abC	+ abc	= aabbCc	abC	+ Abc	= AabbCc
abc	+ abc	= aabbcc	abc	+ Abc	= Aabbcc
450 av. fat,	150 av. fat,	450 av. fat	450 av. fat	350av. fat	550 av.fat

The dam is given full credit only for that part of the daughter's production which she individually increased over that of the sire's potential transmitting ability. This plan is followed because the dam's potential transmitting ability is difficult to determine and it is, therefore, extremely difficult to determine what part of the joint contribution is made by the dam.

This point may be made clear by the following illustration. If a sire furnished a sperm of the composition ABc and the dam an egg of the composition ABC, the daughter would be of the composition AABbCc. Her actual production would be the same as the contributions of both sire and dam. As the sire alone would have produced the same result the sire is credited with the daughter's production. In a second case the sire might furnish a sperm of the composition ABc and the dam an egg of the composition abC. As the dominant C would supplement the sire's contribution the daughter of the composition AaBbCc would be a better producer than the sire's potential transmitting ability and the dam would be given credit for the increase in the daughter's production above that of the sire's transmitting ability.

A further illustration of the relation between the sire's potential transmitting ability and the supplementing value of the dam's upon the daughter's average performance will aid in making clear the equation later to be formulated indicating this relationship. Let us take a sire of the genetic composition AABbCC, with a potential transmitting ability of 750 pounds of fat. If he is mated with each of the 64 eggs pro-

duced by the cows in Table 8, the progeny performance will be 750 pounds of fat. Thus even though the dam's average production was 550 pounds of fat, the supplementing value of the dam was zero. However, if a sire of the composition AaBBCC were used with a potential transmitting ability of 650 pounds of fat and mated to the same dams with an average fat production of 550 pounds of fat, the average progeny performance of the daughters would be 700 pounds of fat. In other words, the various dams averaging 550 pounds of fat have a supplementing value of 50 pounds of fat when mated with a sire having a potential transmitting value of 650 pounds of fat. This is equal to 9.1 per cent of her own record of production. In the following table the same data for sires of other genetic composition are presented.

TABLE 10.—RELATION BETWEEN SIRE'S GENETIC COMPOSITION AND THE SUPPLEMENTING VALUE OF THE DAM

Genetic composition of sires	Potential transmitting ability of sires	Av. Prod. of dams	Av. Progeny performance	Supplementing value of dams	Supplementing value of dams
	<i>lbs. fat</i>	<i>lbs. fat</i>	<i>lbs. fat</i>	<i>lbs. fat</i>	<i>%</i>
AABBCC	750	550	750	0	0
AaBBCC	650	550	700	50	9.1
AaBbCC	550	550	652	102	18.5
AaBbCc	450	550	597	147	27.7
AaBbcc	350	550	542	192	35.0
Aabbcc	250	550	500	250	45.5
aabbcc	150	550	450	300	54.5

As the potential transmitting ability of the sires for fat production declines, the supplementing value of the same dams increases. From this relation the following deductions may be made: (1) When the potential transmitting ability of the sire is similar to the average fat production of the dams, the supplementing value of the dams will be low. (2) When the potential transmitting ability of the sire is high and the average record of fat production of the dams is less than the potential of the sire, the supplementing value of the dams will be low. (3) when the potential transmitting ability of the sire is low and the average record of fat production of the dams becomes greater and greater, the supplementing value of the dams will be greater and greater.

The aim of breeders is to use a sire which it is hoped is better than the average production of the dam to which he will be mated. For that reason the average supplementing value of the dams, on the average, might be expected to be low. Such, in fact, is the case as will appear later.

It might further be pointed out that the sires considered in this study are a highly selected group of animals, only those with tested progeny being considered. Of this highly selected group only a few have

demonstrated their ability to sire daughters which will be above the average of the breed in fat production. It is, therefore, obvious that the statement that the sire and dam on the average contribute equally to their daughters, while true of unselected, untested animals, may not be true of highly selected sires which have shown by their progeny performance that their contribution is greater than that of dams which have been selected to a much less extent.

In the preceding discussion the relation between the dam's record of production and the daughter's record and the sire's potential transmitting ability was considered. It was shown that when the dam was heterozygous for the genes influencing large milk and fat secretion her record of production was a very poor index of her transmitting ability to her daughters.

The dam's contribution to her sons will be exactly the same as to her daughters because the same number of chromosomes are included in all eggs. The sire's contribution to his son's lacks one chromosome (the sex chromosome). If any of the genes concerned with large milk or fat secretion are carried on the sex chromosome, the only possibility of the son receiving that gene or genes is through the dam. While it is possible that a few of the genes influencing milk or fat secretion may be carried on the sex chromosome, there is no way of determining it definitely as the character is not expressed in the male.

On the other hand, the high degree of relationship shown by the sires' daughters and the sons' daughters indicates that many of the genes influencing high production are transmitted from sire to son and in turn from the son to his daughters.

Referring again to the sire heterozygous for the three postulated genes influencing milk secretion $AaBbCc$. He would produce in equal proportions sperms with eight different combinations of factors or genes.

ABC	ABc	AbC	Abc	aBC	aBc	abC	abc	Av. potential trans.
750	550	550	350	550	350	350	150	mitting ability 450
								lbs. fat.

If the son receives the factors ABC from his sire and abc from the dam the combination of factors $AaBbCc$ would be similar to that of the sire and the son would have a potential transmitting ability similar to his sire. In the following checker board, the eight combinations of factors from the sire are mated with the same combinations of factors from the dams. This indicates the possibilities for variation by such matings. While the average potential transmitting ability of the sons would be similar to the sire, there would be a considerable individual range. Only one out of 64 would be homozygous for the dominant characters. If 15 to 20 genes are concerned in fat secretion, the chances of a homozygous animal appearing are only one to several thousand or a million. There will, however, be a large number of animals that will approach

TABLE 11.—MATINGS OF SIRE AND DAM OF COMBINATION AaBbCc

Combinations of Sperms	Combination of Eggs							
	ABC 750 lbs. fat	ABc 550 lbs. fat	AbC 550 lbs. fat	aBC 550 lbs. fat	Abc 350 lbs. fat	aBc 350 lbs. fat	abC 350 lbs. fat	abc 150 lbs. fat
ABC 750 lbs. fat	AABBCC 750 lbs.	AABBCCc 750 lbs.	AABbCC 750 lbs.	AaBBCC 750 lbs.	AABbCc 750 lbs.	AaBBCCc 750 lbs.	AaBbCC 750 lbs.	AaBbCc 750 lbs.
ABc 550 lbs. fat	AABBCCc 750 lbs.	AABBcc 550 lbs.	AABbCc 750 lbs.	AaBBCCc 750 lbs.	AABbcc 550 lbs.	AaBBcc 550 lbs.	AaBbCc 750 lbs.	AaBbcc 550 lbs.
AbC 550 lbs. fat	AABbCC 750 lbs.	AABbCc 750 lbs.	AAbCc 550 lbs.	AaBbbCC 750 lbs.	AAbbCc 550 lbs.	AaBbCc 750 lbs.	AabbCC 550 lbs.	AabbCc 550 lbs.
aBC 550 lbs. fat	AaBBCC 750 lbs.	AaBBCCc 750 lbs.	AaBbCC 750 lbs.	aaBBCC 550 lbs.	AaBbCc 750 lbs.	aaBBCCc 550 lbs.	aaBbCC 550 lbs.	aaBbCc 550 lbs.
Abc 350 lbs. fat	AABbCc 750 lbs.	AABbcc 550 lbs.	AAbbCc 550 lbs.	AaBbCc 750 lbs.	AAbbcc 350 lbs.	AaBBcc 550 lbs.	AabbCc 550 lbs.	Aabbcc 350 lbs.
aBc 350 lbs. fat	AaBBCCc 750 lbs.	AaBBcc 550 lbs.	AaBbCc 750 lbs.	aaBBCCc 550 lbs.	AaBbcc 550 lbs.	aaBBcc 350 lbs.	aaBbCc 550 lbs.	aaBbcc 350 lbs.
abC 350 lbs. fat	AaBbCC 750 lbs.	AaBbCc 750 lbs.	AabbCC 550 lbs.	aaBbCC 550 lbs.	AabbCc 550 lbs.	aaBbCc 550 lbs.	aabbCC 350 lbs.	aabbCc 350 lbs.
abc 150 lbs. fat	AaBbCc 750 lbs.	AaBbcc 550 lbs.	AabbCc 550 lbs.	aaBbCc 550 lbs.	Aabbcc 350 lbs.	aaBbcc 350 lbs.	aabbCc 350 lbs.	aabbcc 150 lbs.

that condition more or less closely. The indication of homozygosity in a sire is the uniformity of production of his daughters and his granddaughter. In other words, progeny performance is fundamental to safe breeding operations.

Assuming that the general scheme of inheritance of fat secretion by the dairy cow is approximately as described above many of the results in breeding are easily understandable and may readily be explained. Knowing the underlying plan of inheritance breeders will be enabled to place emphasis on the points of greatest importance in the selection of breeding stock and yet realize that there is still much of chance in breeding that cannot be eliminated.

PART II. AN ANALYSIS OF PROGENY PERFORMANCE OF JERSEY SIRES AND DAMS

The importance of the progeny performance record as a genetic measure of transmitting ability has already been pointed out. In the case of dairy cattle, such a measure of the females is usually obtained, if obtained at all, too late to be of value. The sire with considerable service, may have a considerable number of tested progeny by the age of 5 or 6 years.

The principal criticism of the sire's progeny performance as a measure of the sire's transmitting ability has been the difficulty of the equitably evaluating the dam's contribution to her daughter's production. The following study was planned with the object of obtaining data which would throw light on the relation between the records of production of the dams and daughters and indirectly the influence of the dams upon the average progeny performance of the sires.

Production of Dams and Daughters Compared

The mature equivalent yearly fat record of the dam of each daughter in the previous study was determined wherever possible. In some cases the number of tested dams is low, but on the whole a large number of comparisons was found. (See Table 5.) The comparison of the dam's average mature equivalent fat production with the daughter's average fat production furnishes the information in regard to the phenotype of the dams to which the sire was mated. It is also indicative as to whether or not the daughters show an increased or decreased production in relation to their dams.

It has already been pointed out in connection with the study of Guernsey Advanced Registry³⁹ data that the sires which cause the greatest improvement in the average fat production of their daughters over that of their dams are not necessarily the best sires. Sires bred to low producing cows may cause a considerable increase in production of their daughters, whereas, the same sires bred to high producing cows may produce little, if any, increase and a possible decrease in production of their daughters. Yet if the two sires were bred to cows with similar average records, their daughter's average might be similar. Therefore, the net change in production of the dams and daughters of a sire used by Pearl, Gowen and Miner¹⁴ of the Maine Station, is in itself a poor index of the transmitting qualities of Jersey sires for production.

By determining the relation between the dams of various classes of production and their daughters' production, one is able to determine the average transmitting ability of the dams in relation to their actual production. If a sire were bred to a large number of dams of varying productive ability, the dam and daughter comparison would indicate the

influence of the dams, as the sire would be the same in each case. Unfortunately, the number of bulls having a large number of tested daughters and dams is limited. Where available such comparisons will be of value in indicating the of correlation between dams and daughters of individual sires. These comparisons are reserved for future study. For the present the entire population of dams and daughters will be analyzed statistically. There are two alternatives in such an analysis.

First, it is possible to determine the relation between the production of the dams and daughters irrespective of the sire's influence. Second, the relation between the dams and daughters of sires whose progeny performance is similar. The latter plan would tend to hold constant the influence of the sires (as far as such is possible) and the relationship indicated by the comparison would more nearly represent the relation between the dams' records of production and their transmitting ability to their daughters. Both methods are presented in Tables 12 to 19 inclusive.

In Table 12 is presented a dam and daughter comparison which includes the daughters of all Jersey sires studied. The distribution of the daughters' production by various classes of dams is shown in conjunction with their mean or average production. The quantitative relationship between the production of the dams and daughters is presented in two ways. The coefficient of correlation was found to be $0.346 \pm .011$. The regression slope was found to be practically the same 0.351. This relation would naturally follow when the standard deviation of the dams and of the daughters are quite similar. There are two objections to this method of determining the relation between the dam's record of production and her transmitting ability. The minimum entrance requirements exclude a significant number of the daughters as noted by the shape of the distribution curve. Where the daughters are all above the minimum entrance requirements as seen in tables 13 and 14, it will be noted that there is a bell-shaped distribution. If, however, there is an equal elimination of dams and daughters there may be no serious errors introduced by the minimum entrance requirement.

The second objection to the correlation of the entire population of dams and daughters is more serious. If all cows were bred to the same quality of sires (the sire held constant) a dam and daughter correlation would be satisfactory as the sire's influence on the daughters in all parts of the population would be the same. However, all sires are not similar. They vary greatly in potential transmitting ability. As shown in Tables 6 to 13, when average dams are bred to sires with the potential transmitting ability for low production the daughters are lower in production than their dams. When the dams and sires are about the average there will be little change in their daughter's production, and when the sires

TABLE 12.—DAM AND DAUGHTER COMPARISONS OF ALL JERSEY Sires

Fat Production Dams Lbs.	Pairs Dams and daughters	Av. Fat Production daughters Lbs.	Distribution of Daughters (Pounds Fat)															
			Under 400	400 449	450 499	500 549	550 599	600 649	650 699	700 749	750 799	800 849	850 899	900 949	950 999	1000 1049	1050 1099	1100 1149
Under 400	297	529	28	58	60	45	31	29	20	14	5	4		2			1	
400- 449	631	549	41	103	111	122	70	57	50	32	19	12	5	5	2	1		
450- 499	699	551	52	95	119	127	98	70	55	37	21	14	5	3	1	2		
500- 549	650	578	26	78	91	116	92	73	59	48	33	14	11	2	4	2		1
550- 599	437	603	9	22	44	94	74	55	51	40	24	10	10	5	1			
600- 649	315	600	9	18	41	49	55	47	24	30	11	13	6	4	6	1	1	
650- 699	241	620	7	16	24	34	46	27	20	16	20	14	10	5	2			
700- 749	175	639	3	5	21	19	28	23	24	18	11	10	5	3	2	2	1	
750- 799	93	639	2	6	7	7	10	14	12	6	7	11	5	2	2	1		
800- 849	74	661		4	9	8	6	10	6	10	6	7	4	2	2			
850- 899	48	740	1		4	3	3	5	5	8	4	3	1	2	3	2	3	1
900- 949	21	759	1		1	2	2		1	1	4	2		4	2		1	
950- 999	16	719		1			3	2	2	1	4			1	1	1		
1000-1049	2	625				1				1								
1049-1099	5	915				1							1			2		1
1000-1149	1	875											1					
1150-1199	2	525				2												
Total	3707		179	406	530	630	518	412	329	262	169	114	64	38	30	14	7	3

Percentage Distribution

Coefficient of correlation = .346 ± 0.011

Regression Slope = 0.351

TABLE 13.—JERSEY SIRES WHOSE DAUGHTERS AVERAGE OVER 700 POUNDS FAT

Ave. Fat Production Dams lbs.	Pairs Dams and Daughters	Ave. Fat Production Daughters lbs.	Distribution of Daughters																	
			Pounds Fat																	
			Under 400	400-449	450-499	500-549	550-599	600-649	650-699	700-749	750-799	800-849	850-899	900-949	950-999	1000-1049	1050-1099	1100-1149	1150-1199	1200-1249
388	9	696	0	0	1	1	0	1	1	2	2	0	0	1	0	0	0	0	---	
427	44	719	0	1	2	2	3	4	8	9	5	4	0	3	1	1	0	0	1	
479	43	673	1	0	2	5	6	6	4	8	4	3	2	0	1	1	0	0	---	
527	69	711	0	2	2	3	7	10	9	9	12	5	5	1	2	1	0	1	---	
571	51	712	1	1	1	3	4	5	7	7	9	5	4	3	1	0	0	0	---	
631	31	744	0	1	0	1	5	3	2	4	3	3	2	1	5	0	1	0	---	
674	38	746	0	0	1	2	2	5	4	4	6	6	3	3	2	0	0	0	---	
722	22	791	0	0	0	0	2	1	3	3	4	3	1	1	2	1	1	0	---	
779	24	804	0	0	1	1	1	2	1	0	3	6	3	2	2	1	0	0	---	
823	16	746	0	1	1	1	1	1	1	0	2	2	3	1	2	0	0	0	1	
877	14	872	0	0	0	0	0	0	1	3	2	2	0	1	2	1	1	1	0	
922	6	848	---	---	1	---	---	---	---	---	1	---	---	2	1	---	---	---	---	
952	3	969	---	---	---	---	---	---	---	---	---	---	---	1	1	---	---	---	---	
1058 Total	4 374	1016	2	6	12	19	31	38	41	49	53	39	24	19	23	9	4	3	1	
Percentage Distribution	---	---	.5	1.6	3.2	5.1	8.3	10.2	11.0	13.1	14.2	10.4	6.4	5.1	6.1	2.4	1.1	0.8	1.3	0.3

Coefficient of Correlation = .288 ± 0.038
 Regression Slope = 0.323

TABLE 14.—JERSEY SIREs WHOSE DAUGHTERS AVERAGE BETWEEN 650 AND 699 POUNDS FAT

Ave. Fat Production Dams lbs.	Pairs Dams and Daughters	Ave. Fat Production Daughters lbs.	Distribution of Daughters														
			(Pounds Fat)														
			Under 400	400 449	450 499	500 549	550 599	600 649	650 699	700 749	750 799	800 849	850 999	900 949	950 999	1000 1049	1050 1099
388	12	697	0	1	1	0	0	1	2	4	2	---	---	---	---	---	1
431	42	651	0	3	0	4	6	10	7	3	4	1	3	0	1	---	---
478	37	662	0	2	4	0	5	6	7	4	3	3	2	1	---	---	---
523	57	674	0	1	2	6	8	11	5	10	7	2	3	0	2	---	---
575	47	670	0	0	1	4	8	8	8	12	1	1	2	2	---	---	---
621	35	689	1	0	0	4	3	7	4	7	3	1	2	2	1	---	---
673	36	673	0	1	1	3	9	4	4	3	4	4	1	2	---	---	---
724	36	692	0	1	1	2	8	5	4	2	2	6	2	2	0	1	---
774	26	688	0	1	0	1	2	5	7	3	3	2	2	---	---	---	---
819	15	682	0	1	2	0	2	0	0	6	1	2	1	---	---	---	---
879	12	758	0	0	1	1	1	0	1	1	2	1	1	1	1	1	---
925	4	719	---	---	---	1	---	---	1	---	1	---	---	1	---	---	---
958	4	648	---	1	---	---	---	1	---	---	2	---	---	---	---	---	---
Total	363	---	1	12	13	26	52	58	50	55	35	23	19	11	5	2	1
Percentage Distribution			0.3	3.3	3.3	7.2	14.3	16.0	13.8	15.2	9.6	6.3	5.2	3.0	1.4	0.6	0.3

Coefficient of Correlation = 0.096 ± 0.035

Regression Slope = 0.097

TABLE 15.—JERSEY SIREs WHOSE DAUGHTERS AVERAGE BETWEEN 600 AND 649 POUNDS FAT

Ave. Fat Production Dams lbs.	Pairs Dams and Daugh- ters	Ave. Fat Production Daughters lbs.	Distribution of Daughters (Pounds Fat)														
			Un- der 400	400 449	450 499	500 549	550 599	600 649	650 699	700 749	750 799	800 849	850 899	900 949	950 999	1000 1049	1050 1099
386	24	613	0	1	4	2	5	6	0	2	1	3	---	---	---	---	---
424	67	580	2	9	7	16	11	2	7	4	4	3	1	1	---	---	---
476	102	614	2	3	7	19	18	12	21	8	5	5	1	1	---	---	---
524	90	604	1	7	10	12	19	14	6	12	3	4	1	1	---	---	---
575	73	645	0	1	4	14	9	11	11	6	10	4	3	---	---	---	---
625	73	625	0	4	6	9	13	14	8	9	3	5	1	1	---	---	---
673	55	631	1	2	7	6	10	7	6	4	6	1	5	---	---	---	---
718	45	611	12	2	5	8	5	6	8	4	3	1	2	---	---	---	---
771	16	627	1	1	1	1	3	4	1	1	1	2	---	---	---	---	---
820	19	673	0	0	0	3	1	5	4	2	0	3	0	1	---	---	---
876	9	708	---	---	---	2	1	2	2	---	---	---	---	---	---	---	2
925	5	792	---	---	---	---	1	---	---	1	2	---	---	---	---	---	---
953	2	743	---	---	---	---	---	---	1	---	1	---	---	---	---	---	---
1047	1	500	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---
1116	1	862	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---
Total	582	---	8	30	51	93	96	83	75	52	38	33	15	5	1	---	2
Percentage Distribution			1.4	5.2	8.8	16.0	16.5	14.3	12.9	8.9	6.5	5.7	2.6	0.9	0.2	---	0.3

Coefficient of correlation = 0.139 ± 0.021

Regression Slope = 0.091

TABLE 16.—JERSEY SIREs WHOSE DAUGHTERS AVERAGE BETWEEN 550 AND 599 POUNDS FAT

Ave. Fat Production Dams lbs.	Pairs Dams and Daughters	Ave. Fat Production Daughters lbs.	Distribution of Daughters (Pounds Fat)														
			Under 400	400 449	450 499	500 549	550 599	600 649	650 699	700 749	750 799	800 849	850 899	900 949	950 999	1000 1049	1050 1099
383	73	558	0	9	12	14	10	10	12	5	---	---	---	---	1	---	---
427	186	565	4	23	30	34	29	27	17	13	4	3	1	1	---	---	---
475	209	562	10	26	24	42	38	33	16	8	7	3	0	1	0	1	---
523	223	566	7	19	40	46	35	24	27	10	10	3	1	0	0	1	---
572	146	585	---	5	15	33	35	22	21	11	3	---	1	---	---	---	---
625	109	586	2	5	16	22	23	18	6	9	2	4	1	---	---	1	---
673	71	852	3	4	6	15	20	7	4	5	3	3	1	---	---	---	---
722	50	589	1	1	10	6	7	9	8	7	1	---	---	---	---	---	---
779	17	592	---	---	4	3	3	2	3	1	---	1	---	---	---	---	---
817	15	628	---	2	1	---	2	4	1	2	3	---	---	---	---	---	---
883	8	644	---	---	1	---	1	2	1	3	---	---	---	---	---	---	---
935	5	666	1	---	---	1	---	---	---	1	1	---	---	1	---	---	---
975	5	642	---	---	---	---	2	1	1	---	1	---	---	---	---	---	---
Total	1117	---	28	94	159	216	205	159	117	75	35	17	5	3	1	3	---
Percentage Distribution	-----	-----	2.5	8.4	14.2	19.3	18.4	14.2	10.5	6.7	3.1	1.5	0.4	0.3	0.1	0.3	---

Coefficient of Correlation = 0.121 ± 0.020
 Regression Slope = 0.016

TABLE 17.—JERSEY SIREs WHOSE DAUGHTERS AVERAGE BETWEEN 500 AND 549 POUNDS FAT

Ave. Fat duction Dams lbs.	Pairs Dams and Daughters	Ave. Fat Production Daughters lbs.	Distribution of Daughters (Pounds Fat)											
			Under 400	400 449	450 499	500 549	550 599	600 649	650 699	700 749	750 799	800 849	850 899	900 949
385	80	511	5	14	25	12	10	8	5	---	---	1	---	---
427	147	513	10	23	37	41	13	9	10	3	1	---	---	---
470	173	511	8	30	49	39	24	12	4	6	1	---	---	---
523	114	548	6	15	15	28	20	12	9	7	1	---	1	---
570	77	543	2	8	12	24	14	8	4	4	1	---	---	---
625	45	522	2	6	12	7	10	3	4	1	---	---	---	---
671	23	544	---	5	5	3	3	4	2	---	1	---	---	---
724	17	576	---	1	4	2	5	1	1	2	1	---	---	---
771	9	513	1	3	1	1	1	1	---	1	---	---	---	---
818	6	488	---	---	3	3	---	---	---	---	---	---	---	---
868	3	611	---	---	1	---	---	1	---	1	---	---	---	---
939	1	526	---	---	---	---	1	---	---	---	---	---	---	---
975	2	661	---	---	---	---	1	---	---	1	---	---	---	---
1048	1	740	---	---	---	---	---	---	---	1	---	---	---	---
1182	2	511	---	---	---	2	---	---	---	---	---	---	---	---
Total	700	---	34	105	164	162	102	59	39	27	6	1	1	---
Percentage Distribution	---	---	4.9	15.0	23.4	23.1	14.6	8.4	5.6	3.9	0.9	0.1	0.1	---

Coefficient of Correlation = 0.155 ± 0.025

Regression Slope = 0.130

TABLE 18.—JERSEY SIRES WHOSE DAUGHTERS AVERAGE BETWEEN 450 AND 499 POUNDS FAT

Ave. Fat Production Dams lbs.	Pairs Dams and Daughters	Ave. Fat Production Daughters lbs.	Distribution of Daughters (Pounds Fat)									
			Under 400	400 449	450 499	500 549	550 599	600 649	650 699	700 749	750 799	800 849
384	61	475	10	16	15	11	5	3	---	1	---	---
425	111	480	16	27	30	22	8	5	1	1	---	---
471	107	481	20	22	29	21	7	1	3	3	1	---
523	80	471	7	28	18	20	2	2	3	---	---	---
565	36	494	3	6	7	15	4	1	---	---	---	---
621	21	486	4	2	7	5	1	2	---	---	---	---
669	15	485	1	3	4	5	2	---	---	---	---	---
719	5	493	1	---	1	1	1	---	---	---	---	---
771	1	400	---	1	---	---	---	---	---	---	---	---
824	3	490	---	---	2	1	---	---	---	---	---	---
883	1	490	---	---	1	---	---	---	---	---	---	---
1060	1	525	---	---	---	1	---	---	---	---	---	---
Total	442	-----	62	105	114	102	30	15	7	4	2	1
Percentage Distribution			14.0	23.8	25.8	23.1	6.8	3.4	1.6	0.9	0.5	0.2
Coefficient of Correlation = 0.061 ± 0.032			Regression Slope = 0.032									

TABLE 19.—JERSEY SIRES WHOSE DAUGHTERS AVERAGE BETWEEN 400 AND 449 POUNDS FAT

Ave. Fat Production Dams lbs.	Pairs Dams and Daughters	Ave. Fat Production Daughters lbs.	Distribution of Daughters (Pounds Fat)					
			Under 400	400 449	450 499	500 549	550 599	600 649
381	38	429	13	17	2	5	1	---
425	34	434	9	17	5	3	---	---
472	28	416	11	12	4	1	---	---
528	17	436	5	6	4	1	1	---
571	7	434	3	1	2	1	---	---
603	1	504	---	---	---	1	---	---
655	3	395	2	---	1	---	---	---
853	2	388	1	1	---	---	---	---
Total	130	---	44	54	18	12	2	---
Percentage Distribution			33.8	41.5	13.8	9.2	1.5	---
Coefficient of Correlation = -0.051 ± 0.059			Regression Slope = -0.056					

are higher than the dams the daughters will be better than their dams. If random breeding was practiced and the chances were equal for the good and poor to be mated in the same proportion, the effect would be neutralized, but when there is a tendency for the better dams and sires and the poorer dams and sires to be mated together the influence on the lower and the higher producing daughters is not the same. In other words while the attempt is made to determine the correlation between the production of the dams and daughters, a third factor, the influence of the sire on the daughter's production is not in any way controlled. Because of selective mating there appears to be a tendency for this factor to increase the coefficient of correlation of dams and daughters.

