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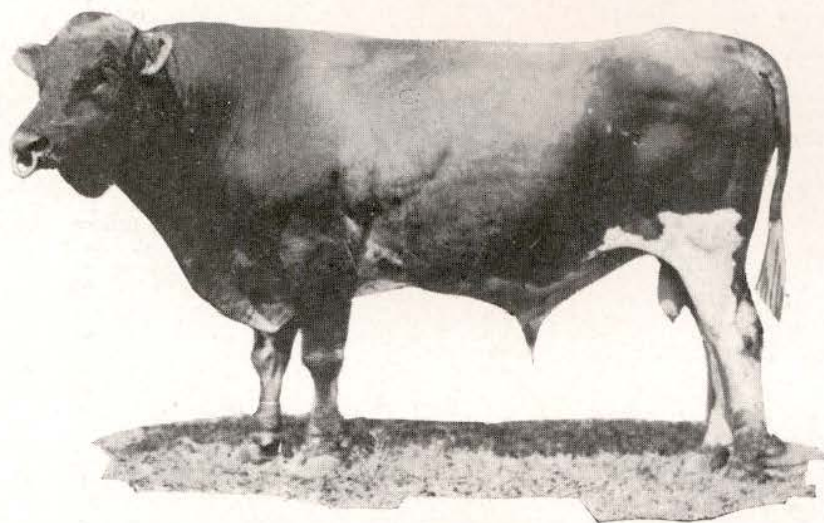
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Purebred Sires Effect Herd Improvement



GOLDEN SHYLOCK

The butterfat records made by the daughters of this Jersey sire were more than 40 per cent greater than those of their dams.

AGRICULTURAL EXPERIMENT STATION
THE UNIVERSITY OF NEBRASKA
LINCOLN

PEDIGREE OF PRINCE ORMSBY MERCEDES DEKOL

<p>No. 47008 Born March 17, 1907. Bred by A. C. Loring, Minneapolis, Minn. Sire of 5 A. R. O. daughters 2 daughters with A. R. O. daughters</p>	<p>Cem Pietertje Hengerveld Paul DeKol No. 23300 Sire of: Inka Sylvia DeKol Fat 7 days.....20.84 lbs. 12 other A. R. O. daughters 14 sons with A. R. O. daughters 7 daughters with A. R. O. daughters</p>	<p>Pietertje Hengerveld's Paul DeKol No. 22128 Sire of: 16 A. R. O. daughters 30 sons with A. R. O. daughters 14 daughters with A. R. O. daughters</p>
<p>Sir Ormsby Hengerveld DeKol No. 31212 Sire of: Aaggie Texal Waye 2d 7 days fat.....24.48 365 days fat.....862.18 Skylark Ormsby Heng. 7 days fat.....21.37 365 days fat.....623.11 Akkrunner Ormsby 7 days fat.....24.89 365 days fat.....645.18 Pietertje Maid Ormsby 7 days fat.....28.45 365 days fat.....607.30 30 days fat.....116.53 (World's record.) 69 A. R. O. daughters, 9 over 21 lbs. fat 7 days, 9 over 500 lbs. fat in 365 days. 25 sons with A. R. O. daughters 38 daughters with A. R. O. daughters Grandsire of: Duchess Skylark Ormsby 365 days milk 27,761 lbs. 365 days fat 1,205 lbs. (World's record for fat.)</p>	<p>Duchess Ormsby 2d No. 35439 Fat 7 days.....17.05 lbs. 3 A. R. O. daughters 2 sons with A. R. O. daughters 3 daughters with A. R. O. daughters</p>	<p>Maplecroft Gem No. 35909 3 A. R. O. daughters 1 son with 13 A. R. O. daughters 4 daughters with A. R. O. daughters</p>
	<p>DeKol 2d's Paul DeKol No. 2, No. 23366 Sire of: Madison Jennie 7 days fat 23.36 lbs. 30 days fat 96.51 lbs. 365 days fat 615.74 lbs. Madison Pearl 7 days fat 20.00 lbs. 365 days fat 661.35 lbs. 36 other A. R. O. daughters 19 sons with A. R. O. daughters 28 daughters with A. R. O. daughters</p>	<p>Tritomia's Netherland Carl No. 16406 Sire of 7 A. R. O. daughters 2 sons with A. R. O. daughters 16 daughters with A. R. O. daughters</p>
<p>Daisy Mercedes Pietertje 2d No. 53643 Record 7 days: Fat .....17.43 lbs. Milk .....525.70 lbs. 3 A. R. O. daughters 1 son with 6 A. R. O. daughters 4 daughters with A. R. O. daughters</p>	<p>Duchess Ormsby No. 16004 5 A. R. O. daughters 2 sons having A. R. O. daughters 2 daughters with A. R. O. daughters</p>	<p>DeKol 2d's Paul DeKol No. 20735 Sire of: Aaggie Corn. Pauline Fat 7 days 27.46 lbs. Fat 30 days 110.09 lbs. 44 other A. R. O. daughters 37 sons with A. R. O. daughters 35 daughters with A. R. O. daughters</p>
	<p>Daisy Mercedes Pietertje No. 46888 Dam of: 3 A. R. O. daughters 2 daughters with A. R. O. daughters</p>	<p>May Hartog of Brookside No. 36420 3 A. R. O. daughters 1 son with 37 A. R. O. daughters 3 daughters with A. R. O. daughters</p>
		<p>Jeltje's Netherland Pietertje No. 15927 Sire of: 7 A. R. O. daughters 3 sons with A. R. O. daughters 8 daughters with A. R. O. daughters</p>
		<p>Daisy A. Mercedes 2d No. 34298</p>