In order to meet these criticisms, the data were separated as shown in Tables 13 to 19 inclusive. The sires were grouped according to their progeny performance by 50 pound fat classes as shown by Table 12. The following quotation from Pearl³⁵ gives a justification for the method. ". . . . if we physically select individuals so that they are all alike relative to one variable and then directly measure their correlation in respect to two other variables, the average correlation so obtained is substantially identical with the result which we get mathematically when we calculate the partial correlation."

This grouping has the following advantages: (1) It has a tendency to hold the influence of the sires fairly constant. (2) It furnishes data which are in part much less influenced by the minimum entrance requirements than is the entire population. The usual method of partial correlation would accomplish the first advantage mentioned and can well be used for that purpose. It might be noted that the correlation coefficient of the production of the dams and daughters used by Gowen^{20, 23} of the Maine Station is faulty because the sires are not held constant in his studies. Gowen²² has recently recognized this error in his previous studies and has determined the partial correlation of the dams and daughters of the Guernsey breed and actually obtained a significant decrease in correlation when the sires (average progeny performance minus daughter concerned) were held constant. The correlation of dams and daughters was $0.36 \pm .02$, while the partial correlation was only $0.25 \pm .02$. This observation substantiates the writer's contention that to obtain the true correlation of dams and daughters it is necessary to hold the sires constant as far as that is possible in such data.

It is quite obvious that the fault with any classification of sires using the progeny performance as a measure of their transmitting ability is the difficulty of equitably evaluating the dam's contribution. On the other hand, to determine the relation between dams and daughters some measure of the sire is necessary. It is a vicious circle for which as yet no entirely satisfactory solution has been found.

Goodale¹⁷ has recomputed the data from the study of Guernsey sires which shows "that those sires whose daughters average the largest yield of butter fat were mated to cows of superior average butter fat production, while the sires whose daughters averaged the least, were mated to cows whose average was comparatively low."

The average fat production of the dams in each sire group in tables 13 to 19 are shown in Table 20. It is apparent that a similar relation holds true for the Jersey data. The fact that the dams of the daughters of the sires with high average fat production also tend to be high average producers further complicates the situation. It must be granted that some error is introduced by such a classification, but that its effect is actually very small is believed to be indicated by the partial correlation obtained.

TABLE 20.—RELATION BETWEEN DAMS AVERAGE PRODUCTION AND SIRES PROGENY PERFORMANCE (Jersey Data)

Sires grouped by daughters av. fat production	Daughter's Dams Av. fat production	No. of Dams	Data from Table
<i>lbs.</i>			
700 or over	604.0	374	13
650—699	605.5	363	14
600—649	578.0	582	15
550—599	538.5	1117	16
500—549	508.0	700	17
450—499	488.0	442	18
400—449	453.0	129	19

The line of regression of the daughters on the dams was calculated as well as the coefficient of correlation of each sub-group. The close relation between the slope of the regression line and the correlation indicates that the line of regression of dams on the daughters is quite similar, due to the relation $r = \sqrt{b_1 \times b_2}$ where r equals the correlation coefficient, and b_1 and b_2 the slope of the regression lines of x on y and y on x respectively. The use of the regression line is of advantage in that the relationship between the dams and daughters can be shown graphically. Its further value lies in the fact that the point at which the regression line cuts the y axis is believed to indicate the average potential transmitting ability of the sires in each group.

The data in each Table 13 to 19 are plotted in Fig. 5. The smooth lines passing through the observed values were obtained from the regression equation $D = A + Bd$ in which D is the average production of the daughters; d the average production of the dams; A the sire's potential transmitting ability with dams of low production (complete recessives); B the average increase in production of the daughters above A for each pound of increase in the production of the dams. The values for A and B are placed on the figure.

The equations for each group of sires are presented in the following table:

TABLE 21.—REGRESSION EQUATIONS OF DAUGHTERS ON THE DAMS
ACCURACY OF PREDICTING SON'S DAUGHTER'S FAT PRODUCTION FROM SIRE'S DAUGHTER'S
FAT PRODUCTION

Sire's Progeny Performance fat, lbs.	Equation		Dam and daughter Pairs Included	Coefficient of Correlation
	A	B		
700 or over	D = 541.8 + 0.323 d		374	0.288 ± 0.058
650 to 699	D = 624.2 + 0.097 d		363	0.096 ± 0.035
600 to 649	D = 567.9 + 0.091 d		582	0.139 ± 0.021
550 to 599	D = 518.8 + 0.106 d		1117	0.121 ± 0.020
500 to 549	D = 462.1 + 0.130 d		700	0.155 ± 0.025
450 to 499	D = 465.3 + 0.032 d		442	0.061 ± 0.032
400 to 449	D = 453.0 - 0.056 d		129	-0.051 ± 0.059

It will be noted that with the exception of the first group of sires and the last two groups, the values of B (the average increase in the production of the daughters above A for each pound of increase in fat production of the dams) are quite similar and exceptionally low considering the relationship of the variates.

The weighted average correlation coefficient of the groups is 0.131. This may be considered as the coefficient of partial correlation of the dams and daughters holding the sires constant. These results are of extreme interest in connection with the theory of inheritance of fat secretion proposed. It was shown that upon theoretical grounds, assuming a lack of dominance and no correlation between parents, the parent offspring partial correlation should be 0.5. With the assumption of dominance, the phenotypic parent-offspring correlation would vary from about 0.2 with complete dominance up to 0.5 with varying degrees of dominance. These data are taken to substantiate in part the theory proposed as the correlation is under 0.2.

Fig. 5 indicates the average increase in fat production of the daughters for each pound of increase in the production of the dams. The values for *b* indicate the slope of these lines. These data are interpreted as follows: The potential transmitting ability of a sire is taken as the average productive contribution to his daughters assuming that the dams made no genetic contribution which would increase the daughter's production. As the dams increase in productive ability and presumably contribute dominant genes to their daughters, they show their effect in the daughters only when the sires are recessive for the same genes. The dam contribution thus functions as a supplement to the sire's contribution. In other words, the slope of the lines in Fig. 5 measure the supplementing value of the dams to the daughters in addition to the sire's potential transmitting ability.

Because of the ease of determining the progeny performance of the sire, and thereby obtaining a rough measure of his transmitting ability,

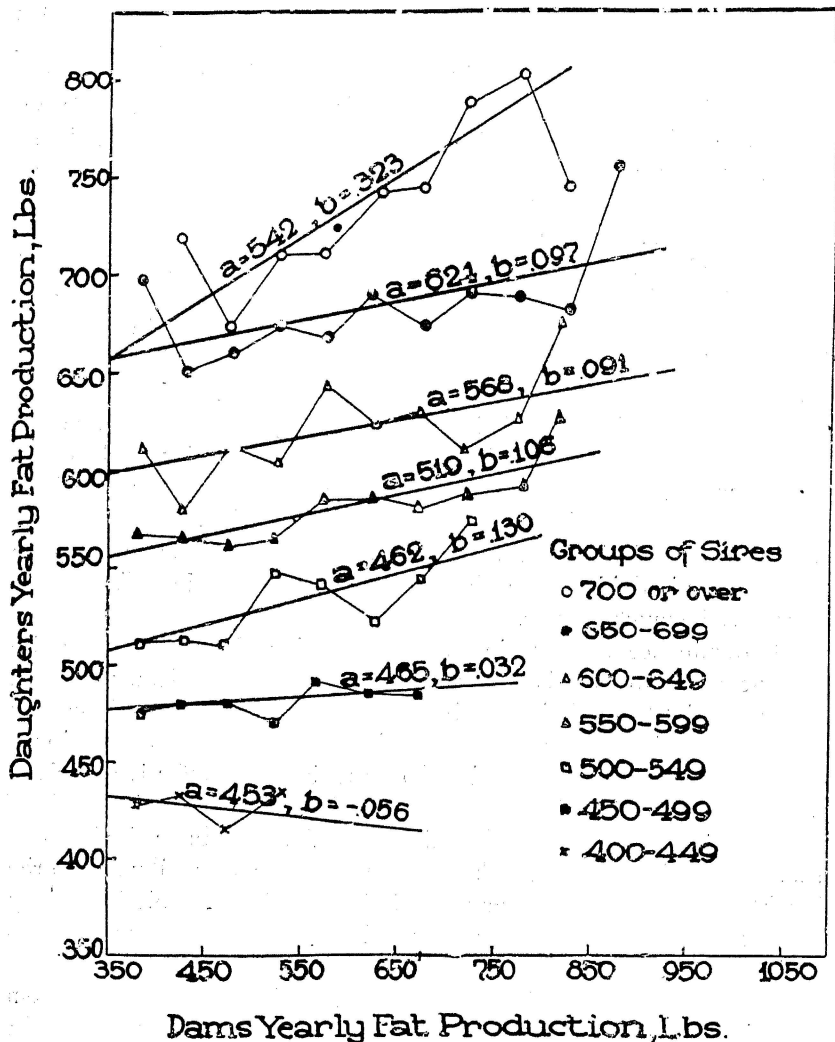


Fig. 5.—The relation between the production of the dams and daughters of various groups is presented. The smooth lines passing through the observed values were obtained from the straight line equation $D = A + Bd$, in which D is the production of the daughters, d the production of the dam, A the sire's potential transmitting ability with dams of such low production (complete recessive) that they contribute nothing to the daughter's production, and B the rate of increase in the production of the dams. The values for A and B are placed on the figure. In round figures there is an increase of 10 to 15 pounds of fat in the yearly fat production of the daughters for an increase of 100 pounds of fat in the average yearly record of the dams above the potential transmitting ability of the sire.

the sire is given credit for that part of the daughter's production which might more correctly be considered to come jointly from the sire and dam due to the fact that both sire and dam may contribute the same factors. The dam is given full credit only for that part of the daughter's production which she individually increased it over that of the sire's potential transmitting ability. This plan is followed because the dam's potential transmitting ability is difficult to determine. It is, therefore, extremely difficult if not impossible to determine directly what part of the joint contribution is made by the dam.

The sire's progeny performance would be greater than his potential transmitting ability only when the dams to which he is bred supplement the factors for high production contributed by the sire. Reference to Table 10 will indicate the relative supplementing value of dams as the potential transmitting ability of the sires decline. As it is the aim of breeders to use a sire which it is hoped will be better than the average production of the dams to which he will be mated, it might well be expected that the average supplementing value of the dams would be low. The actual supplementing values observed ranging from about 10 to 30 per cent come within the range of values that might theoretically be expected. In individual cases, however, the supplementing effect of the dams may be much greater.

If dominance were lacking no such relationship between the sire and the dam would exist. Instead of the dam supplementing the sire's potential transmitting ability, the entire contribution of the dam would be effective. When there is dominance, $Aa = AA$ so a dominant gene from the sire and a recessive from the dam is as effective as if the dam contributed a dominant gene. When dominance is lacking Aa is of less value than AA so that if the dam contributed A instead of a there is a difference in the result. The fact that the dam's contribution to the daughter appears to supplement the sire's potential transmitting ability rather than be additive further substantiates the proposed theory as to the inheritance of fat secretion.

The regression equations in Table 21, are in such form that from them the production of future daughters might be predicted knowing the fat production of the dam. Thus if the sire's progeny performance were between 550 and 599 pounds of fat the equation

$$\text{Daughter} = 518.8 + 0.106 \text{ dam's record}$$

would be used. The question of importance to answer is, will such a predicted production be better than simply using the sire's progeny performance? The test of the value of such a prediction equation is this, is the variability of the daughters any less from the theoretical predicted production than it is from the mean or average of the sire's progeny per-

formance? It may be shown that when the correlation coefficient is 0.3 the standard deviation or standard error of estimate is decreased 4.6 per cent. That means the prediction value is low—practically useless. When the correlation coefficient is 0.4 the standard error of estimate is decreased 8.3 per cent. (See Wallace and Snedecor⁵¹.)

As the average dam and daughter correlation is in every case less than 0.3 and in many cases approaches 0.1, it is evident that such equations, unfortunately, have little prediction value. A number of actual tests were made as to the truth of this statement and in each case the standard deviation was practically unchanged when the mean of the sire or a daughter prediction equation was used.

Sire's Potential Transmitting Ability

Knowing the average relation between the dam's record of production and her average supplementing ability or effective contribution to her daughter's production, it was thought possible to determine the sire's average potential transmitting ability to his daughters.

In a previous study of the Advanced Registry records of the Guernsey breed⁴⁷ an equation was formulated to express the relation between the sire, dam, and daughters. A regression equation of the form

Daughter = Sire's potential transmitting ability + B × Dam
was used. This equation was inverted by an algebraic transformation into the form

$$\text{Sire's potential transmitting ability} = \text{Daughter} - B \times \text{Dam}$$

in order to obtain the sire's potential transmitting ability when the average production of the dams and daughters are known. It has since been learned that regression equations cannot be inverted algebraically unless the correlation coefficient between the two variables is 1.0^{43, 4}. As the correlation coefficient is about 0.1 it is obvious that this apparently simple method of obtaining a measure of the sire's potential transmitting ability cannot be obtained in this way. Therefore, a generalized equation cannot be obtained. It is possible to obtain the value of the sire's potential transmitting ability, as shown in Table 21, by small groups of sires with similar progeny performance or of individual sires where there are many dam and daughter pairs.

the dam's record of production bears only a slight relation to her daughter's production. From this it might be concluded that the dam's record of production would bear only a slight relation to her son's transmitting ability. This being true, less weight should be given to the dam's record of production than to the sire's progeny performance.

The genealogy tables afford an excellent opportunity of testing out the above conclusions by actual results from various combinations of sires and dams upon their son's daughters.

Comparisons of Sire's Daughters with Son's Daughters

In comparing the sire's daughter's average fat production with the son's daughter's average fat production it is important that only sires with a sufficiently large number of daughters to indicate their transmitting ability be compared. Unless a sire, in the genealogy tables, has at least six daughters he was discarded in making this comparison. It should also be pointed out that both the sire's daughters and the son's daughters are influenced by their dams. No cognizance of this factor, or of the dam's production records, was taken in this comparison.

The sons of the inferior sires produce daughters which are better than their sire's daughters. The sons of superior sires produce daughters which are lower than their sire's daughters. This indicates the applications of Galton's law of regression to the inheritance of fat production. As a matter of fact, the tendency to regress toward the average is a phenomenon of Mendelian inheritance as well. There is a strong tendency for high or low producing animals to regress toward the average production of the breed. The regression noted may be explained in part as being due to the fact that the sons of the poorer sires were bred to dams which are nearer the average production of the breed. This would have a tendency to increase the average production of the daughters. On the other hand the sons of the better sires being bred to average dams would cause the daughters to be lower.

The results of this comparison are shown in Table 22 and Fig. 7. It will be noted that as sires are able to transmit the factors for superior yearly fat production to their daughters, they are also transmitting, to a high degree, the same factors to their sons. The sons in turn are transmitting the factors from their sires to their daughters, to a comparatively high degree. This relationship may be expressed by the following equation:

$$\text{Son's daughters' yearly fat production} = 302.3 + 0.481 \text{ Sire's daughters' fat production}$$

The meaning of this equation may be shown by the calculation of the son's daughter's average fat production. If a son of a proven sire

having 20 daughters with an average yearly fat production of 675 pounds is used on average cows, what may be expected of his daughters?

$$\begin{aligned} \text{Son's daughter's yearly fat production} &= 302.3 + 0.481 \times 675 = \\ &= 302.3 + 324.7 = 627.0 \end{aligned}$$

Of course, not every son will produce daughters with the above average fat production. Some will be above, others will be below this predicted production. It is of interest to determine the average range in production when the comparison is made between the predicted yearly fat production and the actual yearly fat production of the son's daughters (See genealogy tables.)

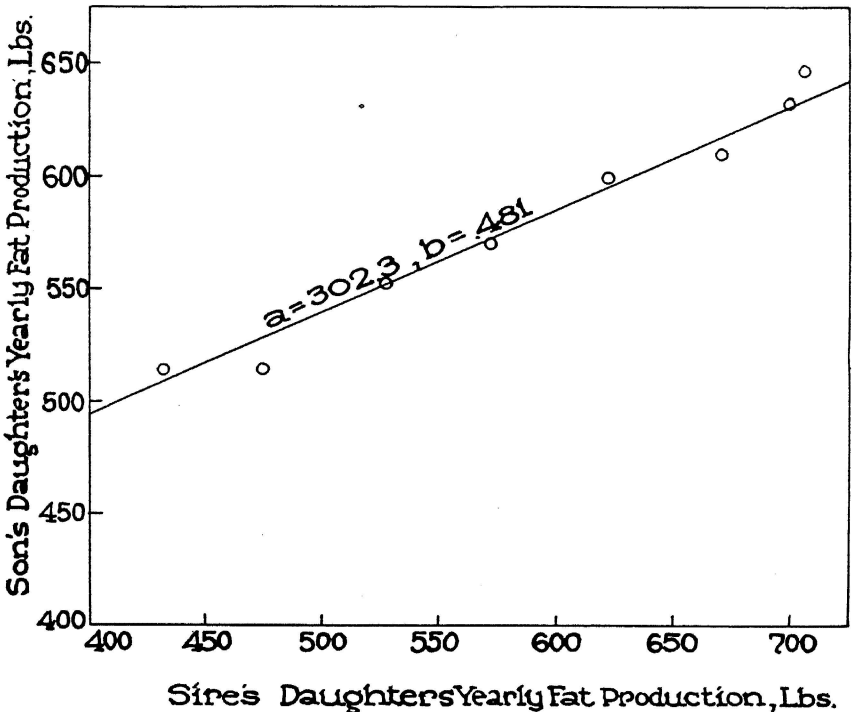


Fig. 7.—The average relation between the fat production of the sire's daughters and the average fat production of the son's daughters is shown. The line passing through the observed values was obtained from the equation $S = A - Bs$, in which S is the son's daughter's average yearly fat production, s the sire's daughter's average fat production, B the constant increase in the son's daughters above A . From the values for A and B it appears that above 302 pounds of fat an increase of one pound of fat on the part of the sire's daughters, produces an average increase of 0.481 pounds of fat on the part of the son's daughters. The accuracy of the relation in predicting the son's progeny performance is indicated in the text.

The value for the mean indicates that the equation is very satisfactory in predicting the son's daughter's production. The standard

error of estimate is a measure of the prediction value of the equation. It indicates the variation that may be expected in the application of the equation. About 68 per cent of the son's daughter's average will be found within a range of \pm the standard error (68.25), 95 per cent will fall within two times the standard error.

ACCURACY OF PREDICTING SON'S DSAUGHTER'S FAT PRODUCTION FROM SIRE'S DAUGHTER'S FAT PRODUCTION

Son's daughter's actual fat production above or below the calculated production.	No. of comparisons in each class.
Class limits	Frequency
-175 to -199	1
-150 to -174	1
-125 to -149	3
-100 to -124	8
-75 to -99	20
-50 to -74	39
-25 to -49	43
0 to -24	39
0 to +24	37
+25 to +49	26
+50 to +74	33
+75 to +99	15
+100 to +124	12
+125 to +149	6
+150 to +174	2
+175 to +199	1
+200 to +224	0
+225 to +249	2
Total	288

Mean = +0.057
 Standard Error of Estimate = 68.25 \pm 2.73

TABLE 22.—RELATION BETWEEN FAT RECORDS OF DAUGHTERS OF SIREs AND THE AVERAGE FAT RECORDS OF THE DAUGHTERS OF THE SONS

Sire class	No of sires	Av. Fat production of sire's daughters	No. of sons	Total No. of daughters of sons	Av. Fat production of son's daughters
400—449	4	439	6	87	526
450—499	29	474	81	1482	527
500—549	31	530	76	1385	554
550—599	31	571	64	1098	570
600—649	11	620	25	336	599
650—699	6	668	21	422	619
700—749	4	710	11	164	646

Because of a recent study of the progeny performance of Guernsey sires and sons by Gowen,²³ of the Maine Station, it is believed to be important to emphasize the need of a sufficient number of tested daughters of the sire in drawing conclusions as to the reliability of the sire's progeny

performance in predicting the performance of the son's daughters. Following the method essentially the same as that described above and in the study of the Guernsey sires⁴⁷, except that all sires and sons having two or more daughters were compared, Gowen found "that for an increase in the sire's daughter's butter-fat of 100 pounds corresponding increase of 30 pounds is found in the son's daughter's average butter-fat." He concludes, therefore, that "this relationship is not so large as it should be if the dairyman is to put much faith in this mode of selecting the sire."

With a large proportion of the comparisons included based on a very limited number of tested daughters, it is remarkable that so high a relation was found between the sire's daughters and son's daughters. If only sires who have six or more daughters were included in this comparison the relation would have increased considerably. In using the above prediction equation it is important, therefore, to use it only when the sire has six or more daughters.

TABLE 23.—EFFECT OF FAT RECORD OF DAM ON THE AVERAGE FAT RECORDS OF HER SON'S DAUGHTERS
(Jersey Breed)

Class of Dams	Dam Av. Fat lbs.	No. of Sons	No. of Daughters of Sons	Av. Fat Production of Daughters in lbs.
350—399	384	9	135	515
400—449	434	19	304	575
450—499	474	19	269	563
500—549	520	29	410	531
550—599	577	19	307	552
600—649	625	29	491	560
650—699	679	21	284	562
700—749	721	14	263	589
750—799	776	8	115	606
800—849	820	8	151	595
850—899	880	9	145	659
900—949	923	2	23	624
950—999	965	14	241	627
1000—1049	1003	2	171	694

Comparison of Dam's Fat Record with Son's Daughter's Fat Records

When selecting an unproven sire by pedigree, it is the almost universal practice to give a great deal of consideration to the record of production of the dams. This is done in the hope that the dam will transmit her own high production to her son and through him to her granddaughters. The relation between the dam's record and her son's daughter's production will give an indication of the value of the record in indicating her transmitting ability.

The genealogy tables furnish the data for such a comparison. All possible dam and sons comparisons were made where the sons had six or more daughters. In this case no cognizance of the sires was taken.

The results are shown in Table 23 and Fig. 8. It will be noted that above 463 pounds of fat an increase of 100 pounds of fat on the part of the dam causes an increase of only 17.6 pounds of fat in the average production of the son's daughters. This relation may be expressed by the following equation:

Son's daughter's yearly fat production = 463.1 + 0.176 Dam's yearly fat production.

This is taken to indicate that the record of production of the dam is a rather poor index of her transmitting ability to her son and granddaughters.

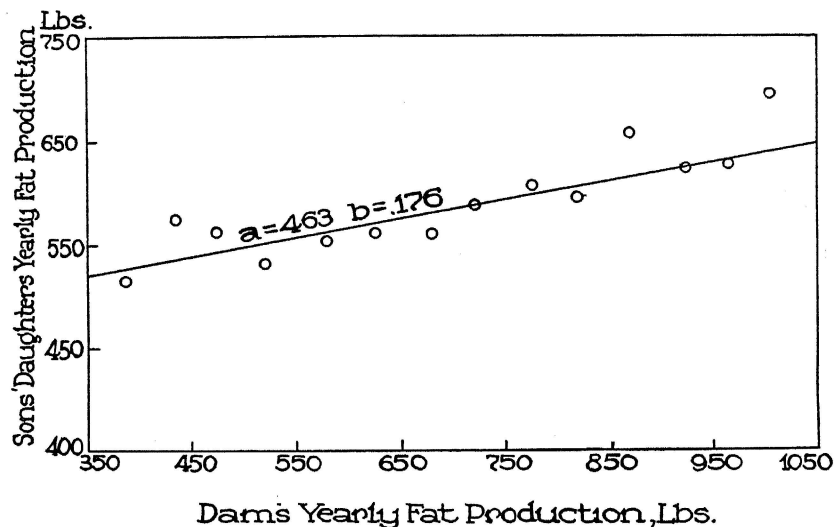


Fig. 8.—The relation between the fat record of the dam and the average fat production of the son's daughters. The line passing through the observed values was obtained from the straight line equation, $S = A + BD$, in which S is the son's daughter's average yearly fat production, and B the constant increase in the son's daughter's production for an increase of one pound of fat of the dam above A . From the values on the straight line fitting the observed values, it appears that above 463 pounds of fat, an increase of one pound of fat on the part of the dam causes an increase of only 0.176 pounds of fat on the part of the son's daughters. This is taken to indicate that the dam's record of production does not bear a close relation to her transmitting through her sons to her granddaughters.

If a sire is purchased because the dam has a large record, with the hope that the son will produce daughters which will have an average production similar to his dam, the purchaser is likely to be disappointed. It does not mean, however, that the son may not produce a few daughters that will approach the record of their sire's dam, but the majority of the daughters will probably be disappointingly low. The relation shown is surprisingly low, considering the fact that there is a tendency for the

sons of high producing cows to be out of the better sires, to be used in high class herds, and to be mated with selected cows. Any one of these factors would tend to increase the apparent effect of the dams.

It would be of great value to use some other indication of the dam's transmitting ability to her sons than her own record of production. The dam's daughter's performance could be compared with her son's daughters' performance records. There are two possibilities of study. The difficulty here lies in the limited number of dams with sufficient tested daughters. When these data are available it is believed to be as valuable as the progeny performance of the sire and should be made use of. When the daughters are by the same sire and are few in number, it is difficult to determine whether the daughters' records are due to the influence of the sire or the dam.

The second possible indication of the dam's transmitting ability would be her sire's progeny performance (including her own record). While her own record might be very high or very low, the average pro-

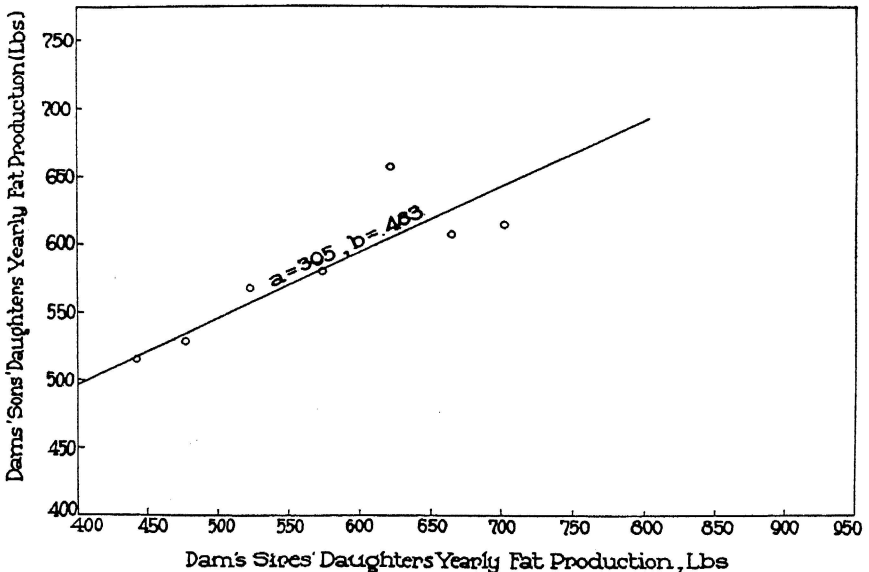


Fig. 9.—The relation between the dam's sire's daughter's (half sisters) average yearly fat production and the dam's son's daughter's yearly fat production. The line passing through the observed values was obtained from the straight line equation $S = A + BD$ in which S is the son's daughter's average yearly fat production, and B the constant increase in the son's daughter's production for an increase of one pound of fat by the dam's half sisters above A . From the values on the straight line fitting the observed values, it appears that above 305 pounds of fat, an increase of one pound of fat on the part of the dam's half sisters causes an increase of 0.483 on the part of the son's daughters. This is taken to indicate that the average fat production of the dam's half sisters (her sire's progeny performance) gives a better indication of her transmitting ability to her granddaughters than does her own record of production.

duction of her half-sisters might be a better indication of her transmitting ability to her sons and granddaughters, than her own record. As seen in Table 24 and Fig. 9, there is a high degree of relation between the dam's sire's progeny performance and the son's daughter's progeny performance. This relation may be expressed in the form of an equation as follows:

$$\text{Son's daughter's yearly fat production} = 304.5 + 0.483 \text{ Dam's sire's daughter's yearly fat production.}$$

It will be noted that the average of the dam's half-sisters is almost three times as valuable as an index of her transmitting ability to her son's daughters as is her own record of production.

TABLE 24.—RELATION BETWEEN THE AVERAGE FAT PRODUCTION OF THE DAM'S SIRE'S DAUGHTER AND THE DAM'S SON'S DAUGHTER

Dam's sire's daughter's Avg. fat production in lbs.	No. pairs	Dam's son's daughter's average fat production in lbs.
443	11	515
477	46	529
524	51	567
574	44	579
621	11	657
666	18	607
702	3	613

Combined Influence of Sire's Progeny Performance and Dam's Record of Production on Granddaughters

In the preceding discussion, the separate influence of the sire and of the dam upon the production of the son's daughters has been covered. It is of interest to indicate the combined influence of both the sire and of the dam. This was accomplished by separating the sires into four groups based upon their progeny performance and then determining the son's daughter's production by various classes of dams separated according to their records of production. The results are shown in Table 25.

In the first class of sires (progeny performance of 400 to 499 pound group) the son's daughters showed no significant change as the production of the dams increased. In the next class of sires (500 to 599 pounds of fat group) there was an increase of slightly more than 100 pounds in the average production of the son's daughters for an increase in the dam's record of over 500 pounds. This is an increase of about 20 pounds of fat on the son's daughters for each 100 pounds of fat by the dams above 450 pounds.

In the third group of sires (600 to 699 pound group), the son's daughter's production bears the closest relation to the dam's production.

The son's daughters' average production increases 180 pounds for an approximate increase of 500 pounds. This is an increase of about 27 pounds of fat on the part of the son's daughters for each 100 pounds of fat by the dams above 460 pounds.

In the last and highest group of sires (700 to 799 pounds group), the son's daughters again show no significant change when the dam's average production increased 100 pounds. The number of comparisons however, is low, as well as the variation in the production of the dams.

The data, as a whole, can be taken as substantiating the contention that the dam's record of production does not bear a close degree of relationship to her son's daughters' production and that the more important

TABLE 25.—INFLUENCE OF SIRE'S PROGENY PERFORMANCE AND DAMS RECORD OF PRODUCTION ON SON'S PROGENY PERFORMANCE

Sire's Progeny Performance Average Fat lbs. 400 to 499			
Dam class fat Production lbs.	Average Fat, Dams	No. of daughters of Sons	Son's daughters' Avg. Fat Production, lbs.
300—499	419	195	532
500—699	582	323	549
700—899	721	82	513
Sire's Progeny Performance Average Fat lbs. 500—599			
300—499	446	378	553
500—699	595	688	561
700—899	803	253	618
900 and up	976	247	661
Sire's Progeny Performance Average Fat lbs. 600—699			
300—499	460	54	520
500—699	603	205	569
700—899	819	143	638
900 and up	947	92	701
Sire's Progeny Performance Average Fat lbs. 700-799			
500—699	650	82	644
700—899	759	68	646

point in the selection of an unproven bull is the sire's average progeny performance. If such a son is out of a large producing cow, so much the better, but it is not to be expected that more than a few of her son's daughters will approach her record unless the sire has a high average progeny performance.

SUMMARY AND CONCLUSIONS

1. The object of the study of Register of Merit Jersey records herewith presented was to determine if possible the mode of inheritance of

yearly butterfat production with the view of selecting breeding animals more intelligently.

2. Certain objections to the use of the Advanced Registry data in the study of the inheritance and the mode of transmission of the characters concerned were pointed out.

3. In order to compare the records of production of the progeny of Jersey sires made at various ages, conversion factors were used to convert all records to their "mature equivalent."

4. All Jersey sires having ten or more tested daughters were compared as to the average butterfat production of their progeny in order to indicate the sires which have demonstrated their transmitting ability for use as proven sires if still alive and fertile.

5. Before discussing the results of the analysis of the Register of Merit data a review of the results of previous investigations relating to the inheritance of milk and fat production was presented.

6. A theory of the mode of inheritance of fat secretion was advanced which is believed to explain the results obtained. The theory consists of three parts: (1) That milk and fat secretion of the dairy cow is influenced by many genes; (2) That many of the genes favoring high production are dominants; and (3) That all genes do not have the same effect.

7. The implications of the theory were illustrated by an example of a trihybrid each gene of which was given a definite numerical value. The relation between the record of production (phenotype) and the transmitting ability (genotype) was clearly shown.

8. The "mature equivalent" yearly fat record of the dam of each daughter was calculated wherever the dams had records. Dam and daughter comparisons were made by groups according to the sire's progeny performance, using a modified method of partial correlation. This method has the advantage that the sires may be held constant. The low correlation obtained is taken to substantiate the theory that many of the genes favoring high production are dominants.

9. The line of regression of the daughters on the dams was calculated for each sub-group. This line shows the relationship between the dams and daughters graphically. The point at which the regression line cuts the y axis is taken to indicate the average potential transmitting ability of the sires in each group.

10. Because of the low correlation between the dams and daughters these regression equations were found to be of little or no value as pre-

diction equations of the daughter knowing the sire's progeny performance and the dam's record of production.

11. The regression equation cannot be transformed algebraically in order to obtain a measure of the sire's potential transmitting ability, knowing the average production of the dams and daughters.

12. By means of genealogy charts, the ability of the sires and dams to transmit the favorable factors concerned in fat production through their sons to their granddaughters was studied. The sire's daughters' average fat production was found to bear the following relation to the son's daughters' average production:

$$\text{Son's daughters' yearly fat production} = 302. + 0.481 \text{ sire's daughters' fat production.}$$

The prediction value of this equation was found to be satisfactory.

13. The relation between the dam's record and her son's daughters' average fat production is expressed by the following equation:

$$\text{Son's daughters' yearly fat production} = 463 + 0.176 \text{ dam's yearly fat production}$$

A more satisfactory indication of the dam's transmitting ability was found to be her sire's average progeny performance.

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HOW TO USE THE GENEALOGY TABLES

To students of Jersey cattle breeding, the variation in the progeny performance of the sires listed in Table 3 immediately calls forth the questions, "How were the sires bred?", "Who is the sire and dam, the grandsire and the granddam on each side?" "Were they also sires of good daughters and were the dams large producers of milk and fat?"

To answer these questions at a glance, the genealogy tables are appended. The pedigrees of all the sires listed in Table 3 have been prepared and transformed into genealogy tables. As the generations are in the reverse order from that found in pedigrees, they may be somewhat confusing. A detailed explanation of the tables follows.

The progenitor of the sires included in each chart are placed at the left. Immediately to the right are listed all of his sons which have 10 or more tested daughters or are themselves the sires of sons with 10 or more tested daughters. The generations of sire, son, grandson, etc. are read from left to right. Immediately following the sire's name is given the herd book number either Island of Jersey or American Jersey Cattle Club. Following the herd book number is given, within parenthesis, the number of daughters and their average mature equivalent yearly fat production.

Immediately below each sire, the name and number of the dam is presented. Following the herd book number is given, in parenthesis her highest mature equivalent yearly fat production. In order to further trace the breeding of the dams in Table 27 is presented a table giving the name and number of the sire and dam of each dam in the genealogy tables. Following the name of the dam's sire is given the number and average mature equivalent yearly fat production of his tested daughters. The highest mature equivalent record of fat production of the dam follows in parenthesis.

Chart I.—Sires Descended from Golden Lad P. S. 1242 H. C. (Golden Lass 4th P. 2447 H. C.)

1. Orme P. 1660 H. C.	<ul style="list-style-type: none"> Golden Lad 2d P. S. 2023 H. C. (Golden Lass F. 5711 H. C.) 	1. Orlando P. S. 2535 H. C. (White Rose P. S. 4915 H. C.)	<ul style="list-style-type: none"> Rosette's Golden Lad 57498 (2-460) Sultana's Rosette 149740 	<ul style="list-style-type: none"> 1. Rosette's Golden King 65790 (Diploma's Bird 100356) 2. Baronetti's Golden Lad 67908 (13-476) Baronetti of Ingelside 132059 (644, 	<ul style="list-style-type: none"> Irene's King Pogis 73182 (62-559) Jacoba Irene 146443 (961) Valentine's Ashburn Baronet 100044 (23-710) (Lad's Valentine 195635) Finance's Remus 104413 (13-552) (Brookhill Fox's Finance 203812) 	
		2. Golden Romulus 57221 (Mousy 3d P. S. 1832 C.)				<ul style="list-style-type: none"> Golden Romulus 2d 59876 (Golden Sumptuous 157324)
2. Sultana's Golden Lad P. S. 2609 H. C. (1-421) (Sultana P. S. 6072 H. C.)	<ul style="list-style-type: none"> Sultana's Jersey Lad 55391 (16-535) (Mermaid of the Island 138787) 	1. Forfarshire's Love 124334 (11-612) (Forfarshire's Golden Love 221433)	<ul style="list-style-type: none"> 2. Sultana's Virginia Lad 82703 (25-613) (Virginia A. 131997) 			
3. Golden Grand 53658 (4-564) (Hearty P. S. 5724)	<ul style="list-style-type: none"> 1. Golden Lad's Carlo 57736 (2-404) (Cowslip of the Island 138790) 2. Rosaire's Golden Lad 64554 (6-682) (Golden Lads Rosaire 115227) 	Golden Lad's Butter Boy 63091 (Duchess of Westbranch 119967,	<ul style="list-style-type: none"> Amy's Golden Lad 73513 (Amyorba 162968) 	<ul style="list-style-type: none"> 1. Rinda Lad of S. B. 89518 (48-695) (Rinda Sunny Bank 175361) 2. Holger 109744 (27-728) (Rinda Sunny Bank 175361) 3. Empress's Lad of S. B. 77323 (11-549) (Empress of Sunny Bank 149464) 	<ul style="list-style-type: none"> Odeletha's Golden Lad 85101 (2-647) Odeletha 120280 (547) Marine's Lad 129781 (11-634) (Combination's Marine 28035 (469) 	<ul style="list-style-type: none"> Martha Bluebell's Odelio 102298 (17-502) (Martha Bluebell 207689 (667)

4. Golden Mon
Plaisir
59936
(1-376)
(Golden
Lily of St.
Mary
162052
1. Tulip's Mon Plaisir 61923
(2-459)
(Uncle Peter's Tulip 146273
2. Isabelle's Golden Lad 62833
(2-460)
(Golden Isabelle 157466
3. Fancy's Pioneer P. S. 3195
H. C. (10-584)
(Fancy's Rose F. S. 8277
H. C.
- { Keepsake's Golden Lad 71325
(14-546)
(Diploma's Keepsake 168399)
- { Golden Lad of Summit 85396
(15-564)
(June's Lad 196166)
5. Great Scot
P. S. 2153
(1-476)
(Belle Bre-
bis
129536
- { Golden Lad's
Successor
53960
(Golden Ora
127228)
- { La Chasse Golden Lad
72513 (2-469)
(La Chasse Flirt
127236)
- { Holmstead Lad S. 99112 (2-445)
(Jamont's Maid 192759 (418)
- { Lad's Pogis of Hickory Lawn
108050 (14-440)
(Nonda Miller 2d 185104 (537)
6. Marion P. S.
1690 H. C.
- { The Owl 54738
Alicante P. S.
3880 H. C.
- { 1. Spermfield Owl
57088 (48-579)
(Spermfield Lassie
129540)
- { 1. The Owl of Meridale
85853 (14-496)
(Interested Victor's Ra-
chel 188230 (477)
- { 2. Spermfield Owl 2d 93634
(27-629)
(Model's Interested Violet
201940 (522)
- { 3. The Owl's Duke 89472
(7-575)
(The Duke's Dorothy
170818 (519)
- { 4. Sibley's Choice 83040
(23-690)
(The Duke's Nutley Violet
170846 (447)
- { 5. Mertha's Duke 77649
(5-605)
(Mertha's Duchess 170810
(544)
- { 1. Owl of Belleview 106305
(17-552)
(Beaudesert's Pet 236177
(763)
- { 2. Fancy's Owl of B. 109383
(Fancy's Constance
229551 (470)
- { Fancy's Spermfield Owl 125623
(1-411,
(Owl's Golden Queen Princess
239769)
- { Lucile's Owl 148563 (10-642)
(Lucile of Cedar Grove 6th
213062) (631)
- { 2. Fontaine's Duke
61709 (11-524)
(Fontaine B.
152191)
- { The Owl's Double Grandson
80314 (10-604)
(Owl's Lassie 155973)
- { 1. Owl of River Ridge 102894
(2-527)
Interested Owl's Beauty
193937 (685)
- { 2. Owl's Temisia's Owl 94772
(6-654) Spermfield Owl's
Temisia 215982 (882)
- { Prince of River Ridge 129249
(38-526)
(Passport 219742 (843)
- { Vermont Owl 110939 (24-575)
(Temisia's Owl Rose 215973
(876)

(Sons of Golden Lad P. S. 1242 H. C.)

- 7. Golden Pride 1903 H. C.
 - P. { Caumais Lad P. 2257 H. C.
 - { (Imp. Blue Belle 180234)
- { Cherry Belle F. 7791 H. C.)

- 1. Financial King 57788 (4-516) (Finance P. 4611 C.)
 - 1. Financial Count 61316 (11-596) (Fontaine's Countess 152195)
 - 2. Fontaine's King 65641 (11-514) (Fontaine B. 152191)
 - 3. King's Owl 79433 (The Owl's Lily 2d 163583)
 - 4. Lily's King 62195 (2-400) (The Owl's Lily 141870)
- 2. Alexie P. S. 2656 H. C. (Surprise of Arden 151896)
 - Interested Prince 58224 (46-557)
 - (Compound Interest 152193)

- { Blue Belle's Owl 79641 (14-482) (Flying Fox's Blue Belle 187434)
- { Witch's King 77648 (2-461) (Rockwood Witch 178274)
- { Benedictine King 86100 (23-525) Forfarshire's Benedictine 196142 (392)
- 1. Golden Interest 66705 (3-424) (Imp. Grace Darling 145737)
 - { Altama Interest 98466 (20-505) (Althea Altama 197262 (560)
 - { Lorna's Altama Interest 108420 (14-565) (Lorna of Venadera 196127 (577)
- 2. Marston's Interested Prince 71855 (11-571) (Girle's Matilda 122948)
 - 1. Nettina's Meridale Prince 14174 (19-542) (Nettina's Fontaine 259447 (474)
 - 2. Interested Sayda's Owl 127673 (7-515) (Nettina's Fontaine 259447 (474)
 - { Lucy's Interested Owl 158742 (15-646) (Sayda's Lucy 249169 (626)
- 3. Prince Jonquil 85334 (11-535) (Spermfield Owl's Eva 193934 (993))
 - 3. Meridale Prince Darling 135643 (27-683) (Grace Darling Interested 279962 (697)
- 4. Interested Prince 2d 95708 (31-573) (Owl's Violetta 212124 (600))
 - 3. Meridale Prince Darling 135643 (27-683) (Grace Darling Interested 279962 (697)
- 5. Meridale Interested Prince 86473 (7-534) (Sayda's Queen of Ventnor 168033 (807))
 - { Lookout Prince 115074 (27-480) (Count Prize 203521 (533)
- 6. Interested Prince's Owl 89117 (30-505) (Owl's Violetta 212124 (600))
- 7. Spermfield Prince Interest 95697 (49-709) (Temisia's Owl's Rose 215973 (876))
 - 1. Matilda's Interested Owl 121648 (13-706) (Matilda's Emma 191076 (698)
 - 2. Chroma's Interested Duke 144111 (14-685) (Chroma's Golden Ceres 278757 (665)
- 8. Sibley's Interested Prince 108578 (16-613) (Spermfield Owl's Temisia 215982 (882))
 - 1. Interested Veda's Prince 122951 (24-551) (Owl's Interested Veda 193942 (526)
 - 2. Darling's Interested Owl 123837 (15-623) (Spermfield Owl's Actress 252113)
 - 3. Compound Int'd Prince Owl 137849 (14-640) (Golden Belle Interested 252109 (691)
 - 4. Owl Interest Temisia 155070 (21-728) (Spermfield Owl's Temisia 215982 (882)
- 9. Sible's Interested Owl 134069 (10-740) (Spermfield Owl's Temesia 215982 (891))
- 10. Meridale Interested Duke 111310 (13-509) (Nietta's Duchess 141693)
- 11. Owl's Model Prince 132871 (4-593) (Owl's Model Interested Tones 252107 (433))
 - { Maplewood's Interested Owl 151916 (11-573) (Suc B 2d's Choice 323897 (623)

8. Boyle P.
1559 H. C.
(Tootsie
P. S. 3214
H. C.)

1. Fontaine's
King P. S.
2207 H. C.
(11-514)
(Fontaine 4
P. 2537 C.)

{ Caicst P. S. 2591 H. C.
(1-536)
{ (Oxford Lass P. S. 3582
C)

{ Mabel's Poet 65780 (15-490)
Mabel 35th P. S. 6311 H. C.

2. Golden
Fern's
Lad P.
2160 H. C.
(Golden
Fern P.
4711
H. C.)

1. Carnation's Fern
Lad 63542 (1-
439)
(Carnation's Glory
8th P. 5875 H.
C.)

1. Fabby's Skylock 70334
(1-576)
(Fabulous Interest
168515)
2. Champion of St. Cloud
70566 (11-478)
(Champion Lucy 161054)
3. Rosebud's Fern Lad 70045
(11-635)
(Rose Fern Rosebud
169128)
4. Naiad's Golden Lad 67475
(11-449)
(Golden Naiad 161052)

2. Emanon 52299 (3-
422)
(Little Eminence
122506)

1. Jacoba's Premier 89296
(14-521)
(Jacoba of Jersey Lawn
223121)
2. Jacoba's Emanon 84177
(11-582)
(Jacoba of Jersey Lawn
223121)

3 Sensational Fern
75924 (24-530)
(The Owl's Sensa-
tion 162128)

1. Eminent's Sensational
King 107123 (11-492)
(Nunthorpe's Eminence
232105 (544))
2. Sensational Fern 24th
104762 (10-481)
(Eminents Buttercup of
St. Sar 238312 (465))

1. Oxfordshire 63548 (12-
541)
(The Owl's Oxford
Dairy 162113)
2. Mabel's Poet's Sultan
77854 (10-489)
(Sultana's Fawn Princess
195803)
3. Fontaine's Caicst 81118
(18-531)
(Fontaine's Brown Daisy
195762)
4. Foxy's Brown Poet 82982
(16-458)
(Foxy's Brown Mabel
188320)

1. Financial Countess' Lad
86252 (27-544)
(Financial Countess 155-
100 (806))
2. Golden Shylock 81862
(13-556)
(Golden Glitter 168509)
3. San Aloï 81012 (18-593)
(Financial Countess
155100 (806))
4. Rowena's Interested Fern
72009 (16-599)
(Rowena's Dairy 161056)

1. Premier of Fairview
116508 (14-513)
(Jacoba's Corinne 251615
689)
2. Jacoba's Portersville King
125053 (13-554)
(Loretta D's Jacoba Irene
215043 (448))

{ The King of Cloverland 115137
(12-598)
{ Eminent's Bess 209719 (971)

{ Thompson Farm Sans Aloï
132155 (12-559)
{ (Hallowe'en's Beauty 249615
(424)

(Sons of Golden Lad P. S. 1242 H. C.)

(Sons of Boyle P. 1559 H. C.)

(Sons of Golden Fern's Lad P. 2160 H. C.)

- 4. Eminent's Gold-
mont Lad 70268
(4-489)
(Eminent's Jubilee
Lady 180291)
 - { Mona Rose's Glory 92531
(14-539)
(Mona's Rose 181623 (379))
- 5. Imp. Sultane's
Golden Fern
65304 (2-579)
(Tristesse Vol. X.
p. 349 E.)
 - { Hazel Fern Golden King (10-
495)
Golden Hazel Fern 172111
- 6. H. F. Golden Fern
Lad 80437 (16-
528)
(S c o t ' s B e l l e
195756 (476))
 - { Golden Lucy's Eminent Lad
85639 (11-579)
(Eminent's Golden Lucy
210895 (446))
- 7. Golden Fern of
Linden 84011
(14-537)
(Golden Lad's Indus-
try 162058)
 - { 1. Golden Fern of Alden
114321 (11-452)
(Milka of Lawn 153132)
 - { 2. Fern of Saucon 100525
(3-498)
(Blue Belle's Nameless
208781)
- 8. Golden Fern's
Chieftain 70507
(1-464)
(Brown Fontaine's
Princess 180270)
 - { Rosaire's Fern Lad 98590
(15-564)
(Inez Rosaire 205906 (663))
- 9. Golden Fern's
Pilot 73492 (11-
485)
(Flying Fox's Dis-
tinction 187449)
- 10. Fern's Lad of St.
Martin 80126
(10-505)
(Rosa of St. Mar-
tin 195816)
- 11. Golden Fern's Son
78687 (25-541)
(Gamboge of St.
Saviour 195816)
 - { 1. Lucky Fern 126758
(13-625)
(Lucky Farce 298177
(939))
 - { 2. Saucon's Golden Prince
142483 (31-571)
(Golden Prince's Farce
246890 (643))

- | | | |
|--|--|---|
| 12. Golden Fern's Victor 69506
(Flying Fox's Brown Queen 172874) | { Golden Cicero 80272 (15-530)
(Eminent's Expectation 195813) | { Cicero of S. B. 97904
(19-512)
(Bisson's Rosa 8th 235981
(673) |
| 13. Fern's Lad of Wyldewood 75857(1-477)
(Brown Duchess of S. T. L. a. v. 195827) | { Fancy's Fern Lad 84276 (2-559)
(Fancy of Wyldewood 210956
(603) | { Interesting Lad of B. F. 117119
(Interesting Lady Sherwood 251593)
{ Darling's Fancy Lad 134091
(12-578)
(Darling's Christmas Gift 299111 (625) |
| 14. Mona's Handsome Fern 84194 (6-459)
(Eminent's Mona 1-57919) | { Mona's Handsome Stockwell 90390 (14-488)
(Stockwell's Roseleaf 213965) | |
| 15. Fox's Fern Lad 70267 (1-433)
(Fox's Belle of Granville 180279) | { Brookhill Financial Count 79620 (1-488)
(Brookhill Countess 190886) | { Golden Winnie's Count 105989
(6-552)
(Fern's Golden Winnie 225508
(512) |
| 16. Eminent 69631
(33-447)
(Eminence F. 7124 H. C.) | { 1. Eminent's Pilot 75364
(20-616)
(Idaletta of Glen Roughe 141141)

2. Holker P. S. 3820 C.
(1-383)
(Manfant's Lady 2d P. S. 8271 H. C.)

3. Favori P. S. 2943 H. C.
(1-393)
(Eminent's Brown Duchess 157604)

4. Eminent's Flying Fox 75266 (7-446)
(Fox's Belle of Trinity 203646)

5. Imp. King of Hambie 65298 (19-472)
(Imp. Interest 175430)

6. Eminent of St. Martin 73207 (18-530)
(Mrs. Fox of St. Martin 173305) | { Sultan of Rockland 121150
(19-609)
(Sultan's Nelly of St. Martin's 245044 (551)

{ General Brown P. S. 4232 C.
(2-453)
(Stockwell's Gold Lady 213952)

{ General Cowslip P. S. 4743
(H. C. (18-538)
(Cicero's Cowslip 20th P. S. 9111 H. C.)