PUREBRED SIRES EFFECT HERD IMPROVEMENT

By M. N. Lawritson, J. W. Hendrickson, and W. B. Nevens

DEPARTMENT OF DAIRY HUSBANDRY

Because of his influence in stamping desirable characteristics on his offspring, it is of the greatest importance that an efficient dairy sire be selected.

Unfortunately it is not an easy task to select a dairy bull having the ability to transmit tendencies for increased milk production.

The real worth of a sire for the dairy herd can be established only when production records of the progeny are available for comparison with those of the preceding generation.

A study of the following three sires which have been in service in the University of Nebraska dairy herd should be of interest to the Nebraska dairyman wishing to improve his own herd. This experiment indicates that the apparently high cost of a good herd sire is more than outweighed by the increase in the value of the progeny.

All records were made in the dairy herd of the University and the feeding, care and management were essentially the same for the dams as for the daughters. In every case the records given in the tables are for a period not exceeding 365 days in length, even tho the lactation period extended beyond that time. The ages given are the ages of the cows at the beginning of the lactation period.

PUREBRED SIRES EFFECT GREAT IMPROVEMENT

The purebred Jersey bull Golden Shylock has had a remarkable influence in improving the Jersey herd due to the ability of his daughters to raise the general average of the herd in milk and butterfat production. This bull was purchased in the fall of 1908 when a little over a year of age.

He remained in the herd until his death in August, 1916. Twelve of his daughters from eight different dams have completed records for one lactation period and nine have completed two or more lactation periods.

A comparison of the production of the daughters of this sire with that of their dams reveals the truly wonderful power which he possessed of transmitting to his offspring

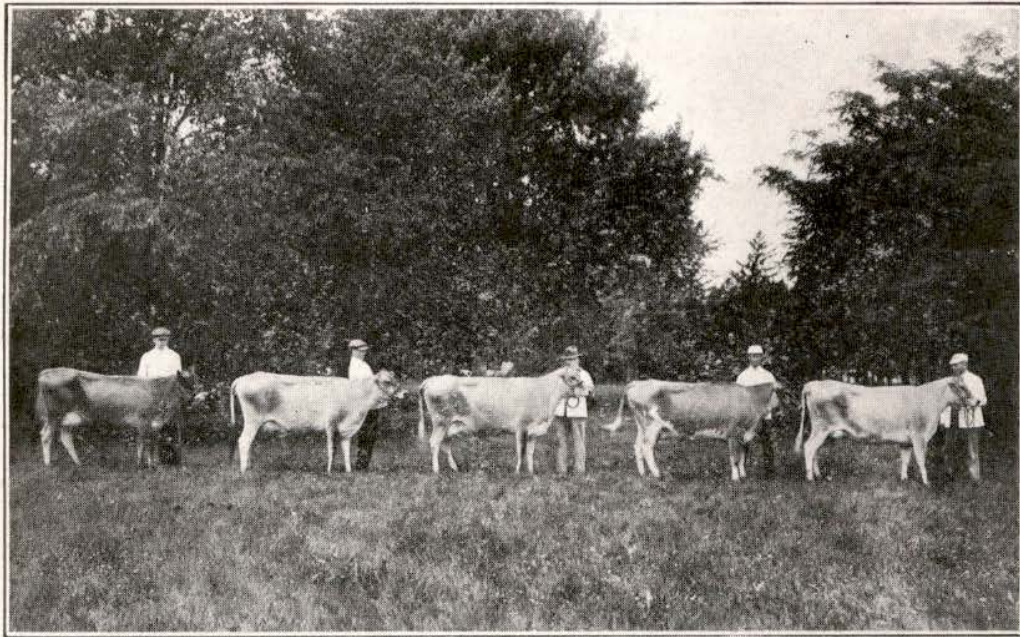


FIG. 1. FIVE DAUGHTERS OF GOLDEN SHYLOCK

From left to right: Lucy, Ula, Esther, Glimmer, Reba. Table 1 shows their average production over that of their dams in their first lactation period to be 42 per cent.

milk and fat producing ability. As shown in Table 1, the average increase in production of the daughters over that of their dams during the first lactation period was 42 per cent in the case of both milk and butterfat. This increase is very great considering the fact that the dams were good producers, their average fat production being more than twice that of the average cow of Nebraska according to the 1910 census reports. As the production of the herd increases it continually becomes more difficult to effect marked improvement. With but a single exception the production of both milk and fat by each of the twelve daughters of this sire was greater during the first lactation period than that of their dams, as shown in Table 4. In the case of the cow

Glory, there was a decrease of about 1 per cent in milk production, but her fat production showed a slight increase. In the second lactation period, three of the daughters failed to produce quite as much butterfat as their dams and two of these were considerably lower in milk production than their dams. The average of all the daughters, however, was considerably greater.

The purebred Holstein-Friesian bull Prince Ormsby Mercedes DeKol was purchased in January, 1911, being nearly 4 years old at that time. He was retained in the herd a little