{ Warden P. S. 3227 H. C. (5-557)
(Clarencia P. S. 8602 H. C.)

{ Oakwood D's Fox 126834
(24-592)
(Dioxide 178610 (472)

{ 1. Fontaine's Lodestar 77305
(10-472) Les Marais Fontaine 197601 (525)

{ 1. Sans Peur of Sheomet 118282 (23-578)
(Lanison's Kuemhild 20-3894 (582)
2. Salada's Lodestar 137337
(14-540)
(Oxfordshire's Salada 22-8026 (619)

2. The Warden 77015 (35-456)
(Olive of Sheomet 187161 (436) |

(Sons of Golden Lad F. S. 1242 H. C.)

(Sons of Boyle P. 1559 H. C.)

(Sons of Golden Fern's Lad P. 2160 H. C.)

(Sons of Eminent 69631)

- 7. Eminent 6th 75752 (16-464)
(Forfarshire's Fontaine 185062)
- 8. Eminent 10th 75753 (13-399)
(Fern's Despatch 169147)
- 9. Eminent 14th 75573 (9-586)
(Nunthorpe's Fontaine 172289) { Buttercup's Golden Lad 124256 (10-516)
(Cromwell's Gray Buttercup 195839)
- 10. Eminent 19th 78620 (26-578)
(Flying Fox's Brown Queen 172874)
- 11. Flying Fox's Eminent 78568 (12-555)
(Flying Fox's LaFontaine 172318)
- 12. Lady Letty's Eminent 82309 (40-508)
(Lady Letty Lambert 124201)
- 13. Eminent 25th 83638 (16-493)
(Eminent's Virginia 195830) { 1. Washington's Eminent Melian 124751 (14-678)
(Ethel's Meliastan 266957 (633))
- 14. Eminent 32d 84333 (1-500)
(Napoleon's Fontaine 19805) { 2. Washington Eminent Melian 124751 (14-678)
(Ethel's Meliastan 266957 (633))
- 15. Mona's Eminent 84618 (13-484)
(Eminent's Mona 195791)
- 16. Bermuda's Eminent 84618 (14-443)
(Fox's Belle of Trinity 203646)
- 17. Eminent's Fern King 110649 (15-547)
(Fern's Eminent Rose 251174 (706))

18. Eminent's Raleigh 69011
(27-521)
(Rill P. S. 6982 H. C.)

1. Raleigh's Fairy Boy 83767
(54-542)
(Fairy Glen P. S. 9178
H. C.) (635)

1. Queen's Fairy Boy 108321
(13-601)
(Majesty's Cherry Queen
230355 (711))
2. Imp. Hauteville Fairy
Boy 90952 (27-523)
(Lily of Hauteville 231556
(599))
3. Oxford's Fairy Boy 92821
(11-631)
(Fontaine's Oxford Ac-
tress 188248 (472))
4. Raleigh's Fairy Boy 4th
101482 (21-559)
(Morny Cannon's Feather
210832 (507))
5. Fontaine's Raleigh 105374
(15-546)
(Fontaine's Gold Medal
203636)
6. Majesty's Western King
113111 (16-545)
(Majesty's Rose of St.
Mary 235178 (671))
7. Astor's Fairy Boy 113679
(15-547)
(Lady Astor 269778 (610))
8. Raleigh's Fairy Boy 9th
113825 (15-635)
Raleigh's Queen 210070
(463)

{ Leda's King 96707 (17-519)
(Golden Jolly's Scotie 253312
(519))

2. Mabel's Raleigh P. S.
3722 H. C. (17-492)
(Mabel Marcus 213879)

1. Mabel's Raleigh 77913
(14-505)
(Jolly's Brookhill 210089)
2. Fairy Glen's Raleigh 79438
(35-556)
(Fairy Glen P. S. 9178
H. C. (635))
3. Financial Raleigh 86298
(12-566)
(Financial Daisy 252132
(596))

1. Queen's Raleigh 88232
(34-581)
(Raleigh's Queen 210070
(463))

2. Feather's Raleigh 121428
(11-568)
(Morny Cannon's Feather
210832 (507))

3. Mabel's Fairy Lad 91271
(2-438)
(Mabel's Poetess 214203
(509))

1. Flora's Queen's Raleigh
130251 (27-607)
(Fairy Glen's Flora 253707
(616))
2. Queen's Raleigh's Aristocrat
108060 (11-590)
(Fontaine's Czarina 2d
244315 (503))

{ Jessie's Fairy Lad 112740
(15-494)
(Oxford's Golden Jessie 237418)

1. Oxford Belle's Raleigh
138985 (4-542)
(Distinction's Oxford Belle
255626 (651))

{ Tiddledywick's Raleigh 158391
(16-694)
(Gamboges Tiddledywick
252156 (635))

2. Financial Raleigh's Noble
102230 (5-761)
(Noble's Blanchette
238456)

{ Financial Raleigh's Grover
146595 (10-564)
(Grover's Riotress 247491 (789))

(Sons of Golden Lad P. S. 1242 H. C.)

(Sons of Boyle P. 1559 H. C.)

(Sons of Golden Fern's Lad P. 2160 H. C.)

(Sons of Eminent 69631)

(Sons of Eminent's Raleigh 69011)

3. The Imported Jap 75265
(49-600)
(Fontaine's Gold Medal
203636)

4. Raleigh's Poet 102464
(10-603)
(Mabel's Poet's Nelly
213904 (452))

5. Woodridge Raleigh 82937
(2-496)
(Viola Ridgewood 138623)

(Sons of Mabel's Raleigh)

- 4. Ibsen 87851 (4-496)
(Coral P. S. 9684 H. C.) { Ibsen's Glory 92986 (11-472)
(Dixon's Harbinger 234545
(577))
- 5. Raleigh's Honeymoon Boy 89551 (5-498)
(Honeymoon P. S. 7132
H. C.) { Le Cotil's Raleigh 120688
(14-452)
(Le Cotil's Beauty 233599)
- 6. Pennithorpe's Raleigh 96185 (8-509)
(Mauser's Pennithorpe
253303) { Raleigh's Plymouth Noble
104107 (11-535)
(Noble Plymouth 253319)
- 7. Emigrant P. S. 4269 H. C.
(2-480)
(Fly P. S. 9714 H. C.) { Financial King's Eminent 94592
(27-543)
(Financial Dulcet 249601)

- 1. Karnak's Jap 84363 (11-510)
(Eminent's Lucy Belle
203639)
- 2. Gertrude's Jap 93947 (16-541)
(Gertrude of Meridale
170976 (575))
- 3. Marigold's Jap 100085
(12-502)
(Eminent's Marigold
203469)
- 4. Fairview Jap 134386 (17-514)
(Spermfield Owl's Prin-
cess 227467 (511))
- 5. The Jap's Owl 138146
(11-667)
(Spermfield Owl's Eva
193934 (993))
- 6. Countess' Bonny Lad
152269 (10-551)
(Countess o'D 298350
(494))

Shannon Raleigh 105825 (16-585)
(Shannon Lass 238305)

- | | | | | | |
|--|--|---|--|--|--|
| 17. Golden Jolly P. S. 2921 H. C. (9-470)
(Brookhill Rose 2d P. S. 3440 C.) | 1. Derry's Golden Jolly
82807 (13-458)
(Golden Rose P. S. 7838 H. C.) | 2. Golden Jolly's Master-piece 86295 (18-466)
(Rose Queen P. S. 9535 H. C.) | 3. Viola's Golden Jolly 79314
(16-486)
(Imp. Lady Viola 238437) | 1. Viola's Oxford Lad 89600
(14-616)
(Oxford Firefly 213932) | Butter Cup's Oxford's Eminent
140108 (10-612)
(Eminent's Buttercup of St. Sar 238312 (465) |
| | | | | 2. Viola's Foxy Eminent 90972 (13-566)
(Eminent's Blanche 213950) | |
| | | | | 3. Sultana's Golden Jolly 86180 (21-521)
(Golden Sultana 146282) | Ixia's Fancy Sultan 126788
(20-515)
(Oxford Ixia Fancy 252184) |
| 4. Flowers Hero P. S. 3502 C.
(May Flower 3d P. S. 6569 H. C.) | The Plymouth Lad 89792
(16-543)
(Financial Plymouth 253304) | 1. Plymouth's Laddie 95709
(4-443)
(Naomi 10th P. S. 12988 H. C.) | McKay's Lad 104234 (12-663)
(McKay's Buttercup 245513) | | |
| | | 2. Plymouth Lad's Majesty 91107 (18-658)
(Majesty's Eminent 238334) | | | |
| | | 3. Sea Lad P. S. 4720 H. C.
(10-543)
(Seaweed P. S. 11942 H. C.) | The Imported Cid 199361
(27-587)
(Imp. Castille 462596) | | |
| | | 4. Plymouth Lad's Golden Jolly 88240 (4-470)
(Clementine Lady P. S. 13049 C. (463) | Plymouth Hallowe'en Fox 102320 (16-532)
(Sweet Apple Blossom 235097 (507) | | |
| | | 5. Benedictine's Plymouth Lad 91106 (10-501)
(Benedictine's Lady Carita 238303) | | | |
| 5. Highfield Lad P. S. 3575
H. C. (1-504)
(Jetty of Kirfield 210878) | Broadlands Glory P. S. 3903
H. C. (2-450)
(Self Help P. S. 9664 H. C.) | Imp. Champion Rower 167487
(17-579)
(Mon Plaisir's Fancy 3d 234162) | | | |

(Sons of Golden Lad P. S. 1242 H. C.)

(Sons of Boyle P. 1559 H. C.)

(Sons of Golden Fern's Lad P. 2160 H. C.)

18

Champion Flying Fox 61441 (45-594) (Sultana's Rosette 149740)

1. Gedney Farm Oxford Lad 71238 (24-473) (Oxford Lass P. S. 3582 C.)

1. Imp. Stockwell 75264 (11-456) (Abier's Golden Leda 191677)

2. Gedney Farm Girls Oxford 75998 (39-577) (Girl of the Island 177564)

3. Royal Majesty 79313 (45-578) (Oxford Ixia 3d P. S. 8584 H. C.)

1. Financial Kings Stockwell 106574 (20-585) (King's Vesta 161065)
2. Stockwell's Trinity Prince 79317 (17-471) (Rose Blair F. S. 9354 H. C.)
3. Stockwell's Fern Laddie 104236 (11-571) (Prince's Fern Lass 239653)

Roycroft Eminent 103231 (24-525) (Eminent's Bess 209719 (971))

1. Majestic Fern 84428 (27-563) (Golden Fern's Victory 213876)

2. Royal Majesty of St. Cloud 89541 (83-573) (Jolly Lady of Beechwood 213915)

3. Majesty's Poet 84337 (10-602) (Mabel's Poet's Nelly 213904 (452))

4. Majesty's Wonder 90717 (15-470) (Mina's Dewdrop 211648)

5. Ida's Majesty 86302 (3-521) (The King's Oxford Ixia 238443)

6. Golden Majesty 90041 (7-593) (Golden Jolly's Dark Lady 213925)

7. Majesty's Poet 84337 (10-602) (Mabel's Poet's Nelly 213904 (452))

8. Majesty's Star 104594 (17-629) (Bushy Belle 238328 (550))

1. Financial Beauty's King 132904 (24-634) (Financial Beauty 271399 (640))
2. Jersey Crest Stockwell 1-33279 (10-452) (Golden Owl's Belle 2895-83 (480))
3. Sans Alois's Niece's King 146291 (13-532) (Sans Alois's Niece 288904 (622))

Davis Majestic 122896 (13-583) (Exile's Grand Thyme 2-11887)

1. Golden Lily's Majesty 11-9596 (12-546) (Champion's Golden Lily 232415 (424))

2. Mon Plaisir's Majesty of F. 126484 (14-575) (Mon Plaisir's Fanny 3d 234162)

3. Royal Majesty of Sunshine 143784 (21-504) (Mona's May Melrose 232392) (645)

Majesty's Gamboge Lad 119409 (12-570) (Gamboge's Crocus 252147 (444))

1. Erdenheim's Honor Bright 135355 (11-629) (Oxford Majesty's Rosy Morn 254623 (565))

2. Majesty's Intense 227191 (10-508) (Majesty's Iris 265701 (964))

Garland's Majesty 147140 (14-571) (Trevarth's Garland 208604)

(Son of Royal Majesty 79313.—See 3 above.)

9. Imp. Oxford Majesty 134-09 (46-543)
(Oxford Lad's Lucy 213913

1. Oxford Handsome Prince 83338 (12-500)
(Handsome Princess - 211477 (385)
2. Julia's Majesty 89717 (9-494)
(Lord Brookhill's Julia 235177) { Gamboge's Vellum's Majesty 123063 (15-559)
(Gamboge's Vellum 257609 (502)
3. Fanny's Oxford Majesty 91781 (19-526)
(Lucy's Champion Fanny 224601)
4. Ella's Majesty Oxford 99911 (13-565)
(Imp. Ella Bowyer 246033)
5. Le Gros 102789 (21-581)
(My Lady Moon 257190 (505)
6. Nurse's Majesty 149002 (20-531)
(La Sente's Nursie P. S. 19766 H. C.)
7. Imp. Gamboge's Royal Majesty 149864 (17-558)
(Majesty's Pride 2d P. S. 14462 C.) { 1. Gamboge's Royal Heritage 126140 (14-598)
(Knight's Oxford Lucy 31795)
2. Sybil's Gamboge 174663 (48-650)
(Gamboge Oxford Sybil 337787)
8. Belvedere's Gamboge Majesty 97440 (13-491)
(Gamboge's Pride 3d P. S. 8168 C)
9. Imp. Oxford Majesty 2d 152182 (13-698)
Gamboge's Oxford Sybil P. S. 21012 H. C.) { Majesty's Heir Apparent 168268 (10-653)
(You'll Do's Gracy 365723 (734)
10. Dairylike Majesty 198188 (84-610)
(Sweet Dairylike 378464 (703)) { 1. Sir Oxford's Majesty 105869 (13-579)
(Oxford Tiddledywink 252228 (413)
2. Sir Oxford's Majesty 105869 (13-579)
(Oxford Tiddledywink 252228 (413)
11. Sir Oxford 93052 (1-659)
(Raleigh's Lucy'Belle 238319)
12. Imp. Champion Majesty 93535
(Gamboge's Crocus 252147 (448)) { Dulcet's Majesty 98230 (27-509)
(Financial Dulcet 249601)
13. Majesty's Oxford King 93277 (9-502)
(Gamboge's Oxford Lass 252189) { Majesty's Oxford Fox 134214 (18-557)
(Shylock's Oxford Daisy 241822)

(Sons of Golden Lad P. S. 1242 H. C.)

(Sons of Boyle P. 1559 H. C.)

(Sons of Golden Fern's Lad P. 2160 H. C.)

(Sons of Champion Flying Fox 61441)

(Sons of Gedney Farm Oxford Lad 71238)

- | | | |
|--|--|--|
| <p>4. Model's Oxford Lad 66518
(11-454)
(My Model of Perfection
180237)</p> | <p>{ Oxford's Lad's Progress 92916
(16-585)
(Spermfield Owl's Belle 194051
(645)</p> | <p>1. Owl's Oxford Interest
121457 (18-544)
(Owl's Interested Matilda
211989 (524)</p> |
| <p>5. Gamboge's Oxford Lad
67284 (25-520)
(Gamboge's Gray Princess
180266,</p> | | <p>2. Oxford Lad's Owl of D. H.
147267 (31-621)
(Owl's Interested Veda
Choice 282548 (580)</p> |
| <p>6. Sultana's Oxford Lad
76506 (10-492)
(Golden Sultana 146282)</p> | <p>{ Sultana's Fawn Prince 90064
(11-489)
(Stockwell's Golden Lady
213952)</p> | <p>3. Spermfield's Owl's Prog-
ress 163331 (16-678)
(Spermfield Owl's Temesia
215982 (891)</p> |
| <p>7. The Owl's Oxford Prince
95699 (15-520)
(Lilac P. S. 7996 C.)</p> | <p>{ 1. Sayda's Oxford Owl
121234 (12-569)
(Sayda's Rose 2d 247207
(632)</p> | |
| <p>8. Lucy's Champion 79315
(6-422)
(Eminent's Lucy Belle
203639)</p> | <p>{ 2. Meridale Oxford Owl
118444 (13-633)
(Owl's Brown Duchess
212141 (742)</p> | <p>1. Scott's Champion 105387
(11-439)
(Kittie's Maid 211635
(379)</p> |
| <p>9. Gedney Farm Napoleon
Oxford 93795 (13-593)
(Madame Bonaparte
187439)</p> | <p>{ 1. Morocco's Champion
86841 (1-390)
(Morocco's Pet 211595)
2. Imp. Ramsgate Champion
93534 (16-585)
(Lady Ramsgate P. S.
12314 H. C.)</p> | <p>2. Morocco's Pioneer 105679
(31-662)
(Renown Lady 232785)</p> |
| <p>10. Leda's Oxford Lad 75096
(3-428)
(Ahier's Golden Leda
191677)</p> | <p>{ 1. Rockwood Laddie 82915
(13-599)
(Hope's Finance 167379)
2. Oxford Victory 83122
(10-483)
(Rozel's Victory 191682)</p> | |

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|---|---|--|--|--|---|
| 2. Bobby's Shy
Fox 64760
(1-428)
(Venus Violet
P. S. 3946
H. C.) | { Blue Belle's
Blue Fox 69632
(Imp. Blue Belle
180234) | 1. Idle Hour
Blue Belle
Prince 722-
92 (41-523)
(Golden Fern's
Carnation
187424) | 1. Nobleman of St. Cloud
76091 (17-501)
(Fontaine's Gold Medal
203636) | { Great Scot's Nobleman I2566
(18-564)
(Great Scot's Champion 203703
719) | |
| | | 2. Noble of Oak-
lands 95700
(44-464)
(Imp. Lady
Viola 238437) | 2. Noble's Raleigh 82757
(15-572)
(Raleigh's Brown Fon-
taine 238440) | { Noble Lorne Count 104770
(2-623)
(Bessie Lorne's Marigold 252691) | { Financial Noble Count 132126
(20-626)
(Tormentor's Ruby Countess
250588) |
| | | | 3. Karnak's Noble 87952
(28-526)
(Raleigh's Pretty Karnak
252135 (574)) | | |
| | | | 4. Aldan's Noble 89581
(10-460)
(Mabel Poet's Lady Aldan
238438) | { Aldan's Lehigh 120836 (10-529)
(Lady Kilburn 213935) | |
| | | | 5. Noble Duke of Oaklands
89682 (14-601)
(Ozouf's Duchess of Tapon
238640) | | |
| | | | 6. Raleigh's Noble 90478
(13-482)
(Raleigh's Duchess of St.
Sav. 235186) | | |
| | | | 7. Noble Peer 90653 (10-581)
(Golden Lassie F. S.
9548 H. C.) | { Doctor of Fair Acres 108360
(6-554)
(Doctor Ethel Mason 240814) | { St. Mawes Noble 132488
(15-665)
(St. Mawes Queen 229067 (594)) |
| | | | 8. Glory's Noble 90655
(22-541)
(Solitude's Glory F. S.
9751 H. C.) | | |
| | | | 9. Noble's Fawn Prince
95705 (13-580)
(Gambage's Handsome
Duchess 252150 (605)) | | |
| | | | 10. Togo's Noble Lord 96421
(13-457)
(Togo's Primrose P. S.
13211 H. C.) | | |
| | | | 11. Noble's Jolly Sultan 97181
(27-529)
(Young Jolly Sultane
269762) | | |

(Sons of Golden Lad P. S. 1242 H. C.)

(Sons of Boyle P. 1559 H. C.)

(Sons of Golden Fern's Lad P. 2160 H. C.)

(Sons of Champion Flying Fox 61441)

(Bobby's Shy Fox 64760)

(Blue Bell's Blue Fox 69632)

(Noble of Oaklands 95700)

- | | | |
|--|---|---|
| <p>12. Noble's Oxford Sultan
106403 (17-503)
(Sultana's Fawn Beatrice
239728 (384)</p> <p>13. Noble Sultan 106673
(13-467)
(Sultana's Tiny Interest
252158)</p> <p>14. Noble Sensational Lad
118536 (20-657)
(Golden Fern's Sensation
173201 (498)</p> <p>15. Imp. Cowslip's Golden
Noble 120789 (26-496)
(Cowslip 16th P. S. 6048
H. C.)</p> <p>16. Imp. Golden Fern's Noble
155762 (65-537)
(Lady Aldan P. 8470 H.
C.)</p> | <p>1. Noble Owl of Oxford
113061 (7-636)
(Oxford's Theresa Rook
289457)</p> <p>2. Golden Fern's Noble Jr.
103746 (11-623)
(Castilian Princess
266582)</p> <p>3. Golden Fern's Finance
104014 (13-518)
(Flying Vixen 274778)</p> <p>4. Financial Fern Noble
113644 (21-583)
(Draconis 7th P. S. 9907
H. C. (4-516)</p> <p>5. Fussy's Fern Noble 129041
(10-516)
(Fussy P. S. 1157 H. C.)</p> <p>6. Golden Maid's Golden
Fern 147475 (15-592)
(Jan F. S. 10350 C.)</p> <p>7. Imp. Fern's Oxford Noble
160983 (35-576)
(Oxford Triumph P. S.
12120 H. C.)</p> <p>8. Cannon's Fern Lad 117293
(Golden Fleece 6th P. S.
13399 H. C.)</p> | <p>{ Mannsfield Noble Major 147149
(10-510)
(Rhoda of Mannsfield 257075
(688)</p> <p>{ Financial Fern Fontaine 13279
(13-592)
(Count's Bessie Fontaine
280291 (438)</p> <p>{ Golden Fern's Militiman
147510 (14-593)
(Oxford Majesty's Gouda
343946</p> <p>{ Hilltop's Happy Days 136444
(14-518)
(Imp. Claqueur 269976 (546)</p> |
| <p>17. Fontaine's Chieftain 97158
(32-562)
(Raleigh's Brown Fon-
taine 238440)</p> <p>18. Imp. Expectation Noble
86786 (2-391)
(Swift's Expectation
233596)</p> <p>19. Lucy's Noble 87218
(Imp. Lucy Belle of St.
Lawrence 241428)</p> <p>20. Oaklands Noble Cham-
pion 86306 (5-463)
(Champion's Maid P. S.
12009 C.)</p> | <p>1. Noble's Aristocratic Boy 101939
(21-600)</p> <p>{ Imp. Nameless Mabel 231690
(448)</p> <p>{ Oise's Noble 95164 (10-550)
(Oise's Lass 232802)</p> <p>{ Fairy's Noble Boy 93378
(10-468)
(Fairy Boy's Beauty 230401
(681)</p> | <p>{ Ixia's Noble Raleigh 102596
(13-505)
(Oxford Ixia of Fair View
238442 (435)</p> |

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| <p>3. King' Fox 64667 (17-462)
(Hope's Finance 167379)</p> <p>4. Flying Fox's Victor 64768
(21-498)
(Dulce of Oaklands F. S.
8801 H. C.)</p> <p>5. Fox's Johnnie O'Dream-
wold 68143 (13-443)
(Golden Bess of St. John
162102)</p> <p>6. Oxford Daisy's Flying Fox
83284 (41-601)
(The Owl's Oxford Daisy
162113)</p> <p>7. Blue Belle's Flying Fox
64762 (2-457)
(Golden Lad's Blue Belle
172290)</p> <p>8. Agatha's Flying Fox 68212
(Agatha of Oak-
lands 162101)</p> | <p>{ Master Fox 80051 (12-497)
(Queen Ves 173667)</p> <p>{ Eminent 2d's Fox 74177
(20-469)
(Eminent 2d's Bess 171792)</p> <p>{ 1. Gamboge's
Knight 95698
(52-514)
(Fontaine's Ox-
ford Pride
187430)</p> | <p>1. Imp. Oxford You'll Do
111860 (83-542)
(Oxford Ever P. 9340
H. C.)</p> <p>2. Fontaine's Gamboge
Knight 96186 (15-505)
(Vellum 6th P. S. 9549
H. C.)</p> <p>3. Golden Tycoon 104240
(Golden Spot's Lucy
252274 (418)</p> <p>4. Gamboge Knight's Fox
106160 (11-659)
(Masie's Red Fox 221944
(519)</p> <p>5. Village Knight 120791
(17-593)
(Villageoise P. S. 13142
H. C.)</p> <p>6. Champion Knight 93537
(5-500)
(Tradition of A. D. F.
241451</p> | <p>1. Oxford Sultan of Oakland
211060 (8-619)
(Noble Sultan of Oakland
P. S. 17218 H. C.)</p> <p>2. Dairy's Pretty Oxford
120937 (2-560)
(Oxford's Pretty Dairy
227260)</p> <p>3. You'll Do's Golden Noble
160958 (12-520)
(Fern's Philippa 271124
(461)</p> <p>4. You'll Do Financial War-
den 137540 (10-507)
Princess Lena P. S. 13303
H. C.</p> <p>5. Imp. Blonde's Golden
Oxford 200863 (18-590)
Bright Blonde P. S. 17450
H. C.</p> <p>6. You'll Do's Fontaine
150686 (11-581)
Fontaine's Dolly P. S.
12855 H. C.</p> <p>7. Oxford He'll Do 97973
(10-483)
(March' Flower 245294)</p> <p>8. You'll Do Oxford 98772
(19-550)
(Noble's Christmas Nurse
289453)</p> <p>9. Oxford You'll Do Jr.
102269 (15-608)
(Queen Tilda F. S. 9381C)</p> <p>10. Tom You'll Do 113062
(20-490)
(Noble's Vespasia 89456)</p> <p>11. Robert You'll Do 120790
(13-606)
(Lady Belinda P. S.
15725 H. C.)</p> <p>12. Oxford's Nunthrope Fox
126475 (11-627)
(Pearl 5th P. S. 11273
H. C.)</p> | <p>{ Fly Sultan P. S.
5415C (2-449)
(Golden Noble's
Faun Beauty
378480)</p> <p>{ Sue's Oxford
Lad 153409 (3-
717)
(Golden Noble's
Sue 381177
(649)</p> <p>{ Xenia's Sultan 224118 (12-589)
(Xenia' 2d P. S. 17747 H. C.)</p> <p>{ Noble Lad You'll Do 169249
(11-563)
(Golden Fern Jacoba 402412
(598)</p> |
|--|--|--|--|--|

(Sons of Golden Lad P. S. 1242 H. C.)

(Sons of Boyle P. 1559 H. C.)

(Sons of Golden Fern's Lad P. 2160 H. C.)

(Sons of Champion Flying Fox 61441)

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|-----|---|--|--|---|
| | (Sons of Agatha's Flying Fox 68212) | <ol style="list-style-type: none"> 2. Combination of St. Saviour's 88245 (16-507) (Gedney Farm Jersey Skater 183139) 3. Sultan of Oaklands 78475 (22-458) (Sultana's Snowdrop 185045) 4. Agatha's Blue Fox 69634 (4-422) (Blue Belle 8698 5th P. S. 8698 H. C.) | <ol style="list-style-type: none"> 1. Imp. Combination's Premier 150715 (31-572) (Oakland's Bess P. S. 9833 H. C.) 2. Combination's Hillside Lad 89246 (3-506) (Rozel's Pet 11th P. S. 8937 H. C.) | <p>{ Octavia's Duke 102270 (13551) (Lady Octavia P. S. 12882 H. C.)</p> |
| | | | <p>{ Queen's Sultan Lad 92257 (Exile St. Lambert Queen 10-1613)</p> | <p>{ Sultan's Alice's Lad 116964 (11-455) (McLallen's Alice 203207)</p> |
| 9. | Flying Fox's Foxhall 61435 (1-550) (Golden Lad's Creampot 162061) | <p>{ Foxhall's Jubilee 76944 (25-567) (Blossom of Florence 164108 (613)</p> | <ol style="list-style-type: none"> 1. Blossom's Foxhall 82038 (10-503) (Sweet Blossom of Florence 197130 (432) 2. Jubilee's Foxhall 82299 (10-419) (Signalone of Florence 195090 (504) 3. Foxhall's Fern Lad 99378 (10-636) (Fern of Florence 2d 205059 (527) 4. Foxhall's Champion 124108 (15-576) (Foxhall's Carola 236985 (727) | |
| 10. | Figgis's Fox O'Dreamwold 68140 (Figgis 76106) | <p>{ Pretty Maid's Figgis's Fox O'D. 89351 (16-473) (Flying Fox's Pretty Maid 162134)</p> | | |
| 11. | Foxs Grey O'Dreamwold 68140 (Lively's Grey Ruby 157605) | <p>{ Brockton O'Dreamwold 77455 (1-439) (King Figgis O-Dreamwold 192998)</p> | <p>{ Brockton's Jolly of Oakland 92100 (2-505) (Mabel's Jolly 203710)</p> | <p>{ Ev-Ken of Dover 112708 (12-532) (A Foxy Maid 209640)</p> |

Chart II.—Sires Descended from Khedive P. 103 H. C. (Coomassie 11874)

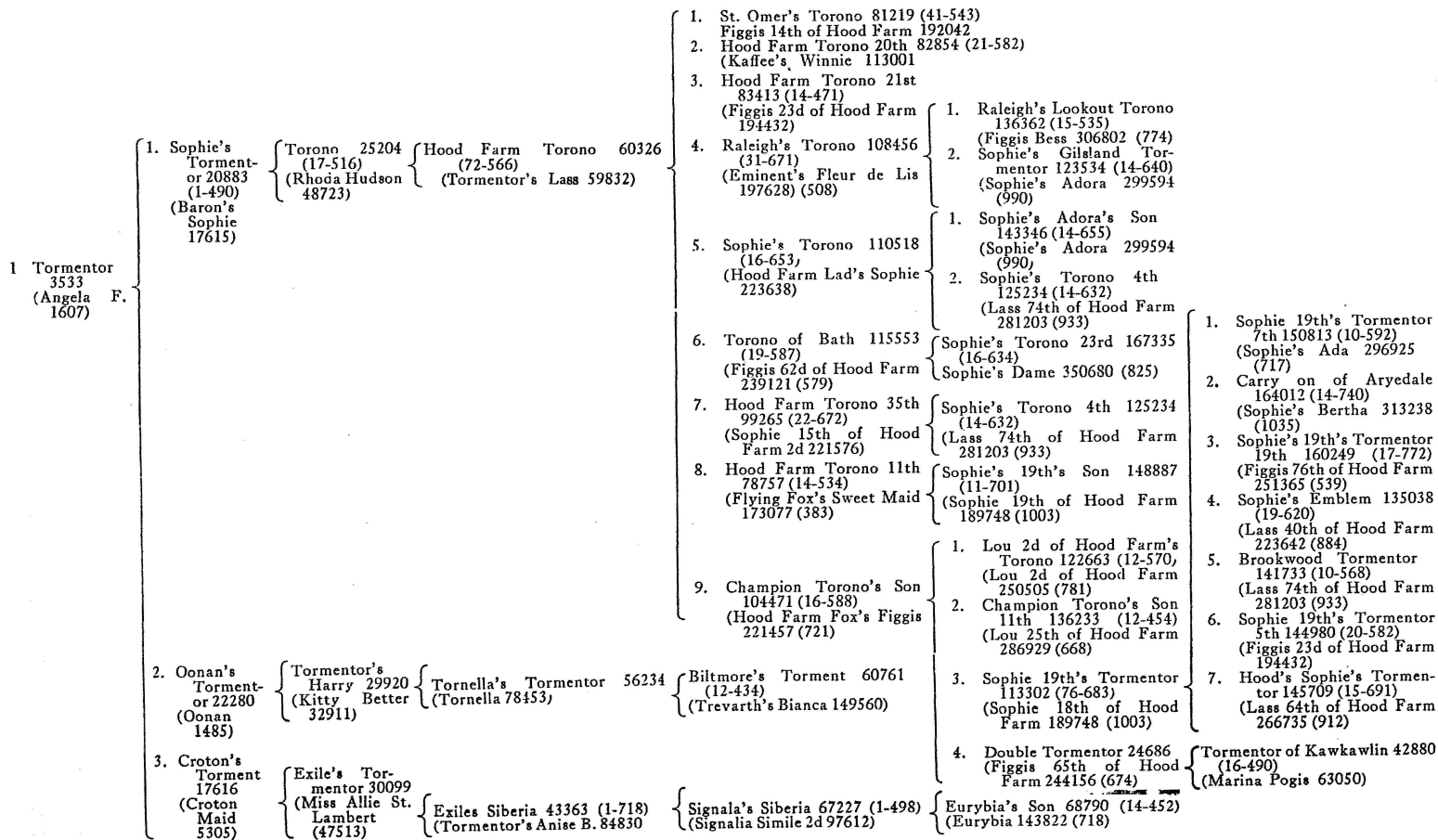


Chart II (Continued).—Sires Descended From Khedive P. 103 H. C. (Coomassie 11874)

- 2. Kaffees Noble 14631 (Queen of Ashantee 14554) {
 - Kaffees Guy Fawks 39309 (Kaffee 58204) {
 - Saydas Heir 45360 (14-498) (Saydas Princess 67385) {
 - Saydas Heir 3rd 47817 (62-565) (Ventor B's Jennie 129768) {
 - 1. Heir of Crystal Springs 136778 (16-670) (Jap's Milla Garfield 246123 (949))
 - 2. Sayda's King of Meridale 121724 (22-740) (Sayda's Queen of Ventnor 168033 (806))
 - 3. Jap Sayda's Baron 142559 (11-607) (Jap's Sayda's Baroness 321895 (966)) {
 - Sprite's Baron 161874 (15-684)
 - (Meridale Countess 299456 (419))

3. Victor Hugo
197
(John De-
Veuille's
Prize cow
of 1863)

Lord Lisgar
1066
(Pauline 494)

Orloff 3143
(Ophelie 493)

Bachelor of St.
Lambert
4558
(Charity of St.
Lambert
6638)

1. Exile of St.
Lambert
13657
(Allie of St.
Lambert
24991)

2. Ida's Rioter
of St. L.
13656
(Ida of St.
Lambert
24990)

1. KoKo of St
Lambert
16527
(Clotaire's
Beauty
28171)

2. Oregon's
F.xile
39871
(Albert's
Kosi
58468)

1. King of St.
Lambert
15175
(Allie of St.
Lambert
24991)

2. Ida's Rioter
of St. L.
8th 40898
3. Ida's Rioter
of St. L.
11th
41012
(Dew 62474)

{ KoKo of St. Lambert 6th 30378
(Cleodoxa 59311)

{ Little Exile 49960
(Landseer's Nettie 65322)

1. St. Lambert's Rioter King
54896 (8-474)
(St. Lambert's Riotress
106220 (478)

2. King of St. Lambert's
King 30752 (3-410)
(Elsie Bonner 78864)

3. Rioter of St. Lambert
16501
(May Day Stoke Pogis
28353)

{ Inda Landseer's Rioter 52103
(Inda Landseer 2d 98677)

{ Rioter's Jersey Lad 58001
(24-521)
(Lad's Lily 99422)

{ Alpheia's Clotaire 47368
(Exile's Alpheia 45393)

{ Springhill Exile 57911
(Miss Fanny W. 125719)

1. Edith Hugo's St. L. Rioter
King 64303
(Rioter's Edith Hugo
142248)
2. Doss Exile King of St. L.
66712 (1-534)
(Exile Maud Coquette
143807)

1. King Sappho King 65262
(25-461)
(Exile Sappho 114262)

2. King Bonner King 61788
(4-433)
(Elsie Bonner 78864)

3. Lorna's King of St. L.
King 57389 (6-460)
(Lorna of Maple Glens
48094)

{ Rioter of St. Lambert Jr.
56580
(Phillis of St. Lambert 78867)

{ Rioter B. K. Helma 66053 (11-
481)
(Baron's K. Helma 128405)

{ Minaret Exile 56933 (11-450)
(Lanison's Minnie 3d 134011)

{ Samson Exile 72702 (10-527)
(Dayton Dame 141097)

{ Captain Hugo 72410 (11-513)
(Nora Hugo Lass 169948)

{ St. Lambert of Winona 79567
(12-516)
(Rioter Letty King of St.
L. 2d 211418)

1. Winnie Pedro's King
72947 (12-621)
(Winnie Pedro Pogis 4th
184049)
2. Wisconsin University's
King 74943
(Miss Juanita 119249)

{ Rose's King Bonner 75839
(10-532)
(Raleigh's Rose 185410 (605)

{ Loretta's King 65050 (59-512)
(Loretta D. 141708 (729)

1. Lady Letty 4th's Rioter
76533 (10-481)
(Lady Letty Lambert 4th
169502)

2. Lady Letty's Victor 65020
(41-573)
(Lady Letty Lambert
124201)

3. Maud's Melia Rioter
75751 (18-516)
(Maud Melia Ann 149774)

{ Double Time's Varsity King
82315 (2-474)*
(Double Time 157531)

*Son of Double Time's Varsity
King 82315 (2-474)
-Bonnetta's King 108980
(18-570)
(Eminent's Bonnetta 246269
(394)

Chart II—Sires Descended from Khedive P. 103 H. C. (Coomassie 11874) (Continued)

(Through Victor Hugo 197, Lord Lisgar 1066, Orloff 3143, and Bachelor of St. Lambert 4558 to Ida's Stoke Pogis 13658)

3. Ida's Stoke Pogis 13658 (Ida of St. Lambert 24990)

{ Oonan's Pogis 17165 (Oonan 1485)

1. Hood Farm Pogis 40684 (Kathletta's Fancy 60738)

{ Hood Farm Pogis 9th 5552 (79-531) (Figgis 76106)

1. Pogis 99th of Hood Farm 94502 (104-701) (Sophie 19th of Hood Farm 189743 (1003)

1. Pogis 99th of Hood Farm 53rd 168456 (12-638) (Figgis 91st of Hood Farm 261868 (499)

2. Pogis 99th of Hood Farm 57th 170476 (10-614) (Lass 92nd of Hood Farm 302072 (828)

3. Sophie's Climax 139809 (16-607) (Hood Farm Torono's Last 305388 (744)

4. Hillside Torono 101792 (29-705) (Lass 57th of Hood Farm 258731 (793)

5. Sophie's Premier 111613 (29-653) (Fern 7th of Hood Farm 264342 (641)

6. Pogis 99th of Hood Farm 7th 118462 (17-614) (Lass 60th of Hood Farm 264343 (595)

7. Pogis 99th of Hood Farm 21st 133582 (16-714) (Lass 53d of Hood Farm 256901 (739)

8. Pogis 999 of Hood Farm 103827 (8-547) (Lass 55th of Hood Farm 257379 (682)

9. Lass 89th of Hood Farm's Son 165860 (13-606) (Lass 89th of Hood Farm 300426 (805)

10. Sophie's Pogis 125595 (19-553) (Figgis 31st of Hood Farm 202311 (732)

11. Pogis 99th of Hood Farm 28th 138349 (13-602) (Lass 68th of Hood Farm 274621 (770)

12. Creek Farm S. Tormentor 139993 (10-612) (Lass 58th of Hood Farm 261869 (578)

{ 1. Marguerite's Premier 137370 (18-577) (L. K. S. Marguerite 251190 (699)

{ 2. Jacoba's Loretta's Premier 132364 (2-547) (Jacoba's Loretta 251186 (802)

{ *Son of Jacoba's Loretta's Premier 132364 (2-547)

{ Jacoba's Farm Boy 169934 (10-599) (Sophie's J. H. L. K. Idelpha 337395 (618)

{ Pogis' Noble Prince 125032 (10-582) (Miss China Princess 285193 (771)

{ Sophie's Pogis B. 155856 (10-556) (Lontie Leonard 281969)

2. Sir Donald 39047
 (Moyane C. 86-492)

{ Valentine's Oonan 58076
 (20-478)
 { (Dollie's Valentine 105049 (645)

3. Oonan's Pogis 7th 47902
 (6-449)
 (Clara Oonan 78454)

{ Oonan's Count 57470 (19-442)
 { (Countess Matilda 74928)

2. Lookout Torono 78593
 (31-483)
 (Hood Farm Tonono 2d 189729 (444)

{ Pogis of Goliad 84397 (11-539)
 { Oonan's Lois 163629 (516)

3. Torona Pogis 78657
 (28-559)
 (Hood Farm Tonona 153471 (445)

{ Ophelia's Challenger 120468
 { (15-586)
 { (Alcarano's Ophelia 219348 (638)

4. Pogis 75th of Hood Farm 94501 (20-647)
 (Warder's Lady 195777 (839)

{ 1. Lime Ridge Lass 30th's Pogis 107192 (17-536)
 { (Lass 30th of Hood Farm 214511 (797)
 { 2. Lou's Torono 106614 (15-590)
 { (Lou 2d of Hood Farm 250505 (781)

5. Pogis 94th of Hood Farm 90492 (16-547)
 (Flying Fox's Sweet Maid 173077 (383)

6. Hood Farm Figgis Torono 90517 (23-533)
 (Tonona 3d of Hood Farm 163721)

7. Pogis 21st of Hood Farm 68590
 (Brown Bessie 8th of H. F. 11891)

{ Crosby 73884 (2-479)
 { (Hood Farm Ethel 177407)

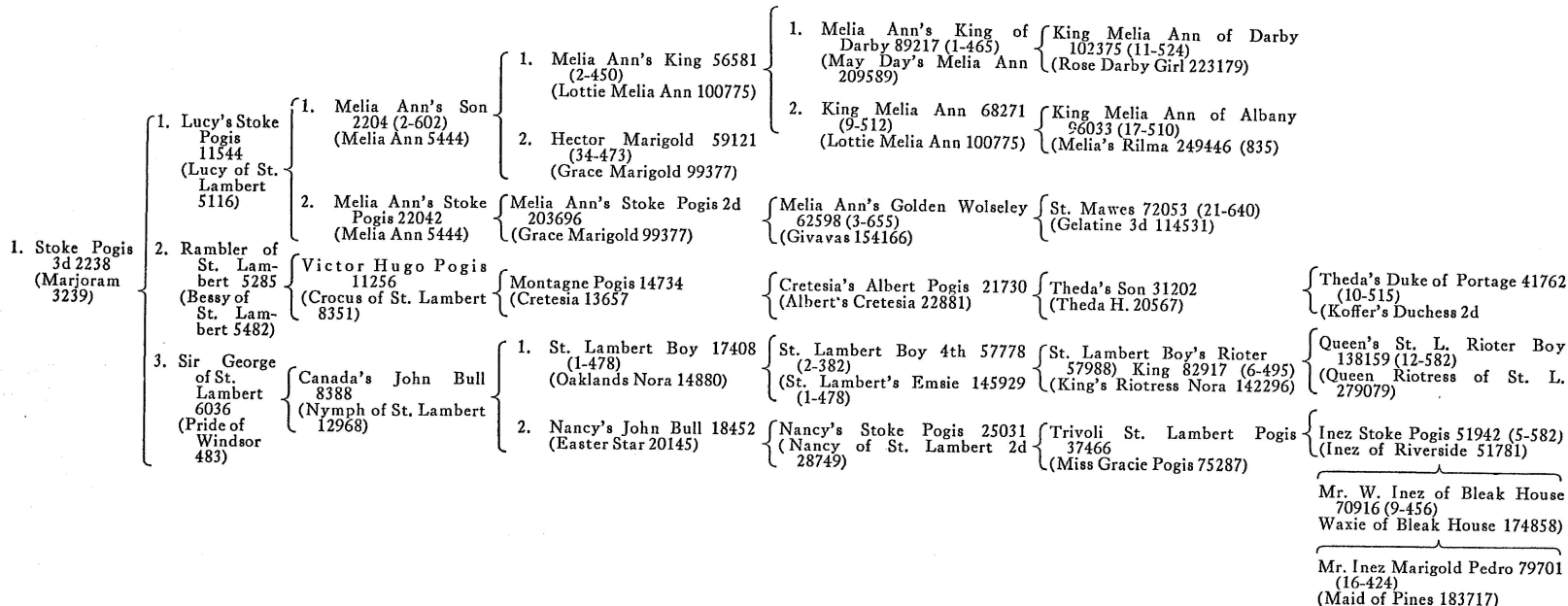
{ Leo of Smith Farm 80490 (11-602)
 { (Hood Farm Bet 184249)

8. Pogis 95th of Hood Farm 92626 (26-660)
 (Belle 7th of Hood Farm 198780 (504)

{ Valetine's Count 69878 (17-420)
 { (Oonan's Countess 163628 (514)

Chart III.—Descendants of Several Jersey Bulls.

Stoke Pogis 1259



- | | | | | | | | | |
|--|---|--|--|--|--|--|--|---|
| 2. Stoke Pogis
5th 5987
(Marjoram
3239) | { Stoke Pogis of
Prospect
29121
(10-593) | { <ol style="list-style-type: none"> 1. Gertie's Son 66463
 (4-580)
 (Gertie of Glynllyn
 74474) 2. Springvale Stoke
 Pogis 54779 (11-
 474)
 (Daisy Harrison
 69253) 3. Gerties Stoke Pogis
 56492 (15-568)
 (Gertie of Glynllyn
 74474) 4. Marigold Pedro
 42643
 (Lorna 2d 22634) | { <ol style="list-style-type: none"> 1. Gertie's Son's Boy 71825
 (12-529)
 (Flossie Gold Leaf 169498) 2. Pride's Olga 4th's Son
 78574
 (Pride's Olga 4th 96870) 3. Pride's Olga Rosaire's
 Son 84768 (17-448)
 (Pride's Olga Rosaire
 194383) 4. Gertie's Son's Victor
 123159 (23-484)
 (Victor's Lady Kate
 218118 (585) | { <ol style="list-style-type: none"> 1. Pride's Olga 3d's King
 83683 (17-538)
 (Pride's Olga 3d 79897) 2. Rosaire's Olga Lad 87498
 (51-662)
 (Ann Rosaire 194379 (711) | { <ol style="list-style-type: none"> 1. Poppy's St. Mawes 115434
 (24-663)
 (St. Mawes Poppy 219992
 (956) 2. St. Mawes of Ashburn
 115996 (22-741)
 (St. Mawes Blossom
 229066 (714) 3. St. Mawes Golden Poppy
 125510 (23-738)
 (St. Mawes Poppy 219992
 (956) 4. Poppy's Maiden's Rosaire
 Lad 154477 (11-753)
 (Poppy's Maiden 272128
 (731) | { <ol style="list-style-type: none"> 1. Poppy's St. Mawes Prince
 126055 (11-703)
 (Gertie's Fern Princess
 244952 (821) 2. Susy's St. Mawes 135577
 (10-683)
 (St. Mawes Susy 219991
 (895) 3. St. Mawes Lad 130501
 (21-858)
 (St. Mawes Beauty 295047
 (933) 1. Dufрана's Poppy 164074
 (11-658)
 (Dufрана's Jessie 265137
 (623) 2. Daisy Golden Poppy
 143372 (13-741)
 (Daisy of Glengary 216615
 (488) 3. Poppy's George 150537
 (16-650)
 (Georgie's Grace 2d
 194237 (451) 4. Susie's St. Mawes Poppy
 146965 (11-656)
 (Nashville Susie 265138
 (596) | | |
| | | | | | | | { <ol style="list-style-type: none"> 1. Mistletoe Pogis 75371
 (10-530)
 (Brown Bessie's Marine
 147527) 2. Gertie's Stoke Pogis 7th
 65796
 (Golden Glow 2d 148165) | { <ol style="list-style-type: none"> Illahee Stoke Pogis 97031
 (10-553)
 (Twilight of N. I. 175478) |
| | | | | | | | { <ol style="list-style-type: none"> Gazelle's King Marigold 55201
 (2-477) (Gazelle's Fawn 93704) | { <ol style="list-style-type: none"> Marigold's Exile King 63232
 (14-512) (September Maid 100718) |

Chart III. (Continued)—Descendants of Several Jersey Bulls

Combination 4389

Combination 3d 17576 (Coma 29330)	{ Brown Bessie's Son 34550 (Brown Bessie 74997)	1.	Brown Bessie's Di- ploma 39344 (Sombre 80796)	{ Chief Engineer 47148 (11-577) (Sulphide 88038)	{ Golden Glow's Chief 61460 (40-592) (Golden Glow 129238)	{ G. G. Chief of Ashburn 86044 (17-554) Josy's Glow 198785 (477)	{ Lulu's Ashburn Chief 126214 (12-535) (Lulu of Ashburn 247954 (428)
2. Dorinda Darling's Diplo- ma 71816 (Dorinda Darling 146249 (676)	{ Diploma's Bijou Boy 86292 (10-469) (Oonan's Bijou 2d 182195 (563)						
		3. Loretta D's Champion 72983 (4-467) (Loretta D. 141708 (729)	{ Loretta D's Champion's Son 77002 (16-451) (Harry's Duchess 3d 123282)				
Young Com- bination 14550 (Goodbye 27366)	{ Compass 16958 (Paradise 32082)			{ Metaphor 23176 (Script 43308)	{ Minute Gum 34775 (4-594) (Tapestry 56607)	{ Diploma's Dairyman 57789 (2-467) (Diploma's Grinnella 145775)	{ Brown Lassie's Son 68873 (5-467) (Diploma's Brown Lassie 166688 (709)

Osprey 17385 (1-408) (Erith 4564)

Fairgold St. Helier 52657 (9-482) Fair Marigold 89387)	{ Merry Miss' Son 76629 (7-545) (Merry Miss 180051 (740)	1. Adelaide's Merry Pogis 91365 (4-594) (Adelaide of Beechlands 168699 (878)	{ Adelaides Sultan 123005 (14- 621) Sultane Sophie 203302 (683)

Kilnarnock P. S. 3155 H. C. { Galway 68208 (1-398)
 Fern of L'Etacq F. S. 8848 { (Shamrock of River Meadow 73052
 H. C. { (191348) { Galway Rioter 84947 { (Missel Brookside 182101) { Galway Fern Rioter 98284
 { (13-614)
 { (Victor's Albertie 240616 (532)

Agar of P. 41638 { Sirdar of St. Lambert 53084 { Sirdar of Hebron 70161 { Hebron Victor 80100 (17-521)
 (Oriana Pogis 64752) { (1-450) { (Cream Victor Pogis 168915) { (Nadge Dorce 64075)

Meteor P. S. 3275 C. (1-371) { Gray Prince of St. Saviour { Lady's Prince George 99374 { Eminent's Oxford Majesty { Oxford's Raleigh Lad 147957
 { 67283 (3-448) { (Eminent's Lady Beatrice 219602) { 113857 (2-560) { (10-484)
 { (Reminder's Soucique 180380) { (Sultan King's Madge 275934) { (Lad's Brown Beauty 273439)

LaChasse's Boy P. S. 3674 { LaFosse Prince P. S. 4071 C { Fancy's Red Flag 87222 (15-
 H. C. { (La Fosse Bella P. S. 10664 { 464)
 { H. C.) { (Red Flag 232782)

Traveller's Topper P. S. 3597 { Gedney Farm Mona's Topper { Latoma's Golden Topper 84170
 H. C. { 70351 (6-540) { (10-513)
 { Gedney Farm Jolly's Mona { (Latoma's Pet 169132)
 { 189623)

Western Duke P. S. 2902 H. C. { Ida's Glory P. S. 3491 H. C. { Golden Spark P. S. 3951 H. C. { Golden Spark of Montpelier
 { (4-482) { (Golden Princess P. S. 7633 { 84576 (11-520)
 { (Ida P. S. 5562 H. C.) { H. C.) { (Miss Flint of Montpelier
 { 210944)

Bright Prince P. S. 4129 H. C. { Imp. Nuriel's Oxford Prince { Hawthorn's Prince 104887
 { 93063 { (11-523)
 { (Oxford Daisy of Trinity { (Hawthorn of Montpelier
 { 235179) { 210945)

Gold King P. S. 4388 C. { Golden Maid's Prince 94944
 { (10-584)
 { (Jersey May Blossom 240816
 { (462)

Chart III (Continued).—Descendants of Several Jersey Bulls

Forget-me-not 6291
(Erica F. S. 1946)

{ Southern Prince 10760
(Oxford Kate 13646)

{ Ethleel 2d's Jubille 18249
(Ethleel 2d 32291)

{ Jubilee of Bois D'Arc 29041
(13-482)
(Birdie Nicholson 31676)

Picton P. S. 2291 H. C.