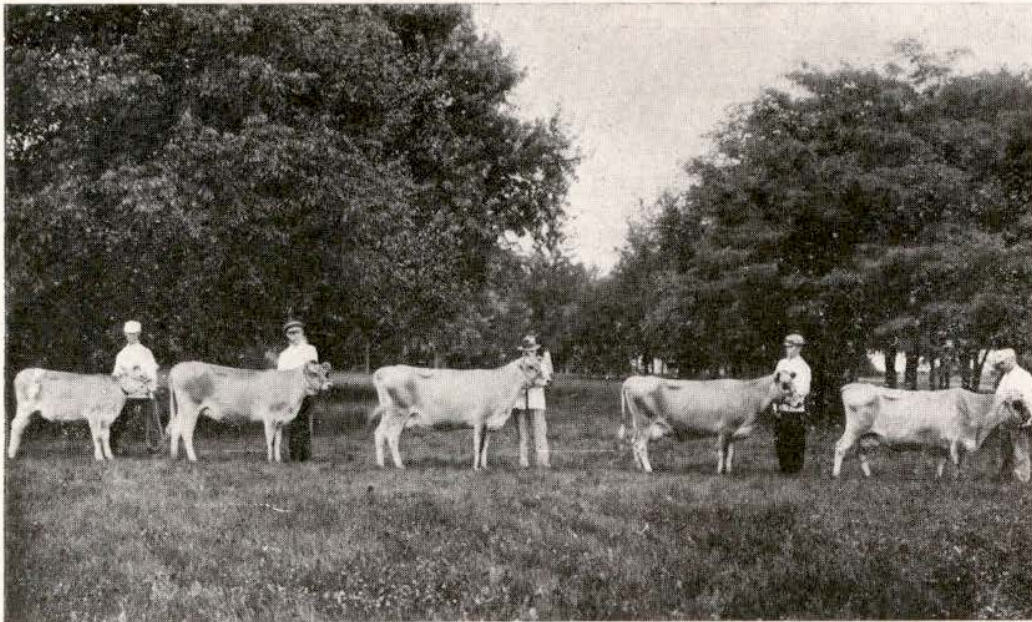


FIG. 2. EDITH RICHARDSON AND HER FOUR DAUGHTERS

Three of the daughters are included in the tabulation of the production of Golden Shylock's daughters, each showing pronounced improvement over her dam.

over a year, being sold in April, 1912. But three purebred daughters of this bull were raised in the herd. All of these showed very marked improvement in production over that of their dams in spite of the fact that two of the dams are among the highest record cows ever owned in the University Dairy herd. Katy Gerben, the dam of Kittie, at 6 years of age produced 19,161.2 pounds of milk containing 665.14 pounds of fat in one year. LaMay, the dam of LaVerna, holds the largest record of any cow in the herd, namely, 26,660.3 pounds of milk and 773.49 pounds of fat.

TABLE 1—Comparison of the Production of Golden Shylock's Daughters with that of their Dams

Production	First Lactation				Second Lactation			
	Av. Age Yrs.-Days	Milk Lbs.	Fat Lbs.	% Fat	Av. Age Yrs.-Days	Milk Lbs.	Fat Lbs.	% Fat
Total—daughters	2-111	79683.3	4435.4	5.69	3-295	68449.2	3777.8	5.52
Total—dams	2-177	56238.8	3018.1	5.36	3-131	51881.8	2738.7	5.26
Total—increase	23444.5	1417.3	.....	.....	16567.4	1039.1	.....
Av. production
Daughters	6640.3	369.6	.....	.....	7605.5	419.7	.....
Av. production
Dams	4686.6	251.5	.....	.....	5764.6	304.3	.....
Av. increase
Daughters	1953.7	118.1	.....	.....	1840.8	115.5	.....
Per cent increase.....	42.	47	.....	.....	32	38	.....

TABLE 2—Comparison of the Production of Prince Ormsby Mercedes Dekol's Daughters with that of their Dams

Production	First Lactation				Second Lactation			
	Av. Age Yrs.-Days	Milk Lbs.	Fat Lbs.	% Fat	Av. Age Yrs.-Days	Milk Lbs.	Fat Lbs.	% Fat
Total—daughters	2-301	42570.3	1583.3	3.72	3-48	50207.8	1884.9	3.77
Total—dams	2-29	25697.8	796.3	3.14	2-341	41249.6	1328.2	3.22
Total increase
Daughters	16872.5	787.0	.....	.....	8958.2	556.7	.....
Av. production
Daughters	14190.1	527.7	.....	.....	16735.9	628.3	.....
Av. production
Dams	8565.9	265.4	.....	.....	13749.9	442.7	.....
Total increase
Daughters	5624.2	262.3	.....	.....	2986.1	185.6	.....
Per cent increase.....	66	99.	.....	.....	22	42	.....

Considering the average improvement of the three daughters over their dams, it was found that in the first lactation period their milk production was 66 per cent, and their fat production 99 per cent greater. (Table 2.) In the second lactation period, there was not such a striking increase, the milk yield being 22 per cent and the fat yield 69