1. King of Arden 58135
(Egyptina Buttercup F. S.
7496 C.)

{ Imp. Golden Maid's Prince
93538 (42-496)
(Golden Maid P. S. 6555 H. C.)

1. Fauvic's Prince 10796
(42-792)
(Fauvic's Empress 254247
(518)

2. Gamboge's Prince 105565
(27-731)
(St. Onen's Gambage
237109)

3. Viola's Bright Prince
97182 (10-501)
(Viola's Bright Lady
255485)

4. Golden Maid's Viscount
113344 (11-492)
(Amelia P. S. 11975C)
5. Lucy's Prince P. S. 3939
H. C. (10-495)
(Forfarshire's Lucy P. S.
10576 H. C.)

{ 1. Viola's Golden Prince
111186 (34-536)
(Cowslip's Fawn Beauty
252254)
2. Morny Cannons Bright
Prince 10744 (12-427)
(Naughty Nancy Marett
244944)

2. Forfarshire 64759 (3-457)
(Sultana's Rosette
149740)

{ 1. Forfarshire's Masterpiece
71633 (1-423)
(Golden Rose of St. Mary
173302)

2. Forfarshire's Rex 62957
(Golden Grassline 2d
P. S. 8619 C.)

{ Honeymoon's Forfarshire 85650
(Hopeful's Honeymoon 173202)

{ Forfarshire's King Dalton
95339 (13-530)
(King's Exile Farce 166960)

{ Forfarshire's Noble Oxford
114886 (14-537)
(Distinction's Oxford Lass
255629)

Picton 3d P. S. 2715

{ Golden King of St. John 57332
(Princess of Maitand 149158)

{ Oakland Count 77311
(Gold Lady of Oaklands
158069)

{ Violet's Oakland Count 80974
(12-465)
(Violet of St. Saviour 20363)

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Adelaide of Beechlands	168699 (878)	Stoke Pogis of Prospect 29121 (10-593) Adelaide's Daughter 129440
A Foxy Maid	209640	What's Wanted is a Fox 64779 (4-429.) Diplomat's Merry Maid 185504
Agatha of Oakland's	162101	Ravachol P. S. 2032 C. Countess of Oaklands 162098
Ahier's Golden Leda	191677	Imp. Golden Fern's Lad 65300 (8-442.) Leda P. S. 6636 H. C.
Albert's Cretesia	22881	Albert Rex 7724 Cretesia 13657
Albert's Kosi	58468	Marjoram's Albert 17450 Trailer's Kosi 47715
Alcarano's Ophelia	219348 (638)	Alcarano 69653 (7-477) Marquis' Golden Jewel 189544 (532)
Alicante P. S.	3880 H. C.	Count Wolseley P. S. 928 H. C. Rosette 5th P. S. 2881 H. C.
Allie of St Lambert	24991	Stoke Pogis 3d 2238 Kathleen of St. Lambert 5122
Althea Altama	197262 (560)	Rioter's Jersey Lad 58001 (24-521) Louise Altama 138645
Amelia P. S.	11975 C	Viscount P. S. 3055 Amy P. S. 6342
Amyroba	162968	Albert Lambert 49617 Myroba 145825
Angela F	1607 H. C.	Foundation Stock Foundation Stock
Anna Rosaire	194379 (711)	Rosaire's Golden Lad 64554 (6-682) Gertie Melia Ann 151596
Baronetti of Ingleside	132059 (644)	Fred Mayfield 44032 (1-644) Baronett's Belle 113585
Baron's K. Helma	128405	Nutwood Prince 34598 Baron's Helma 65128
Baron's Sophie	17615	Baron (P. S. 289 J. H. B. Sophie F. S. 434 J. H. B.
Beaudesert's Pet	236177 (763)	Gedney Farm Girl's Oxford 75998 (39-577) Pet of Belleview 204033 (806)
Belle Brebis	129536	Hillside Lad P. S. 1163 J. H. B. Bredis 3d, P. S. 1898 J. H. B.
Belle 7th of Hood Farm	198780 (504)	Hood Farm Golden Lad 64268 (8-534) Tonana 22d of Hood Farm 180932 (436)
Benedictine's Lady Carita	238303	Benedictine's Prince P. S. 2951 C. Carita P. S. 7747 H. C.
Bessie Lorne's Marigold	252691	Bessie's Lorne 53342 Gold Joram 139783
Bessy of St. Lambert	5482	Buffer 2055 May Bud of St. Lambert 5105
Beulah's Dawn P. S.	14095 H. C.	Mabel's Raleigh P. S. 3722 H. C. (17-492) Beulah's Pet P. S. 11211 H. S.
Birdie Nicholson	31676	Signalda 4027 Lady Mary Hampton 2d 26184
Bisson's Rosa	8th 235981 (673)	King Becquet 78524 (2-640) Bisson's Rosa 97830
Blossom of Florence	164108 (613)	Jubilee of Bois d'Arc 29041 (13-482) Variella of Florence 111427 (523)
Blue Belle	5th P. S. 8698 H. C.	Xit P. S. 2343 H. C. Golden Lad's Blue Belle 172290
Blue Bell's Nameless	208781	Blue Belle's Golden Fern 69196 (1-518) Nameless of Oaklands 195775

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Bright Blonde P. S. 17450 H. C.		Bright Prince P. S. 4129 Golden Blonde P. S. 14191
Brookhill Countess 190886		Imp. Brookhill Fox 65303 (1-425) Financial Countess 155100 (806)
Brookhill Fox's Finance 203812		Imp. Brookhill Fox 653031 (1-425) Financier's Countess 182838
Brookhill Rose 2d P. S. 3440 C.		Count Wolseley P. S. 928 H. C. Brookhill Rose P. S. 1889 C.
Brown Bessie 8th of H. F. 119891		Brown Bessie's Son 34556 Maquilla. 24043
Brown Bessie 74997		Volco 7890 Brown Flora 74996
Brown Bessie's Marine 147527		Recorder 29239 (4-461) Marine 53459
Brown Duchess of St. Sav. 195827		Fereor P. S. 2891 H. C. (2-457) Reminder's Duchess 187420
Brown Fontaine's Princess 180270		Champion Flying Fox 61441 (4-5)† Actor's Brown Fontaine 180236
Brown Bessie's Minuetta 228745 (414)		Marigold's Champion 70801 (4-424) Lady Minuetta 165602 Pioneer
Bushy Belle 238328 (550)		Fancy's Pioneer P. S. 3195 H. C. (10-574) Bushy Belle F. S. 9096 H. C.
Carnation's Glory 8th P. 5875 H. C.		Cato P. 1646 H. C. Carnations' Glory P. 857 H. C.
Castilian Princess 266582		Flower's Hero P. S. 3502 C. Castilian 2d P. S. 7223 C.
Champion's Golden Lily 232415 (424)		Champion of St. Cloud 70566 (11-478) Golden Lily of St. Cloud 2d 200719
Champion Lucy 161054		Gamboge Lad P. S. 1798 H. C. Lucy 4th P. S. 3733 H. C.
Champion's Maid P. S. 12009 C.		Golden Champion P. S. 3334 H. C. (2-538) Clementina P. S. 10354 H. C.
Charity of St. Lambert 6638		Stoke Pogis 3d 2238 Flora of St. Lambert 5526
Cherry Belle F. 7791 H. C.		Foundation Stock Foundation Stock
Chroma's Golden Ceres 278757 (665)		Chroma 3d's Golden Lad 69873 (7-602) Golden Norca 231979
Cicero's Cowslip 20th P. S. 9111 H. C.		King of Arden 58135 Cicero's Cowslip 7th P. S. 4204 H. C.
Clara Oonan 78454		Oonan's Tormentor 22280 Clara Tormentor 41427
Clarencia P. S. 8602 H. C.		Duplex P. S. 2586 H. C. Philomene P. S. 5671 H. C.
Clementine Lady P. S. 13049 C.		Lucy's Champion 79315 (6-422) Clementine 5th P. S. 8836 H. C.
Cleodoxa 59311		Clotaire 9884 Clotaire's Annie 58319
Clotaire's Beauty 28171		Clotaire 9884 Lady Bingo 24160
Coma 29330		Combination 4389 Metalla 3905
Combinations' Marine 280351 (469)		Hazel Fern Combination 80441 (2-532) Mistletoe's Marine 243097
Compound Interest 152193		Doncaster P. S. 1774 H. C. Interest F. 3582 C.
Coomassie 11874		Neptune P. S. 14 J. H. B. Jersey Pride F. S. 1716 J. H. B.

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Countess Matilda	74928	Matilda's Perfection 17100 Countess Dee 18061
Countess O'D	298350 (494)	Mabel's Raleigh's Fairy Boy 92109 (2-492) Duchess O'D 265599
Count's Bessie Fontaine	280291 (438)	Noble's Raleigh 82757 (15-572) Count's Bessie Lewis 251183
Count's Prize	203521 (533)	Oonan's Count 57470 (19-442) Oonan's Sprite 163626
Cowslip's Fawn Beauty	252254 (691)	The Plymouth Lad 89792 (16-543) Cowslip's Golden Beauty 252125 (373)
Cowslip of the Island	138790	Golden Lad P. S. 1242 J. H. B. Cowslip 4th P. S. 3681 J. H. B.
Cowslip 16th P. S.	6084 H. C.	Golden Lad P. S. 1242 H. C. Cowslip 2d P. S. 810 H. C.
Cream Victor Pogis	168915	Melia Ann's Victor Pogis 20697 Calla Pogis 142920
Cretesia	13657	Lord Dartmouth 6302 Daisy Darling 6386
Crocus of St. Lambert	8351	Stoke Pogis 3d 2238 Lolly of St. Lambert 5480
Cromwell's Gray Buttercup	195839	Cromwell P. S. 2922 C. My Grey Buttercup 187416
Coral P.S.	9684 H. C.	Napoleon Bonaparte P.S. 2745 H.C. (3-483) Victoria's Lassie P. S. 7863 H. C.
Corta Maid	5305	Signal 1170 Lucilla 2735
Daisy Harrison	69253	Erie Chief 13438 Pride of Bovina 8050
Daisy of Glengary	216615 (448)	Golden Shelby 70200 (2-479) Marys Dinah 189200
Darling's Christmas Gift	299111 (625)	Fancy's Fern Lad 84276 (2-559) Darling of Montclair 202193
Dayton Dame	141097	Pride's Boy 27144 Dayton Pansy 113143
Dew	62474	Ida's Rioter of St. L. 13656 Lady Appel 8612
Dioxide	178610 (472)	Bill Hepburn 66189 (6-448) Neobule 177661 (476)
Diploma's Bird	100356	Snob 26574 Chatterbox 71546
Diploma's Brown Lassie	166688 (709)	Minute Gun 34776 (4-594) Diploma's Grinnella 145775
Diploma's Grinnella	145775	Diploma 16219 Commilla 79614
Diploma's Keepsake	168399	Diploma's Victor 56310 Anemone's Keepsake 146045
Distinctions Oxford Belle	255626 (651)	Distinction's Noble 83768 (7-503) Porfarshire's Oxford Lass 230070 (461)
Distinction's Oxford Lass	255629	Distinction's Noble 83768 (7-503) Stella's Oxford Lass 230068
Dixon's Harbinger	234545 (577)	Ida's Glory P. S. 3491 H. C. (4-482) Harbinger F. S. 8832 C.

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Doctor Ethel Mason	240814	Doctor's Boy P. S. 3964 H. C. Ethel Mason P. S. 11629 C.
Dolly's Daisy of Maple Lawn	218498	Golden Lad of Maple Lawn 69295 (1-405) Hillcrest Daisy 2d 130915
Dollie's Valentine	105049 (645)	Oonan's Tormentor Pogis 30505 (1-645) Dollie Fay 105047
Double Time	157531	Sister's Time 51658 Ceres Time 123524
Dorinda Darling	146249 (676)	Common 28853 (2-552) Doris Darling 98838
Draconis 7th P. S.	9907 H. C.	Financial King P. S. 2624 H. C. (4-516) Draconis 5th P. S. 7112 H. C.
Duchess of Westbranch	119967	Parade 30875 Pansy's Mascotte 105704
Dufrana's Jesse	265137 (623)	Cowslip's Ashley 83633 (8-558) Dufrana 223461 (499)
Dulce of Oaklands F. S.	8806 H. C.	
Easter Star	20145	Prince Boulivot 8757 Faith of Oaklands 19696
Egyptian Buttercup F. S.	7496 C.	Foundation Stock Foundation Stock
Elsie Bonner	78864	King of St. Lambert 15175 Elsie Dee 18057
Eminent's Bess	209719 (971)	La Rilla's Eminent Lad 71770 (2-791) Hood Farm Fairy Maid 198777
Eminent's Blanche	213950	Eminent 69631 (33-477) Blanchette 4th P. S. 10441 C.
Eminent's Bonnetta	246269 (394)	Blue Belle's Eminent 74774 (6-426) Nona's Bonnie 196675
Eminent's Brown Duchess	157604	Eminent 69631 (33-477) Favorite P. S. 3891 C.
Eminent's Expectation	195813	Prism P. S. 2382 H. C. Hope F. S. 8033 C.
Eminence F	7124 H. C.	Traveller P. 280 C. Brown Fern F. 4606 C
Eminent's Buttercup of St. Saviour	238312 (465)	Eminent 69631 (33-477) Salem's Buttercup P. S. 7564 H. C.
Eminent's Fleur de Lis	197628 (508)	Eminent's Raleigh 69011 (27-521) May Flower P. S. 6692 C.
Eminent's Foxy Belle	304982 (951)	Eminent's Pilot 75364 (22-632) Fox's Lydia 253281
Eminent's Golden Lucy	(210895 (446)	Eminent 69631 (33-477) Golden Lucy F. S. 8636 C.
Eminent's Jubilee Lady	180291	Eminent 2d P. S. 2532 H. C. Jubilee Lady F. S. 8383 H. C.
Eminent's Lady Beatrice	219602	Eminent 69631 (33-477) Fox's Brown Beatrice 202241
Eminent's Lucy Belle	203639	Eminent 69631 (33-477) On I. of J.

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Eminent's Marigold	203469	Eminent 69631 (33-477) Mary Gold P. S. 4188 H. C.
Eminent's Mona	195791	Eminent 69631 (33-477) Mona 11th P. S. 6476 H. C.
Eminent 2d's Bess	171792	Eminent 2d P. S. 2532 H. C. Desert's Pride P. S. 4614 H. C.
Eminent's Virginia	195830	Eminent 69631 (33-477) Virginia F. S. 8233 H. C.
Empress of Sunny Bank	149464	Ida's Rioter of St. L. 30th 47704 (1-538) Empress of Potsdam 87605
Erica F. S.	1946	Foundation Stock Foundation Stock
Erith	4564	St. Helier 45 Kalmia 4561
Ethel's Meliaston	626957 (561)	Ohio Guard 79928 (2-495) Melia Ethelstan 188460
Ethleel 2d	32291	Lord Harry 3445 Ethleel 18724
Eurybia	143822 (718)	Exile's Siberia 43363 (1-718) Little Mayflower 110643
Exile's Alpha	45393	Exile of St. Lambert 13657 Clotaire's Belle 28841
Exile's Grand Thyme	211887	Grand Lad of Riverbrook 62124 Exile's Wild Thyme 2d 171503
Exile Maud Coquette	143807	Rioter's Exile of St. L. 48228 (1-463) Coquette's Riotress 121698
Exile St. Lambert Queen	101613	Exile of St. Lambert 13657 Ethel Rioter 61994
Exile's Sappho	114262	Exile of St. Lambert 13657 Volie of Sennett 2d 78638
Fabulous Interest	168515	Cato 3rd P. 2143 C. Compound Interest P. 6035 H. C.
Fair Marigold	89387	Major Appel Pogis 17861 Ida Marigold 32615
Fairy Boy's Beauty	230401 (681)	Raleigh's Fairy Boy 83767 (54-542) Clair Val Aster P. S. 12891 C.
Fairy Glen P. S.	9178 H. C.	Orlando P. S. 2535 H. C. Brown Fairy F. S. 7819 C.
Fairy Flen's Flora	253707 (616)	Fairy Glen's Raleigh 79438 (35-556) Fairy Boy's Flora 219491 (514)
Fauvic's Empress	254247 (518)	Fauvic's Prince P. S. 3726 C. (1-518) Lassie's Star 343941
Fancy's Constance	229551 (470)	Gedney Farm Girl's Oxford 75998 (39-577) Fancy of Belleview 203498 (404)
Fancy of Wyldewood	210956 (603)	Hood Farm Torono 60326 (72-665) Hood Farm's Fancy 134529
Fancy's Rose F. S.	8277 H. C.	Foundation Stock Foundation Stock
Fern's Despatch	169147	Carnation's Fern Lad 63542 (2-421) Owl's Despatch 168527
Fern's Eminent Rose	251174 (706)	Sensational Fern 75924 (24-530) Eminent's Oxford Belle 206328 (483)

TABLE 27.—BREEDING OF THE DAMS OF THE SIREs INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Fern's Philippa	271124 (461)	Imp. Golden Fern's Noble P. S. 4570 H. C. (65-537) Miriam's Golden Lassie P. S. 14607 H. C.
Fern of Florence	2d 205059 (527)	Jubilee's Crown Prince 64383 (3-489) Fern of Florence 164625 (566)
Fern of L'Etacq.	F. S. 8848 H. C.	Foundation Stock Foundation Stock
Fern 7th of Hood Farm	264342 (641)	H. F. Golden Fern's Lad 80437 (16-528) Lass 30th of Hood Farm 214511 (797)
Figgis	76106	Sophie's Tormentor 20883 (1-490) Birdsey's Surprise 48326
Figgis's Bess	306802 (774)	Pogis 75th of Hood Farm 94501 (20-647) Lass 35th of Hood Farm 216421 (572)
Figgis 14th of Hood Farm	192042	Hood Farm Pogis 9th 55552 (79-531) Hood Farm Leoni 154206
Figgis 23d of Hood Farm	194432	Hood Farm Pogis 9th 55552 (79-531) Violet of Argyle 118562
Figgis 31st of Hood Farm	202311 (732)	Hood Farm Pogis 9th 55552 (79-531) Laura's Inez 154612 (425)
Figgis 62d of Hood Farm	239121 (579)	Hood Farm Pogis 9th 55552 (79-531) Hood Farm Siglizzie 2d 200020
Figgis 65th of Good Farm	244156 (674)	Hood Farm Pogis 9th 55552 (79-531) Lass's Jewel 113211 (481)
Figgis 76th of Hood Farm	251365 (539)	Hood Farm Pogis 9th 55552 (79-531) Oonan 43d of Hood Farm 176104 (430)
Figgis 91st of Hood Farm	261868 (499)	Hood Farm Pogis 9th 55552 (79-531) Jewel's Thelma 194580 (538)
Finance P.	4611 C.	Trial P. 1187 H. C. Interest F. 3582 C.
Financial Beauty	271399 (640)	Sans Aloï 81012 (18-593) Financial King's Interest 235065 (467)
Financial Countess	155100 (806)	Financial King 57788 (4-516) Financial Queen 155098
Financial Daisy	252132 (596)	Financial Poet P. S. 3462 C. (1-596) Financial Buttercup P. S. 9409 H. C.
Financial Dulcet	249601	Financial King 57788 (4-516) Mrs. Cats of St. Martin 195809
Financial Plymouth	253304	Mercury P. S. 3018 C. Lady June P. S. 5050 C.
Fly P. S.	9714 H. C.	Eminent 2d P. S. 2532 H. C. Golden Gate 3d P. S. 7286 C.
Flying Fox's Blue Belle	187434	Champion Flying Fox 61441 (4-594) Imported Blue Belle 180234
Flying Fox's Brown Queen	172874	Champion Flying Fox 61441 (4-594) Papillon P. S. 7785 H. C.
Flying Fox's Distinction	187449	Champion Flying Fox 61441 (4-594) El Mora F. S. 8616 H. C.
Flying Fox's La Fontaine	172318	Champion Flying Fox 61441 (4-594) Brown Fontaine of Trinity 172296
Flying Fox's Oxford Queen	162114	Champion Flying Fox 61441 (4-594) The Owl's Oxford Daisy 162113
Flying Fox's Pretty Maid	162134	Champion Flying Fox 61441 (4-594) Red Rose of Trinity 162133

THE PROGENY PERFORMANCE OF JERSEY SIRES AND DAMS 113

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with avg. Fat Prod.
Fying Fox's Sweet Maid	173077 (383)	Champion Flying Fox 61441 (4-594) Maid of Delhi F. S.7893H. C.
Flying Vixen	274778	What's Wanted P. S. 3126 C. (1-471) Flying Vixen P. S. 10014 H. C.
Fontaine 4th P.	2537 C.	Guenon's Pride P. S. 347 H. C. Fontaine 22631
Fontaine B.	152191	Boyle P. S. 1559 J.H.B. Fontaine 6th P. S. 4320 J.H.B.
Fontaine's Brown Daisy	195762	Caïest P. S. 2591 H. C. (1-536) Brown's Beauty P. S. 6325 H. C.
Fontaine's Countess	152195	Euclid P. S. 2239 J.H.B. Fontaine A. 152190
Fontaine's Dolly	P. S. 12855 H. C.	Raleigh's Duke P. S. 3717 Fontaine's 10th P. S. 8855
Fontaine's Gold Medal	203636	La Fontaine's Prince P. S. 2536 C. On l. of J.
Fontaine's Oxford Actress	188248 (472)	Gedney Farm Oxford Lad. 71238. (24-473) Fontaine's Actress 187419
Fontane's Oxford Pride	187430	Caïest P. 2591 H. C. (1-536) Gamboge Pride P. 4508 H. C.
Forfarshire's Benedictine	196142 (392)	Forfarshire 64759 (3-454) Young Benedictine Ed P. S. 7725 H. C.
Forfarshire's Fontaine	185062	Forfarshire 64759 (3-454) Nunthorpe's Fontaine 172289
Forfarshire's Golden Love	221433	Forfarshire 64759 (3-454) Pedro's Golden Love 140235
Forfarshire's Lucy	P. S. 10576 H. C.	Forfarshire P. S. 2914 H. C. Lucy's Lass P. S. 7092 H. C.
Foxhall's Carola	236985 (727)	Foxhall's Jubilee 76944 (25-567) Carola of Florence 2d 196406
Fox's Belle of Grouville.	180279	Champion Flying Fox 61441 (4-594) Deborah P. S. 6905 H. C.
Fox's Belle of Trinity	203646	Champion Flying Fox 61441 (4-594) Imogene F. S. 8646 H. C.
Foxy's Brown Mabel	188320	La Chasse Foxy 65781 Poet's Brown Mabel 175432
Fussy P. S.	11574 H. C.	Prince Neddy P. S. 3038 C. Dita 4th P. S. 10123 C.
Flossy Gold Leaf	169498	Gen. Jamont 2d 58018 (2-428) Seekonk Bell 123967
Fern's Golden Winnie	225508 (512)	Pedro's Golden Fern 69583 (9-540) Victor's Rosalie 203007
Gamboge of St. Savior	195816	Houp-La P. S. 2793 H. C. (1-381) Fontaine's Oxford Pride 187430
Gamboge Oxford Sybil	337787	Imp. Oxford Majesty 134090 (48-540) Gamboge's Prosperity 252142 (402)
Gamboge's Crocus	252147 (448)	Gamboge's Knight 95698 (52-514) Imported Oxford Buttercup 224579 (441)
Gamboge's Gray Princess	180266	Houp-La P. S. 2793 H. C. (1-381) Gamboge's Pride 3d P. S. 8168 C.
Gamboge's Handsome Duchess	252150 (605)	Gamboge's Knight 95698 (52-514) Peacock Duchess P. S. 10927 C.
Gamboge's Oxford Lass	252189	Gamboge's Knight 95698 (52-514) Majesty's Oxford Lass 213940 (448)

TABLE 27.—BREEDING OF THE DAMS OF THE SIREs INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Gamboge's Oxford Sybil P. S. 21012 H. C.		Imp. Gamboge's Royal Majesty 149864 (17-558) Gamboge Oxford Sibyl 337787
Gamboge's Pride 3d P. S. 8168 C.		Bishop P. S. 2422 C. Gamboge's Pride P. S. 4508 H. C.
Gamboge's Tiddledywind 252156 (646)		Gamboge's Knight 95698 (52-514) Tiddledywind's Lily P. A. 9261 H. C.
Gamboge's Vellum 257609 (504)		Gamboge's Knight 95698 (52-514) Vellum 6th P. S. 9549 H. C.
Gazelle's Fawn 93704		King of St. Lambert 15175 Gazelle Dee 18056
Gedney Farm Jersey Skater 183139		Golden Lad P. S. 1242 H. C. Jersey Skater 4th P. S. 4166 H. C.
Gedney Farm Jolly's Mona 189623		Golden Jolly P. S. 2921 H. C. (9-470) Florence Davis P. S. 8076 C.
Gelatine 3d 114531		Henry Hudson 27970 Gelatine 61404
Georgie's Grace 2d 192437 (451)		Venture's Prize 68416 (1-451) Georgie's Grace 189186 (449)
Gertie of Glynlyn 74474		Rampose's Bachelor 25900 Girletta 61472
Gertie's Fern Princess 244952 (821)		Gertie's Lad 70050 (6-661) Fern Princess 213142
Gertrude of Meridale 170976 (575)		Garfield's Gaffar 46803 (4-466) Gertrude A. 130949
Girl of the Island 177564		Homestead's Boy P. S. 2857 C. Fifine 2d P. S. 4962 C.
Girlie's Matilda 122948		Girlie's Albert 40567 (1-490) Cretesia's Matilda 90000
Golden Belle Interested 252109 (691)		Interested Prince 58224 (46-557) The Duke's Golden Belle 170814 (430)
Golden Bess of St. John 162102		Golden Spur P. S. 2074 C. Foolish Bess P. S. 3151 C.
Golden Fern P. 4711 H. C.		Golden Lad P. 1242 H. C. Brown Fern 2d P. 1944 H. C.
Golden Fern's Carnation 187424		Imported Golden Fern's Lad 65300 (8-443) Carnation's Glory 7th P. S. 5092 H. C.
Golden Fern Jacoba 402412 (598)		Golden Lucy's Golden Lad 133217 (4-641) Jacoba's Melia Ann 347676
Golden Fern's Sensation 173201 (498)		Golden Fern's Lad P. S. 2160 H. C. (1-480) Red Lily P. S. 3542 H. C.
Golden Fern's Victory 213876		Imp. Golden Fern's Lad 65300 (8-443) Wonder's Victory P. S. 5457 H. C.
Golden Fleece 6th P. S. 13399 H. C.		Morny Cannon P. S. 3058 H. C. (7-513) Golden Fleece P. S. 9093 C.
Golden Glitter 168509		Granny's Golden King P. S. 1867 H. C. Espirita F. S. 6579 C.
Golden Glow 129238		Reminder P. 2052 C. Lady Jane Grey 2d P. 1281 C.
Golden Glow 2d 148165		Golden Grand 53658 (4-564) Golden Glow 129238
Golden Grasseline 2d P. S. 8619 C.		King of Arden 58135 Golden Grasseline P. S. 7719 H. C.