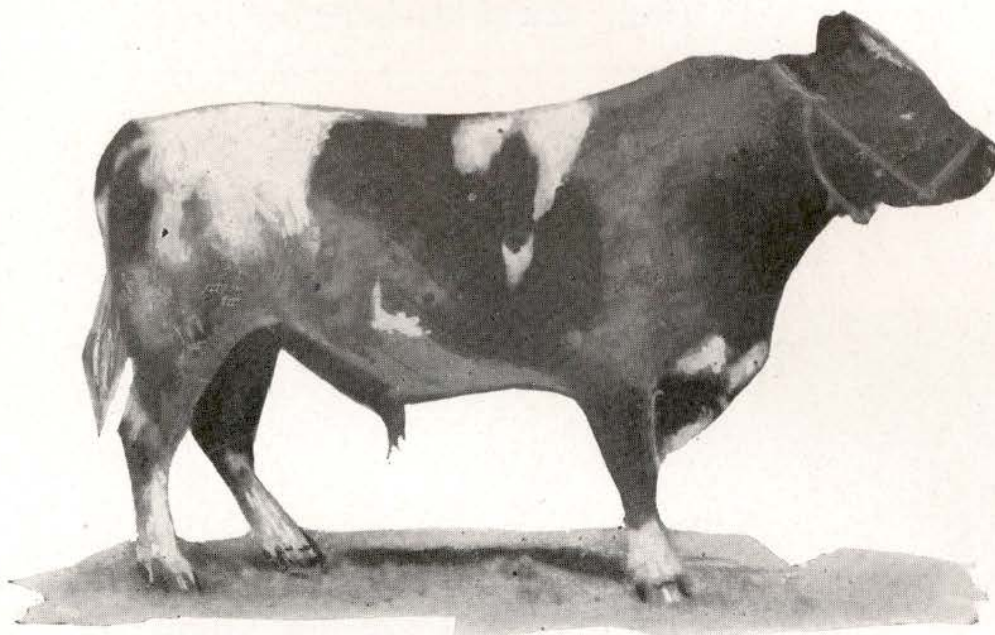


FIG. 3. PRINCE ORMSBY MERCEDES DEKOL

This Holstein sire left but a few daughters in the herd, but all of these are excellent examples of the power of a prepotent sire to transmit to his daughters tendencies for increased production.

per cent greater than that of the dams. In other words the excess production of the three daughters over that of their dams during the first lactation period was 16,872.5 pounds of milk containing 787 pounds of fat, and in the second lactation period 9,068.2 pounds of milk containing 552.2 pounds of fat. The daughters, however, had an advantage over their dams in being older at the time of freshening, thus giving them greater size and capacity.

While the records of but three daughters form but a small number for comparison and for definite conclusions as to the outstanding ability of this sire to effect marked improvement under varying conditions, the increases shown are truly remarkable when the high levels of production attained by his daughters are considered. The average production of the daughters during their first lactation periods was 14,190.1

pounds of milk and 527.7 pounds of fat. During the second it was 16,735.9 pounds of milk and 628.3 pounds of fat. The records of these cows place them among the superior producers of the breed.

King Segis Hengerveld Vale followed Prince Ormsby Mercedes DeKol as herd sire for the Holstein herd, being purchased July 13, 1912. Six of his daughters have completed