THE PROGENY PERFORMANCE OF JERSEY SIRES AND DAMS 115

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with avg. Fat Prod.
Golden Hazel Fern 172111		Emanon 52299 (3-422) Pearl Pensee 2d 134532
Golden Isabelle 157466		Golden Lad P. S. 1242 H. C. Isabelle P. S. 3139 H. C.
Golden Jolly's Dark Lady 213925		Golden Jolly P. S. 2921 H. C. (9-470) Farinense 5th P. S. 9945 H. C.
Golden Jolly's Scotia 253312 (518)		Union Jack P. S. 3850 H. C. (1-519) Scotia 3d P. S. 11493 H. C.
Golden Lad's Blue Belle 172290		Golden Lad 2d P. S. 2023 H. C. Blue Belle P. S. 4307 H. C.
Golden Lad's Creampot 162061		Golden Lad P. S. 1242 H. C. Creampot 2d P. S. 2721 H. C.
Golden Lad's Industry 162058		Golden Lad P. S. 1242 H. C. Oporto P. S. 2807 C.
Golden Lad's Rosaire 115227		Golden Lad P. S. 1242 Angela's Rosette 3rd P. S. 2970
Golden Lady of Oaklands 158069		Golden Lad of Oaklands P. S. 2860 Golden Dell of Sr. Peter 157316
Golden Lass F 5711 H. C.		Foundation Stock Foundation Stock
Golden Lass 4tn P. 2447 H. C.		Sultan's Cicero P. S. 670 H. C. Golden Lass F. S. 5711 H. C.
Golden Lassie F. S. 9548 H. C.		Foundation Stock Foundation Stock
Golden Lily of St. Mary 162052		Clarence P. S. 1494 H. C. Lily Brown P. S. 420 C.
Golden Maid P. S. 6555 H. C.		Golden Lad P. 1242 H. C. Bonny Lass P. 4577 H. C.
Golden Marsh 173431 (588)		Golden Grand 53658 (4-564) Marsh Marigold 143336
Golden Naid 161052		Golden Lad P. S. 1242 H. C. Miss Julia 6th P. S. 4521 H. C.
Golden Noble's Faun Beauty 378480		Design's Golden Noble P. S. 4903 C. Fly 15th P. S. 18626 H. C.
Golden Noble's Sue 381177 (650)		Bosnian's Golden Noble 106898 (3-559) Sarah Ann of All-Work 289434
Golden Ora 127228		Golden Lad P. S. 1242 J. H. B Ornament F. S. 7702 J. H. B.
Golden Owl's Belle 289583 (480)		Golden Owl of Sugar Loaf 79453 (1-480) King's Butter Belle 227441
Golden Princess P. S. 7633 H. C.		Golden Dream P. S. 2289 H. C. Lady Trilby P. S. 6536 C.
Golden Prince's Farce 246890 (643)		Golden Option's Prince 93434 (2-508) Gold Farce 2d 245131
Golden Rose P. S. 7838 H. C.		Golden Lad P. S. 1242 H. C. Mantlet's Rosy 2d P. S. 5718 H. C.
Golden Rose of St. Mary 173302		Ruler P. S. 2081 H. C. Belle of L'Alva P. S. 4210 H. C.
Golden Spot's Lucy 252274 (418)		Golden Spot P. S. 3727 C. (1-418) Lucy's Lass P. S. 1113 C.

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Golden Sultana	146282	Golden Fern's Lad P. S. 2160 J. H. B. Sultanne 9th P. S. 1145 J. H. B.
Golden Sumptons	157324	Golden Lad P. S. 1242 H. C. Lady Sumptons P. S. 4901 C.
Goodbye	27366	Auroraboreellis 2408 Frankie Lass 24900
Grace Darling Interested	279962 (697)	Interested Prince 58224 (46-557) The Duke's Grace Darling 170827 (562)
Grace Marigold	99377	Stoke Pogis of Prospect 29121 (10-593) Lady Grace of Upholme 39569
Great Scot's Champion	203703 (719)	Rhymer P. S. 2756 H. C. (3-538) Tricycle 3d P. S. 6295 C.
Grover's Riotress	247491 (789)	Golden Grover 73902 (6-489) Rioter's Clochette 212116 (721)
Gwavas	154166	Rockwood Beau 44733 Gelatine 3d 114531
Hallowe'en's Beauty	249615 (424)	Hallowe'en's Fox P. S. 3631 H. C. (4-462) Brownyn's Beauty P. S. 6325 H. C.
Handsome Princess	211477 (385)	Sultan of Oaklands 78475 (22-458) Eminent's Rosy 203647
Harry's Duchess 3d	123282	Parole 26114 (1-450) Harry's Duchess 60289
Hawthorn of Montpelier	210945	Beechlands Champion P. S. 3599 H. C. (3-636) Hawthorn P. S. 6656 C.
Hearty P. S.	5724	Lowland King P. S. 1673 H. C. Orpheline 3d P. S. 3279 H. C.
Hector's Queen	180033 (510)	Hector Marigold 59121 (34-473) Aaron's Queen 155591 (650)
Honeymoon P. S.	7132 H. C.	Lord Chancellor P. S. 2060 C. Honeyden P. S. 4696 C.
Hood Farm Bet	184249	Briarcliff Beau 57176 (1-485) Lady Bet W. 153011 (419)
Hood Farm Ethel	177407	Fairview Prince Jr 66414 (2-506) Miss Falcon's Pansy 135432
Hood Farm Fox's Figgis	221457 (721)	Hood Farm Golden Lad 4th 71215 (3-601) Figgis 29th of Hood Farm 201845 (503)
Hood Farm Lad's Sophie	223638 (587)	Hood Farm Golden Lad 4th 71215 (3-601) St Clare Trizy 149640 (483)
Hood Farm Tonona	153471 (445)	Torono 25204 (17-516) Good Rosabelle 124829
Hood Farm Tonona 2d	189729 (444)	Hood Farm Torono 60326 (72-665) Hood Farm Tonona 153471 (445)
Hood Farm Torono's Last	305388 (744)	Hood Farm Torono 60326 (72-665) Sophie 14th of Hood Farm 189733 (444)
Hopeful's Honeymoon	173203	Hopeful P. S. 2584 H. C. Honeymoon P. S. 7132 C.
Hope's Finance	167379	Financial King 57788 (4-516) Hope's Polly P. S. 6897 C.
Ida Marigold	32615	Ida's Rioter of St. L. 13656 Arawana Marigold 9380
Ida P. S.	5562 H. C.	Lord Wolseley 4th P. S. 1320 H. C. Miriam 3d P. S. 3712 C.

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Ida of St. Lambert 24990		Stoke Pogis 3d 2238 Kathleen of St. Lambert 5122
Idaletta of Glen Rouge 141141		Two Hundred per cent 33592 Pomona's Ida of St. L. 59565
Imp. Blue Bell 180234		Meadow Boy P. 1193 C. Griseete P. 2058 H. C.
Imp. Castile 462596		The Imported Jap 75265 (49-600) Castile F. S. 9154 H. C.
Imp. Claqueur 269976 (546)		Ida's Glory P. S. 3491 H. C. (4-482) Claqueur F. S. 9211 C
Imp. Ella Bowyer 246033		Morny Cannon P. S. 3058 H. C. (7-513) Ella Bowyer F. S. 8992 C.
Imp. Grace Darling 145737		Beauty's Greycoat P. S. 2248 J.H.B. Alouette P. S. 6958 J. H. B.
Imp. Interest 175430		Gamboge Hero P. S. 2416 C. Maggie O'Mare F. S. 8403 C.
Imp. Lady Viola 238437		Nobleman P. 2555 H. C. Golden Lad's Victoria 157325
Imp. Lucy Belle of St. Lawrence 241428		Gold Stick P. S. 3564 H. C. Lucy Bell 2d P. S. 5088 H. C.
Imp. Nameless Mabel 231690 (448)		Mabel's Raleigh P. S. 3722 H. C. (17-492) Nameless P. S. 5136 C.
Inda Landseer 2d 98677		Ethol 19104 (1-523) Inda Landseer 98676
Inez of Riverside 51781		Holyoke 8147 Clara of Riverside 26301
Inez Rosaire 205906 (663)		Rosaire's Golden Lad 64554 (6-682) Inez Melia Ann 160786
Interesting Lady of Sherwood 251593		Interesting Peter of M. 94252 Sir Galahad's Marjory 248455
Interested Owl's Beauty 193937 (685)		Interested Prince 58224 (46-557) Spermfield Owl's Beauty 170819 (487)
Interested Victor's Rachel 188230 (477)		Interested Prince 58224 (46-557) Victor's Nutley Rachel 173665
Jacoba's Irene 146443 (961)		King of Corfu 50110 (1-960) Pogis Irene 2d 146435 (674)
Jacoba of Jersey Lawn 223121		King of Corfu 50110 (1-960) Jacoba Irene 146443 (961)
Jacoba's Corinne 251615 (689)		Irene's King Pogis 73182 (62-559) L. K's Corinne 231669 (630)
Jamont's Maid 192759 (418)		Prince Cherub 66850 (2-438) Matilda Laura 2d 175446
Jan F. S. 10350 C.		Foundation Stock Foundation Stock
Jap's Milla Garfield 246123 (949)		The Imported Jap 75265 (49-600) King's Milla Garfield 191202
Jap Sayda's Baroness 321895 (966)		The Imported Jap 75265 (49-600) Sayda's Baroness 159229 (446)
Jersey May Blossom 240816 (462)		Sir James P. S. 3935 C. (2-450) Bess 3d P. S. 11193 C.

TABLE 27.—BREEDING OF THE DAMS OF THE SIREs INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Jetty of Kirkfield	210878	Reminder P. S. 2419 H. C. Marigold P. S. 6457 C.
John De Veulle's Prize Cow	of 1863	
Jolly Lady of Beechwood	213915	Golden Jolly P. S. 2921 H. C. (9-470) Oasis 3d P. S. 6398 H. C.
Jolly's Brookhill	210089	Golden Jolly P. S. 2921 H. C. (9-470) La Galliarde F. S. 9036 H. C.
Josy's Glow	198785 (477)	Golden Glow's Chief 61460 (40-592) Webfoot Josy 155328
June's Lad	196166	June Beauty's Lad 59154 Valentine's Alice 161804
Kathletta's Fancy	60738	Ida's Landseer 17745 Kathletta 19567
King's Exile Farce	166960	Young Exile 37539 Kings Farce 166954
King's Figgis O'Dreamwold	182998	Forfarshire's Oxford King 61445 (1-677) Figgis 76106 (7 day record)
Knight's Oxford Lucy	317952	Gamboge's Knight 95698 (52-514) Majesty's Lucy Belle 238326
King's Riotress Nora	142296	King of St. Lambert 15175 St. Lambert's Nora B. 124869
King's Vesta	161065	Financial King 57788 (4-516) Tricycle 2d P. S. 3677 H. C.
Kittie's Maid	211635 (379)	Imp. Golden Maid's Prince 93538 (42-496) Kittie 4th P. S. 5137 C.
Kitty Better	32911	Lord Harry 3445 Kate Gordon 8387
Kobelle	58204	Mabel's Gold Mine 10811 Koffee's Lady 37263
Koffee's Duchess 2d	57988	Ida's Pogis 18000 Koffee's Duchess 35113
Koffee's Winnie	113001	Koffee's Caterer 29000 Leurona's Winnie 74961
La Chasse Flirt	127236	Golden Lad P. S. 1242 J.H.B. Sousie P. S. 5714 J.H.B.
La Creole's Amy's Queen	360093 (821)	Oxford You'll Do Jr. 102269 (15-608) La Creole's Amy 243571 (825)
La Fosse Bella	P. S. 10664 H. C.	Whisky P. S. 3029 H. C. La Fosse Beauty P. S. 7778 H. C.
L. K's Marguerite	251190 (699)	Loretta's King of St. John 84073 (1-699) L. K's Marguerite B. 231667 (536)
La Sente's Mursie	P. S. 19766 H. C.	Aldan's Noble Sultan 103565 Nurse Agatha P. S. 12117 C.
Lad's Brown Beauty	273439 (687)	Melia's Golden Lad 71366 (6-664) Blossom of Dreamhurst 187750
Lad's Lily	99422	Pogis Lad 19289 (1-481) Lily Adonis 59836
Lad's Valentine	195635	June Beatie's Lad 59154 Dollie's Valentine 105049 (645)
Lady Aldan	P. S. 8470 H. C.	Imp. Golden Fern's Lad 65300 (8-443) Aldan F. 6213 C.

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Lady Astor 269778 (610)		Astor P. S. 3042 H. C. (1-610) Rosy Face P. S. 10056 H. C.
Lady Belinda P. S. 15725 H. C.		Broadlands Glory P. S. 3903 H. C. (2-450) Lady Lucinda P. S. 9633 C.
Lady Kilburn 213935		Kilburn P. S. 3259 H. C. (1-411) Leonie's Lady 214017
Lady Larkspur 56051		Prince Pogis 10682 Honeymoon of St. Lambert 11221
Lady Letty Lambert 124201		St. Lambert Boy 17408 (1-478) Letty Coles 2d 48128
Lady Letty Lambert 4th 169502		Emperior of St. Lambert 48229 L. Lady Letty Lambert 124201
Lady Mel Figgis 171641 (668)		Hood Farm Torono 60326 (72-665) Hazel Fern Figgis 163766 (527)
Lady Octavia P. S. 12882 H. C.		Golden Champion P. S. 3334 H. C. (2-538) Octavia P. S. 9403 H. C.
Lady Ramsgate P. S. 12314 H. C.		Clarencia's Lad P. S. 3573 H. C. Lady Margate P. S. 9193 H. C.
Landseer's Nettie 65322		Double Landseer 19818 Merlinette 21413
Lanison's Kuemhild 203894 (582)		Flora's Lanison 43813 (8-498) Kuemhild Ethelwyn 63460
Lanison's Minnie 3d 134011		Lanison 15283 Lanison's Minnie 81387
Lass 25th of Hood Farm 189742		Hood Farm Torono 60326 (72-665) Rich Jessie 164020
Lass 30th of Hood Farm 214511 (797)		Hood Farm Torono 60326 (72-665) Dukes Jessie 2d 118778
Lass 40th of Hood Farm 223642 (884)		Hood Farm Torono 60326 (72-665) Hood Farm Lillian 172797 (460)
Lass 53rd of Hood Farm 256901 (739)		Hood Farm Torono 60326 (72-665) Figgis 29th of Hood Farm 201845 (503)
Lass 55th of Hood Farm 257379 (682)		Hood Farm Torono 60326 (72-665) Hood Farm Sweet Marie 188301
Lass 57th of Hood Farm 258731 (793)		Hood Farm Torono 60326 (72-665) Winnie of Fort Hill Farm 183850
Lass 58th of Hood Farm 261869 (578)		Hood Farm Torono 60326 (72-665) Figgis 19th of Hood Farm 188915 (436)
Lass 60th of Hood Farm 264343 (595)		Hood Farm Torono 60326 (72-665) Belle 11th of Hood Farm 202310
Lass 64th of Hood Farm 266735 (912)		Hood Farm Torono 60326 (72-665) Figgis 27th of Hood Farm 196930 (493)
Lass 68th of Hood Farm 274621 (770)		Hood Farm Torono 60326 (72-665) Hood Farm Riotesia 193623
Lass 74th of Hood Farm 281203 (933)		Hood Farm Torono 60326 (72-665) Figgis 19th of Hood Farm 188915 (435)
Lass 89th of Hood Farm 300426 (805)		Hood Farm Torono 60326 (72-665) Combination's Maid 241526
Lass 92 d of Hood Farm 302072 (828)		Hood Farm Torono 60326 (72-665) Figgis 65th of Hood Farm 244156 (674)
Latoma's Pet 169132		Pearl King P. S. 2827 H. C. (1-523) Golden Fern's Roy 168520

TABLE 27.—BREEDING OF THE DAMS OF THE SIREs INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Le Cotil's Beauty	233599	Gaboge's Knight P. S. 3645 H. C. Le Cotil's Gem P. S. 10395 H. C.
Les Marais' Fontaine	197601 (525)	Fontaine's Lord P. S. 2900 H. C. (1-525) Homefield P. S. 8564 C.
Lilac P. S.	7996 C.	The Owl 54738 LeBourg Queen P. S. 3328 C.
Lily of Hauteville	231556 (599)	Imp Golden Maid's Prince 93538 (42-496) Cora Spry F. S. 9078 C
Little Eminence	122506	Orme P. S. 1660 J.H.B. Eminence F. S. 7124 J.B.H.
Lively's Grey Ruby	157605	Lively P. S. 2218 C. Ruby P. S. 6091 C.
Lontie Lenoard	281969	Baronetti's Golden Lad 67908 (13-476) Lucile Bell 183054
Lord Brookhill's Julia	235177	Lord Brookhill P. S. 2734 H. C. Pretty Julia P. S. 3320 H. C.
Loretta D.	141708 (729)	Ida's Rioter of St. L. 9th 41010 (1-729) Cicero's Chemical Test 101087
Loretta D's Jacoba Irene	215043 (448)	Loretta D's Champion 72983 (4-554) Jacoba Irene 146443 (961)
Lorna 2d	33634	Stiletto 8320 Lorna 19016
Lorna of Maple Glens	48094	Column 9622 Lorna 2d 3364
Lorna of Venadera	196127 (608)	Marigold's Exile King 63232 (14-512) Maud Carlyle 115574
Lottie Melia Ann	100775	Melia Ann's Stoke Pogis 22042 Melia Ann 3d 68070
Lou 25th of Hood Farm	286929 (668)	Hood Farm Torono 20th 82854 (21-582) Figgis 68th of Hood Farm 245449 (490)
Lou 2d of Hood Farm	250505 (781)	Hood Farm Torono 20th 82854 (21-582) Lass 38th of Hood Farm 223628 (937)
Lucile of Cedar Grove 6th	213062 (631)	Cedar Grove's St. Lambert 49836 (2-578) Lucile of Cedar Grove 137270
Lucky Farce	298177 (884)	Lucky Prince 91770 (1-884) Golden Prince's Farce 246890 (643)
Lucy of St. Lambert	5116	Victor Hugo 197 Lydie 495
Lucy's Champion Fanny	224601	Lucy's Champion 79315 (6-442) Fanny P. S. 11617 C.
Maud Melia Ann	149774	Melia Ann's Son 22041 (2-602) Maud of Glen Rouge 103781
Mauser's Pennithorpe	253303	Mauser P. S. 2892 H. C. Pennithorpe F. S. 8098 H. C.
May Day Stoke Pogis	28353	Stoke Pogis 3d 2238 May Day of St. Lambert 5109
May Day's Melia Ann	209589	Melia Ann's King 56581 (2-450) Mirtha of St. Lambert 135126
May Flower 3d P. S.	6569 H. C.	La Chasse Prince P. S. 1927 C. May Flower 2d P. S. 3479 H. C.
McLallen's Alice	203207	McLallen's Exile King 64125 (2-443) Exiles Malva 170346

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat productia in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
McKay's Buttercup	245513	McKay P. S. 3878 C. Obediance P. S. 12736 H. C.
Melia Ann	5444	Lord Aylmer 1067 Amelia 2d 1730
Melia's Rilma	249446 (835)	Melia Ann's King 2d 67208 (2-613) Rioter's Rilma 2d 194596
Meridale Countess	299456 (419)	Meridale Interested Prince 86473 (11-571) Sprite's Countess 232238 (484)
Mermaid of the Island	138787	Rosy's Wonder P. S. 835 J.H.B. Mermaid F. S. 2554 J.H.B.
Mertha's Duchess	170810 (544)	Son of the Duchess 57069 (2-507) Imported Mertha 145736
Merry Maiden	64949	Diploma 16219 Costa Rica 64570
Merry Miss	180051 (740)	Hood Farm Torono 60326 (72-665) Merry Maidens Daughter 168608 (396)
Milka of Lawn	153132	Applause 34234 (1-391) Sibyl of Lawn 121539
Minute Gun's Commilla	183619 (473)	Minute Gun 34776 (4-594) Commilla 79614
Miss Allie of St. Lambert	47513	Exile of St. Lambert 13657 Miss Signal 20379
Miss China Princess	285193 (771)	Florodora's Noble P. S. 4624 H. C. (1-771) Imp. China Princess 258931
Miss Fanny W.	125719	Pride's Boy 27144 Alice of Jefferson 78159
Miss Flint of Montpelier	210944	Father Flint P. S. 3585 H. C. Theory 4th P. S. 8250 C.
Miss Gracie Pogis	75287	Lord Victor Pogis 14499 Gracie of Jersey 10370
Miss Juanita	119249	Ida's Rioter of St. L. 5th 34947. Zend-Avesta. 94672
Missel Brookside	182101	Brookside Rioter 59839 (2-440) Esther M. Brookside 169062.
Lulu of Ashburn	247954 (428)	Western Ranger 73604 (2-424) Lucy C. of Humboldt 171296 (386)
Mabel's Jolly	203710	Mabel's Raleigh P. S. 3722 H. C. (17-492) Golden Jolly Twylish 203663
Mabel Marcus	213879	Marcus P. S. 2461 H. C. Mabel 31st P. S. 5324 H. C.
Mabel Poet's Lady Aldan	238438	Mabel's Poet 65780 (15-490) Lady Aldan P. S. 8470 H. C.
Mabel's Poet's Nelly	213904 (452)	Mabel's Poet 65780 (15-490) Nelly Hope F. S. 8946 H. C.
Mabel's Poetess	214203 (509)	Mabel's Raleigh P. S. 3722 H. C. (17-492) Mabel's Poet's Nelly 213904
Mabel 35th P. S.	6311 H. C.	Boyle P. S. 1559 H. C. Mabel 23 P. S. 3213 H. C.
Madame Bonaparte	187439	Napoleon Bonaparte P. S. 2745 H. C. (3-483) Molly P. S. 7105 H. C.