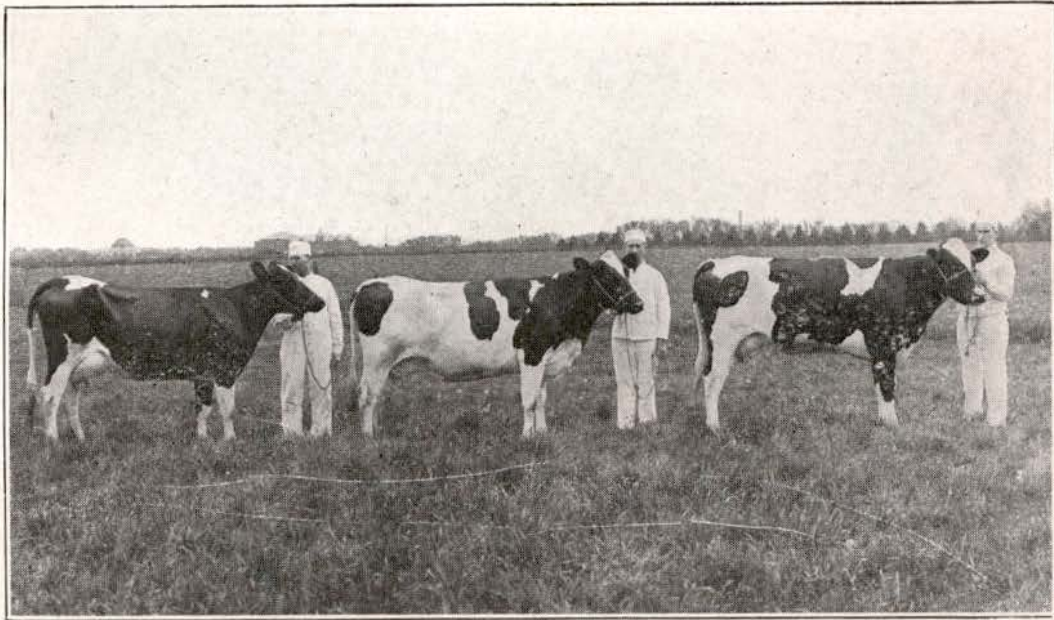


FIG. 4. DAUGHTERS OF PRINCE ORMSBY MERCEDES DEKOL

From left to right: Allie, Kittie, and LaVerna. The first two have completed 365-day records during their third lactation periods of 692.69 pounds and 733.08 pounds of butterfat, respectively.

records for one lactation period or more. In the case of four of these very substantial increases in production over that of their dams is noted. (Table 6.) In the case of two, the production is not greatly different from that of their dams. Considering the average of the six it was found that their production exceeded that of their dams 45 per cent in milk and 42 per cent in fat production, corresponding closely to the increases shown by the daughters of Golden Shylock during their first lactation period.

The average production of the dams of these daughters was greater than in the case of the dams of the daughters of Prince Ormsby Mercedes DeKol, so that the opportunity for a large increase was not quite so great. One of the dams whose record is given in Table 3, is Allie, which appears in Table 5 as a daughter of Prince Ormsby Mercedes DeKol.

FINANCIAL CONSIDERATIONS

It may be of interest to state the increased production of the daughters over their dams in terms of its money value. During the calendar year 1918 the average price paid in Lincoln for butterfat in cream used for buttermaking purposes was 50.73 cents per pound. During the period of September, 1918, to May, 1919, inclusive, the price paid in Lincoln to producers for whole milk testing 4 per cent fat was \$3.48 per hundred pounds.

On this price basis the butterfat produced by the twelve daughters of Golden Shylock during the two years would have been worth \$1,246.14 more than that produced by their dams. If the product had been marketed as whole milk it would have brought a return of \$2,137.07 more than the milk of their dams.

The three daughters of Prince Ormsby Mercedes DeKol for the two years increased the butterfat production over that of their dams to the amount of \$703.37. The increase in the value of their milk at the rate of \$3.22 per hundredweight for milk testing 3.7 per cent fat would have totaled \$1,169.02, or, in other words, considering the average production of the three daughters, it is found that the butterfat produced each year by each daughter was worth \$117.23 more than that of her dam and the milk produced exceeded that of her dam by \$194.83. These amounts are greater than the total value of the butterfat or the milk produced by the average cow of Nebraska.

The six daughters of King Segis Hengerveld Vale in the same period would have returned in increased production over their dams \$759.15 worth of butterfat or \$1,298.47 worth of milk, an average of from \$67 to \$108 per cow per year.

In contrast to the above conditions, Farmers' Bulletin No. 993 of the United States Department of Agriculture gives an example of a scrub bull whose daughters failed to produce as much as their dams, their average production being about 13 per cent less than that of their dams. If this scrub sire had been used instead of Golden Shylock the decreased production of the daughters would have caused a butterfat loss of \$379.65, or a milk loss of \$449.09, in the two years. Thus the difference between this scrub sire and Golden Shylock represents a money value of \$1,625.89 from the sale of butterfat of twelve daughters, or \$2,786.16 from the sale of their milk.