TABLE 27.—BREEDING OF THE DAMS OF THE SIREs INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Maid of Pines 183717		Cambus 57917 Maid of Wolf Pen 68232
Majesty's Eminentia 238334		Royal Majesty 79313 (45-579) Jersey Isle Eminentia 213492
Majesty's Iris 265701 (964)		Royal Majesty 79313 (45-579) Mon Plaisir's Iris 238702
Majesty's Pride 2d P. S. 14462 C.		Royal Majesty 79313 (45-579) Oxford's Fontaine 2245580
Majesty's Rose of St. Mary 235178 (671)		Royal Majesty 79313 (45-579) Island Rosabel 2d 213497
March Flower 245294		Mabel's Raleigh P. S. 3722 H. C. (17-492) Congratulation F. S. 9039 C.
Manfant's Lady 2d P. S. 8271 H. C.		Topsy's Lord P. S. 2420 H. C. Manfant's Lady P. S. 7347 H. C.
Marina Pogis 63050		Pogis Toltec Tormentor. 20501 Evening Beauty 36808
Majoram 3239		
Martha Bluebell 207689 (667)		Dainty's Guenon Lad 67099 (1-667) Flora Jazel 192749
Masie's Red Fox 221944 (519)		Silton's Fox P. S. 3643 H. C. (1-519) Maritana P. S. 9877 C.
Matilda's Emma 191076 (698)		Kingman of Brondale 63317 (2-565) Meadowbrook Matilda 161494
Mina's Dewdrop 211648		Wonder's Lad P. S. 3498 H. C. (1-372) Mina 2d P. S. 8929 C.
Model Interested Violet 201940 (522)		Model's Oxford Lad 66518 (11-454) Interested Violet 188231 (713)
Mon Plaisir's Fanny 3d 234162		Gipsy's King P. S. 3270 H. C. Mon Plaisir's Fanny 203640
Mona's May Melrose 232392 (645)		Mona's Lad 57138 (3-579) May Melrose of St. Cloud 190622
Mona's Rose 181623 (379)		Mona's Glory Jr. 59564 (2-374) Controller's Rose 166178 (510)
Morny Cannon's Feather 210832 (507)		Morny Cannon P. S. 3058 H. C. (7-513) Feather P. S. 7481 C.
Morocco's Pet 211595		Maid's Golden Lad P. S. 3059 H. C. Morocco's Pride P. S. 9089 H. C.
Mousy 3d P. S. 1832 C.		Augustus 10725 Mousy F. S. 745 C.
Moyanc C. 86492		Oonan's Tormentor 22280 Moyanc's Fancy 78452
Mrs. Fox of St. Martin 173305		Champion Flying Fox 61441 (4-594) Miss Bayard 3d P. S. 5422 C.
My Lady Moon 257190 (505)		Campanile's Sultan P. S. 4000 H. C. (2-490) Miss Moon F. S. 9644 C.
My Model of Perfection 180237		Queenie's Prince P. S. 2281 H. C. Model P. S. 6430 H. C.
Nadge Doree 64075		Romp's Tormentor 7126 Miss Flite of Bingo 31000
Nancy of St. Lambert 2d 38749		Canada's John Bull 8388 Nancy of St. Lambert 12964

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod of Daughters Dam of Dam with Avg. Fat Prod.
Naomi 10th P. S. 12988	H. C.	Flower's Hero P. S. 3502 Naomi 6th P. S. 11610
Napoleon's Fontaine	198051	Napoleon Bonaperte P. S. 2745 H. C. (3-438) Brown Fontaine of Trinity 172296
Nashville Susie	265138 (596)	Cowslip's Ashley 83633 (8-558) Nashville Perfection 189189 (519)
Naughty Nancy	Marett 244944	Morny Cannon P. S. 3058 H. C. (7-513) Naughty Nancy 2d P. S. 12664 H. C.
Nettina's Fontaine	259447 (474)	Fontaine's Duke 61709 (11-524) Sperffield Owl's Nettina 170823 (659)
Ninetta's Duchess	141693	Theda's Duke of Portage 41762 (10-515) Ninetta's Rosebud 104155
Noble Plymouth	253319	Noble of Oaklands 95700 (44-464) Financial Plymouth 253304
Noble Sultane of Oaklands	P. S. 17281 H. C.	Noble of Oakland P. S. 3909 Sultane of Oaklands P. S. 11017
Noble's Blanchette	238456	Noble of Oakland's P. S. 3909 H. C. Blanchette 4th P. S. 10441 C.
Noble's Christman Nursie	289453	Noble of Oaklands 95700 (44-464) Nurse Agatha P. S. 12117 C.
Noble's Topsy of Oakland	252169	Noble of Oaklands 95700 (44-464) Topsy 20th P. S. 6979 H. C.
Noble's Vespasia	289456	Noble of Oaklands 95700 (44-464) Nattie P. S. 12475 C.
Nonda Miller	2d 185104 (537)	Bobby F. 42663 Nonda Miller 116736
Nora Hugo Lass	169948	St. Lambert's Rioter King 54896 (8-474) Exile's Nora Hugo 156407
Nunthrope's Eminence	232105 (544)	Eminent 69631 (33-477) Nunthrope's Fontaine 172289
Nunthrope's Fontaine	172289	Lord Carteret P. S. 2064 H. C. Fontaine C. 152192
Nymph of St. Lambert	12968	Stoke Pogis 3d 2238 Diana of St. Lambert 6636
Oakland's Bess	P. S. 9833 H. C.	Favon P. S. 2943 H. C. (1-393) Bess P. S. 6968 C.
Oakland's Nora	14880	Lorne 5248 Pet of St. Lambert 5123
Odeletha	120280 (547)	Odelio 4th 33003 (2-577) Daletha 105311
Oise's Lass	232802	Rochette's Golden Lad 78218 (2-405) Oise F. S. 9454 C.
Olive of Sheomet	187161 (436)	St. Helier of Sheomet 61765 (5-439) Burnham's Gift 161904 (573)
Oonan	1485	Rajah 340 Omoo 1247
Oonan 23d of Hood Farm	163228 (691)	Hood Farm Pogis 40684 (8-546) Masher 64950
Oonan's Bijou	2d 182195 (563)	Valentine's Oonan 58076 (20-478) Oonan's Bijou 150199
Oonan's Countess	163628 (514)	Oonan's Pogis 7th 47902 (6-449) Countess Matilda 74928

TABLE 27.—BREEDING OF THE DAMS OF THE SIREs INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg Fat Prod.
Oonan's Lois	163629 (516)	Oonan's Pogis 7th 47902 (6-449) Pilot's Lassie 130020
Ophelie	493	On I. of J. Lisette 492
Oriana Pogis	64752	Prince Pogis 10682 Moth of St. Lambert 9775
Owl's Brown Duchess	212141 (750)	Spermfield Owl 57088 (48-579) Spot's Duchess 170812 (470)
Owl's Interested Matilda	211989 (524)	Spermfield Owl 57088 (48-579) Matilda's Interest 188175 (529)
Owl's Interested Veda	193942 (526)	Spermfield Owl 57088 (48-579) Interested Veda 181975 (507)
Owl's Interested Veda Choice	282548 (580)	Sibley's Choice 83040 (23-690) Owl's Interested Veda 193942
Owl's Golden Queen Princess	239769	Princess B's Owl 69698 Owl's Golden Queen 193947
Owl's Lassie	155973	The Owl 54738 Spermfield Lassie 129540
Owl's Model Interested Tones	252107 (433)	Spermfield Owl 57088 (48-579) Model's Interested Tones 201935 (428)
Owl's Violetta	212124 (600)	Spermfield Owl 57088 (48-579) Duke's Mag Violet 170829
Oxford Daisy of Trinity	235179	Gedney Farm Oxford Lad 71238 (24-473) Daisy Nuriel 240793
Oxford Ever P.	9340 H. C.	Bessie's Lad P. 2479 C. (1-474) Oxford Lass P. 3582 C.
Oxford Firefly	213932	Gedney Farm Oxford Lad 71238 (24-473) Firefly P. S. 8022 C.
Oxford's Golden Jessie	237418	Imperial Oxford 75669 Young Golden Jessie 2d 203275
Oxford Ixia Fancy	252184	Gamboge's Knight 95698 (52-514) Oxford Prime's Queen 230342
Oxford Ixia of Fair View	238442 (435)	Gedney Farm Oxford Lad 71238 (24-473) Oxford Ixia 213875
Oxford Ixia 3d P. S.	8584 H. C.	Queenie's Prince 2d 2574 H. C. Oxford Ixia 213875
Oxford's Lad's Lucy	213913	Gedney Farm Oxford Lad 71238 (24-473) Lucy 12th P. S. 9236 C.
Oxford's Pretty Daisy	227260	Sultana's Oxford Lad 76506 Jolly's Dark Daisy 213898
Oxford's Theresa Rook	289457	Oxford Knight P. S. 3938 C. Theresa Rook P. S. 96124 C.
Oxford Lass P. S.	35826	Count Wolseley P. S. 928 H. C. Oxford Primrose P. S. 2252 C.
Oxford Majesty's Gouda	343946 (663)	Imp. Oxford Majesty 134090 (48-540) Golden Lassie F. S. 9548 H. C.
Oxford Majesty's Rosy Morn	254623 (565)	Imp. Oxford Majesty 134090 (46-543) Marett's Rosy Morn 242746
Oxford Tiddleywink	252228 (417)	Imp. Oxford Majesty 134090 (48-540) Oxford Beauty of St. Sav. 235161
Oxford Triumph P. S.	12120 H. C.	Oxford Lad P. S. 3123 H. C. Oxford Ever P. S. 9340 H. C.

TABLE 27.—BREEDING OF THE DAMS OF THE SIREs INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Oxfordshire's Salada	228026 (619)	Oxfordshire 63548 (12-541) Salmera 132559
Ozouf's Duchess of Tapon	238640	Morny Cannon P. S. 3058 H. C. (7-513) Reminder's Duchess 187420
Oxford Kate	13646	Pilot P. S. 183 J.H.B. Verclut F. S. 1846 J. H. B.
Paradise	32082	Combination 4389 Goodbye 27366
Passport	219742 (843)	Interested Prince 58224 (46-557) Nursery Rhyme of St. Lambert 173860
Pauline	494	On I. of J. Hebe 489
Pearl 5th P. S.	11273 H. C.	Morny Cannon P. S. 3058 H. C. (7-513) Pearl 3d P. S. 6516 H. C.
Phyllis of St. Lambert	78867	King of St. Lambert 15175 Alic of St. Lambert 2d 43671
Pilot's Model	314765 (869)	Eminent's Pilot 75364 (22-632) Coomassie's Golden Lucy 248618 (543)
Poppy's Maiden	272128 (731)	Oonan 23d's Grandson 74887 (14-490) St. Mawe's Poppy 219992 (956)
Pride of Windsor	483	
Pride's Olga 3d	97897	Real Queen's Stoke Pogis 20535 Pride's Olga 37186
Pride's Olga 4th	79897	Melia Ann's Stoke Pogis 22042 Pride's Olga 37186
Pride's Olga Rosaire	194383	Rosaire's Golden Lad 64554 Pride's Olga 4th 96870
Prince's Fern Lass	239653	Golden Fern's Grey Prince 73208 (6-440) Rhyme's Beauty 228666
Princess Leva P. S.	13303 H. C.	Grand Warder P. S. 3690 H. C. (2-444) Sir Watkin's Lass P. S. 11768 H. C.
Princess of Maitland	149158	Duke of Maitland P. S. 2185 J.H.B. Unit P. S. 5928 J. H. B.
Queen of Ashantee	14554	Guy Fawkes F. S. 251 J.H.B. Mabel 2d F. S. 889 J.H.B.
Queen Riotress of St. L.	279079	King's Rioter Lad 62098 (6-557) Riotress Lady Riotress 245607
Queen Tilda F. S.	9381 C.	Foundation Stock Foundation Stock.
Queen Ves	173667	Pet's Parole 49872 (1-378) Adelaide M. 146120
Raleigh's Brown Fontaine	238440	Eminent's Raleigh 69011 (27-521) Fontaine 10th P. S. 8855 H. C.
Raleigh's Duchess of St. Sav.	235186	Raleigh's Duke 72486 (1-655) Ozouf's Duchess of Tapon 238640
Raleigh's Lucy Belle	238319	Eminent's Raleigh 69011 (27-521) Eminent's Lucy Belle 203639
Raleigh's Queen	210070 (463)	Eminent's Raleigh 69001 (27-521) Minerva's Queen P. 8651 C.

TABLE 27.—BREEDING OF THE DAMS OF THE SIREs INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Raleigh's Pretty Karnak	252135 (574)	Eminent's Raleigh 69011 (27-521) Fontaine's Gold Medal 203636
Raleigh's Rose	185410 (605)	Eminent's Raleigh 69011 (27-521) Noirmont Rose F. S. 8931 H. C.
Ravachol's Queen	157468	Ravachol P. S. 2032 C. La Grise on I. of J.
Red Flag	232782 (617)	Fancy's Pioneer P. S. 3195 H. C. (10-584) White Flag P. S. 8290 C.
Reminder's Soucique	180380	Reminder P. S. 2052 C. Soucique 2d P. S. 3471 C.
Renown Lady	232785	Fancy Pioneer P. S. 3195 H. C. (10-584) Renown 5th P. S. 7944 C.
Rhoda of Mannsfield	257075 (688)	Mannsfield of Mannsfield 86856 (3-584) Rhoda of Wyldeewood 216165 (624)
Rhonda Hudson	48723	Catono 3761 Rosabel Hudson 5704
Rill P. S.	6982 H. C.	Hope P. S. 1948 H. C. Tula P. S. 5323 H. C.
Rinda Sunny Bank	175361	Norean's Don Pogis 59862 Rinda Double Rex 167864
Rioter Letty King of St. L.	2d 211418	Doss' Exile King of St. L. 66712 (1-534) Rioter Letty King of St. L. 177938
Rioter's Edith Hugo	142248	Rioter's Exile of St. L. 48228 Riotress of St. L. 124695
Rockwood Witch	178274	Rockwood Colonel 62193 The Seer's Witch 165790
Rose Blair F. S.	9354 H. C.	Foundation Stock Foundation Stock
Rose Fern Rosebud	169128	Eminent 2d P. S. 2532 H. C. Golden Fern's Rose Fern 168517
Rosa of St. Martin	195810	Cato 4th P. S. 2400 C. Miss Bayard 4th P. S. 6695 C.
Rose Queen P. S.	9535 H. C.	Homely P. S. 2637 H. C. Golden Queen P. S. 7522 H. C.
Rose's Darby Girl	223179	King's King of St. Lambert 26th 72728 Rose of Darby 204807
Rowena's Daisy	161056	Ruler P. S. 2081 H. C. Sweet Rowena P. S. 6265 H. C.
Rozel's Pet	11th P. S. 8937 H. C.	Financial King P. S. 2624 H. C. (4-516) Rozel's Pet 3d P. S. 4316 C.
Sans Alois Niece	288904 (622)	Financial Countess Lad 86252 (27-544) Soda Susetta 245324
Sadya's Lucy	249169 (626)	Sayda's Heir 3d 74817 (62-565) Edna's Dot 131478
Sadya's Princess	67385	Pocatells 21953 Sayda 3d 17317
Sayda's Queen of Ventnor	168033 (807)	Sayda's Heir 45360 (14-498) Ventnor Beauty's Belle 113195
Sayda's Rose	2d 247207 (632)	Sayda's Heir 3d 74817 (62-565) Sayda's Rose 141576

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Scot's Belle	195756 (476)	Great Scot P. S. 2153 H. C. (1-476) Fallus P. S. 5431 C.
Script	43308	Golden Art 10998 Transcript 31867
Seaweed P. S.	11942 H. C.	Raleigh P. S. 3273 H. C. Seabreeze P. S. 8001 C.
Self Help P. S.	9664 H. C.	Hermit P. S. 2567 H. C. Charmer P. S. 8020 C.
September Maid	100718	Exile of St. Lambert 13657 Berecynthia 68029
Shamrock of River Meadow	191348	Napoleon Bonaparte P. S. 2745 H. C. (3-483) Pennithorpe F. S. 8098 H. C.
Shannon Lass	238305	Sire on I. of J. Dam on I. of J.
Shylock's Oxford Daisy	241822	Fabby's Shylock 70334 (1-576) Fox's Oxford Daisy 180251
Signalome of Florence	195090 (504)	Jubilee of Bois D'Arc 29041 (13-482) Signalome 147591 (423)
Signalia Simile 2d	97612	Silvergilt's Tormentor 29298 Signalia Simile 73082
Signal's Laura Lee	173981	Signal's Maxim 42489 (1-571) Miss Flora Lee 173168
Solitude's Glory F. S.	9751 H. C.	Foundation Stock Foundation Stock
Sombre	80796	Diploma 16219 Alexa 64924
Sophie 15th of Hood Farm 2d	221576	Hudson Pogis 66647 (3-524) Sophie 19th of Hood Farm 189743 (1003)
Sophie 19th of Hood Farm	189743 (1003)	Fort Hill Farm Chief 62859 (2-724) Phil's Scituate 163456
Sophie's Ada	296925 (718)	Pogis 99th of Hood Farm 94502 (104-701) Figgis 83d of Hood Farm 257376 (541)
Sophie's Adora	299594 (990)	Pogis 99th of Hood Farm 94502 (104-701) Lass 59th of Hood Farm 264341 (580)
Sophie's Bertha	313238 (1116)	Pogis 99th of Hood Farm 94502 (104-701) Lass 66th of Hood Farm 271896 (1060)
Sophie's Dame	350680 (828)	Pogis 99th of Hood Farm 94502 (104-701) Lass 32d of Hood Farm 218185 (669)
Sophie's J. H. L. K. Idelpha	337395 (618)	Sophie's Premier 111613 (29-653) Jacob's H. L. K. Idelpha 268970 (569)
Sperffield Lassie	129540	Sir Julius P. S. 1547 Sperflight 2d P. S. 4157
Sperffield Owl's Actress	252113	Sperffield Owl 57088 (48-579) Hillside Actress 196361 (389)
Sperffield Owl's Belle	194051 (645)	Sperffield Owl 57088 (48-579) The Duke's Golden Belle 170814 (430)
Sperffield Owl's Eva	193934 (993)	Sperffield Owl 57088 (48-579) Magyarland's Eva 170805
Sperffield Owl's Princess	227467 (489)	Sperffield Owl 57088 (48-579) Theda's Princess 206389
Sperffield Owl's Temisia	215982 (882)	Sperffield Owl 57088 (48-579) Magyarland's Temisia 134765 (653)

TABLE 27.—BREEDING OF THE DAMS OF THE SIREs INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Star of the Morning	181194	Morning Star P. S. 2968 H. C. Loveland 2d P. S. 8357 C.
Stockwell's Gold Lady	213952	Imp. Stockwell 75264 (11-456) Eminent's Lady P. S. 10393 C.
Stockwell's Roseleaf	213965	Imp. Stockwell 75264 (11-456) Pretty Lady Eminent 224578
St. Lambert's Emsie	145929	St. Lambert Boy 17408 (1-478) Emsie's Riotress 120104
St. Lambert's Riotress	106220 (478)	St. Lambert Boy 17408 (1-478) Letty Rioter 73475
St. Mawes Beauty	295047 (933)	Rosaire's Olga Lad 87498 (51-662) St. Mawes Susy 219991
St. Mawes Blossom	229066 (714)	St. Mawes 72053 (21-640) Susy of Forestdale 191571
St. Mawes Poppy	219992 (956)	St. Mawes 72053 (21-640) Susy of Forestdale 2d 191574
St. Mawes Queen	229067 (594)	St. Mawes 72053 (21-640) Koffee's Waltz of St. L. 2d 191572
St. Mawes Susy	219991 (895)	St. Mawes 72053 (21-640) Susy of Forestdale 191571
St. Owen's Gamboge	247109	Gamboge's Knight 95698 (52-514) Dam on I. of J.
Sultan King's Madge	275934	Oaklands Sultan King 85602 (4-491) Twin Madge 231170
Sultana P. S.	6072 H. C.	Courage P. S. 1813 C. Water Lily P. S. 4838 H. C.
Sue B 2d's Choice	323897 (623)	Sue B's Omega Choice 105522 (5-623) Sue B. 2d 210586 (657)
Sultana's Rosette	149740	Sarabond P. S. 797 H. C. Rosette 4th P. S. 2128 H. C.
Sultana's Fawn Princess	195803	Picton 4th P. S. 2912 H. C. Miriam 3d P. S. 8580 C.
Sultan's Nelly of St. Martins	245044 (551)	Holburton's Sultan P. S. 4130 H. C. (5-545) Fortescue's Nelly P. S. 4826 C.
Sultana's Fawn Beatrice	239728 (384)	Sultana's Oxford Lad 76506 (10-492) Golden Fern's Beatrice 203977
Sultana's Snowdrop	185045	Imp. Golden Fern's Lad 65300 (8-443) Sultane 9th P. S. 1145 H. C.
Sultane Sophie	203302 (683)	Imp. Sultane's Golden Fern 65304 (2-579) Sophie Laurinda 141195
Sulphide	88038	Prince of Mahaska 16159 Crusta 29637
Sweet Apple-Blossom	235097 (507)	Hallow'en's Fox P. S. 3631 H. C. (4-462) Sweet Pea 2d P. S. 11109 H. C.
Sultan's Tiney Interest	252158	Sultan of Oaklands 78475 Tiney's Interested Lass P. S. 94636
Surprise of Arden	151896	Everton Lord P. S. 1088 J. H. B Moonbeam P. S. 2439 J. H. B.
Sweet Blossom of Florence	197130 (432)	Jubilee of Bois d'Arc 29041 (13-482) Variella of Florence 111427 (523)
Sweet Dairylike	378464 (703)	Noble's Jolly Sultan 97181 (27-529) Dairylike 2d P. S. 10392 H. C.

TABLE 27.—BREEDING OF THE DAMS OF THE SIRES INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with avg. Fat Prod.
Swift's Expectation 233596		Isonomy P. S. 3044 C. Eminent's Expectation 195813
Tapestry 56607		Compass 16958 Sarita Victoria 56451
Temisia's Owl's Rose 215973 (876)		Temisia's Owl 72224 (1-875) Temisia's Rose 993939
The Duke's Dorothy 170818 (519)		Theda's Duke of Portage 41762 (10-515) Imported Dorothy's Maid 138109
The Duke's Nutley Violet 170846 (447)		Theda's Duke of Portage 41762 (10-515) Nutley's Violet 122816
The King's Oxford Ixia 238443		The King P. S. 3457 H. C. Oxford Ixia of St. Saviour's 213909
The Owl's Lily 141870		The Owl 541738 Doncaster's Lily P. S. 6445 J. H. B.
The Owl's Lily 2d 163583		The Owl 541738 The Owl's Lily 141870
The Owl's Oxford Daisy 162113		The Owl 541738 Oxford Lily 2d P. S. 5732 H. C.
The Owl's Sensation 162128		The Owl 541738 Cocotte F. S. 8300 H. C.
Theda H. 20567		Clusius H. 5781 Dancy H. 14446
Togo's Primrose P. S. 13211 H. C.		Admiral Togo P. S. 3561 H. C. (2-646) Speckled Hip 231555
Tonona 3d of Hood Farm 163721		Torono 25204 (17-516) Figgis 76106
Tormentor's Anise B. 84830		Tormentor Stoke Pogis 20485 Anise Burns 44635
Tormentors Lass 59832		Tormentor 3533 Addie P. 41428
Tormentor's Ruby Countess 250588		Financial Count 61316 (11-596) Tormentor's Ruby 113004
Tornella 78453		Oonan's Tormentor 22280 Tormentor's Lass 59832
Trevarth's Bianca 149560		Trevarth 39280 Bianca of Pittsford 111532
Tootsie P. S. 3214 H. C.		Everton King P. 390 C. Fontaine 2d P. 807 H. C.
Tradition of A. D. F. 241451		Benedictine's Jockey P. S. 3725 H. C. (2-388), Dam on I. of J.
Trevarth's Garland 208604		Trevarth 39280 Golden Love's Garland 145088
Tristess Vol. X. P. 349 E.		Golden Hero 4857 Sultane 14th Vol. VII p. 232
Twilight of N. I. 175478		Gertie's Stoke Pogis 56492 (15-568) Diploma's Lily 140493
Uncle Peter's Tulip 146273		Uncle Peter P. S. 2115 J. H. B. Tulip 4th P. S. 4447 J. H. B.
Vellum 6th P. S. 59549 H. C		
Ventor B's Jennie 129768		Ventor Prince Cowes 40566 Exies Rosebud 73485

TABLE 27.—BREEDING OF THE DAMS OF THE SIREs INCLUDED IN THE GENEALOGY TABLE
(Table Continued)

Dam of Sire	(Mature equivalent fat production in pounds)	Sire of Dam with Avg. Fat Prod. of Daughters Dam of Dam with Avg. Fat Prod.
Venus Vile P. S. 3946 H. C.		Bobby 5th P. S. 1060 C. Lemon's Venus P. S. 2493 C.
Victor's Abertie 240616 (532)		Hebron Victor 80100 (17-521) Dot Brookside 182180
Victor's Lady Kate 218118 (585)		Lady Letty's Victor 65020 (41-573) Kate of New England 176340
Villageoise P. S. 13142 H. C.		Locket's Astor P. S. 3635 H. C. Lively Queen P. S. 11209 H. C.
Viola Ridgewood 138623		Minerva's Pogis 20085 Lady Selma 130540
Viola's Blue Belle 264737 (377)		Viola's Golden Jolly 79314 (16-486) Blue Belle's Sophona 215045
Viola's Bright Lady 255485		Golden Champion P. S. 3334 H. C. (2538) Willon's Lady Viola 219486
Violet of St. Saviour 203631		Doctor P. S. 2402 H. C. La Croix Violet P. S. 6272 H. C.
Virginia A. 131997		St. Lambert's Torment 30896 Virginia H. 98345
Warder's Lady 195777 (839)		Warder P. S. 3227 H. C. (5-557) Badier's Lady P. S. 7345 H. C.
Waxie of Bleak House 174858		Stoke Pogis of Waxie 54777 Bettie Marigold 136088
White Rose P. S. 4915 H. C.		Golden Lad 1242 H. C. Homely F. S. 2382 C.
Winnie Pedro Pogis 4th 184049		Pedro's Pretty Pogis 33660 Winnie Pedro Pogis 97952
Xenia 2d P. S. 17747 H. C.		Emigrant P. S. 4269 Xenia P. S. 9716
You'll Do's Gracy 365723 (734)		Oxford's Nunthrope Fox 126475 (11-627) Gracy's Lad's Sardine 286196
Young Jolly Sultane 269762		Golden Jolly P. S. 2921 H. C. (9-470) Young Sultane P. S. 2895 C.