TABLE 3—Comparison of the Production of King Segis Hengerveld Vale's Daughters with that of their Dams

Production	First Lactation				Second Lactation			
	Yrs.-Days Av. Age	Lbs. Milk	Lbs. Fat	% Fat	Yrs.-Days Av. Age	Lbs. Milk	Lbs. Fat	% Fat
Total—daughters	2-242	84522.1	2835.9	3.29	3-312	65688.3	2279.1	3.47
Total—dams	2-259	59192.9	2014.1	3.40	3-353	46392.6	1638.4	3.53
Total increase								
Daughters .....	.....	25239.2	851.8	.....	.....	19295.7	640.7	.....
Av. production								
Daughters .....	.....	14087.0	477.6	.....	.....	16422.1	569.8	.....
Av. production								
Dams .....	.....	9865.5	335.7	.....	.....	11598.2	409.6	.....
Av. increase								
Daughters .....	.....	4221.5	141.9	.....	.....	4823.9	160.2	.....
Per cent increase.....	.....	43	42	.....	.....	42	39	.....

The use of this scrub sire instead of Prince Ormsby Mercedes DeKol would have decreased the butterfat production of the three daughters by the amount of \$140.11, a difference of \$843.48 between the two bulls. In milk production the decrease amounts to \$238.88, a difference of \$1,407.90.

In the case of King Segis Hengerveld Vale the scrub sire would have decreased the returns from the six daughters below that of their dams by the amount of \$240.88 in butter-

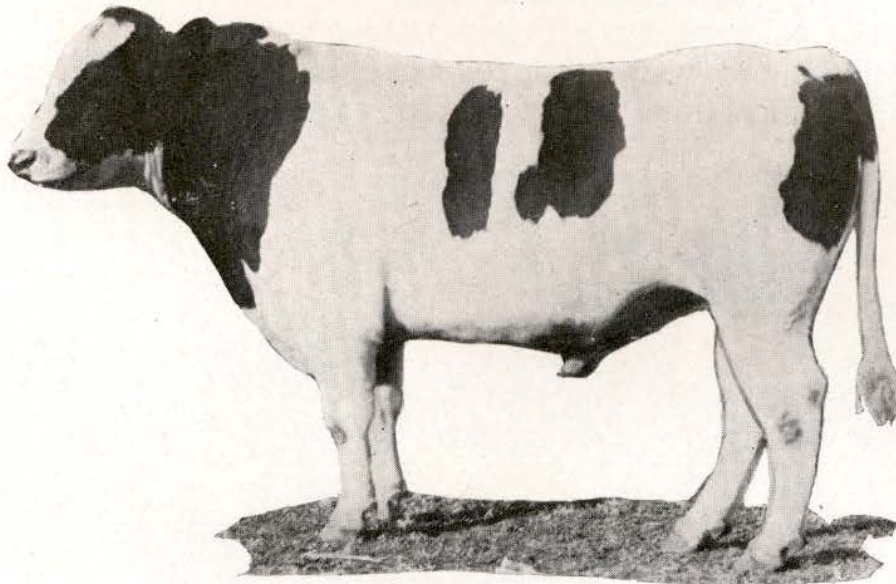


FIG. 5. KING SEGIS HENGERVELD VALE

Two daughters of this sire showed a 100 per cent increase of milk and butterfat over their dames.

fat or \$410.51 in milk production. The difference in favor of King Segis Hengerveld Vale is \$1,003.10 thru the butterfat production or \$1,708.98 thru the milk production of his six daughters.

The above computations should offset any arguments in favor of a cheap bull even for a small herd of cows. The returns from the three daughters of Prince Ormsby Mercedes DeKol would have justified an investment of \$500 in his case and still have left a profit of \$669.02, whereas, with a scrub sire there would have been a loss of \$238.88, besides his purchase price.

It can readily be seen from the foregoing discussion that in herds of such size that six or more heifers can be raised each year one could afford to invest a large amount in a purebred sire if sires having similar ability could be

secured. Assuming that the sire remains in the herd two years and effects an improvement in each of his daughters to the value of from \$50 to \$100 for each year that she produces milk, an investment of \$600 in the sire would be profitable. This does not take into consideration the value of the sire at the time of his disposal from the herd, which is sometimes greater than his purchase price.

Golden Shylock was purchased at a cost of \$200 and died while a member of the herd.

The price paid for Prince Ormsby was \$150 and he was sold about one year later for the sum of \$175. Of course, at that time his real worth was not at all realized, or doubtless



FIG. 6. QUALLA LINCOLN AND CALF

This cow is one of the best daughters of King Segis Hengerveld Vale.

efforts would have been made to retain him for a longer period. The immediate reason for his sale was his ugly disposition and the difficulty of handling him on account of his tearing the ring from his nose.

King Segis was bought for \$500 and was sold at the end of his term of service in the herd for \$280. The net cost of the three sires was therefore \$420. This is but a very small

proportion of the value of the improvement which they effected in the herd from the standpoint of milk and butterfat.

Another phase of the question is the value of the offspring. The fact that the daughters of these sires were able to make such good records naturally raised their money value above that of their dams, and better prices were also secured for the male calves sold. The good qualities which these sires were able to transmit to their daughters did not cease in their good effects in that generation but the tendency for high production was transmitted in some degree to several succeeding generations also.

HOW TO SELECT A PREPOTENT SIRE

The task of selecting a sire which will transmit to his offspring tendencies for high milk and fat production is not an easy one. The only certain method of determining whether a sire possesses this power is to compare the records of his daughters with those of their dams as has been done in this paper. This, of course, precludes the possibility of making such a comparison until the daughters have completed one lactation period which means that the sire will be at least four years old at that time.

Practically the only means available for judging the prepotency of a sire before his daughters freshen is his pedigree. Since investigations indicate that tendencies for high milk production are transmitted by the sire to his daughters and by the dam thru her sons, some of the points which should be considered in the study of a pedigree of a young bull are:

First, his dam. Does she have high records of milk and butterfat production? Do her daughters have high records and have her other sons produced daughters which have high records? Has her sire proved to be a producer of uniformly good stock? Have her other ancestors been uniformly good producers of milk and stock?

Second, his sire. Do his daughters have high records of milk and butterfat production? Have his other sons produced good stock? Has his dam good records as outlined above? Have his other ancestors good production records?

A study of the pedigree of Prince Ormsby Mercedes De-Kol reveals the fact that it meets practically all of the requirements outlined above. The pedigrees of the other two herd sires exhibit similar qualities.

TABLE 4—Comparison of the Production of Golden Shylock's daughters with that of their Dams. (The daughter's record is given first and that of her dam just below.)

Name	First Lactation				Second Lactation			
	Age Yrs.- Days	Lbs. Milk	Lbs. Fat	% Fat	Age Yrs.- Days	Lbs. Milk	Lbs. Fat	% Fat
Berna	2-174	7061.1	371.9	5.26	3-277	8594.5	430.6	5.0
Brown Lassie.....	2-321	2977.1	159.5	5.35	3-307	3815.7	212.4	5.57
Increase		4084.0	212.4	-.09		4778.8	218.2	-.57
% increase.....		138	133			125	103	
Reba	2-157	8107.5	455.8	5.62	3-325	9188.8	535.9	5.71
Ruby	1-340	2461.8	147.0	5.96	2-337	3399.3	205.0	6.00
Increase		5645.7	308.8	-.34		5789.5	330.9	-.29
% increase.....		229	210			170	152	
Ula	2-125	7665.3	450.6	5.88	3-209	9311.7	519.2	5.58
Ursa	2-2	5233.3	291.8	5.60	3-114	6053.0	339.6	5.61
Increase		2432.0	158.8	.28		3258.7	179.6	-.03
% increase.....		46	54			54	53	
Esther	2-73	7987.9	377.9	5.32		Died		
Edith R.....	3-356	4844.9	267.0	5.51	4-351	5484.2	272.8	4.97
Increase		2243.0	110.9	-.19				
% increase.....		46	42					
Elma	2-163	9185.6	468.1	5.10	4-9	8877.9	484.4	5.46
Edith R.....	3-356	4844.9	267.0	5.51	4-351	5484.2	272.8	4.97
Increase		4340.7	201.1	-.41		3393.7	211.6	.49
% increase.....		89	75			62	78	
Elaine	2-41	5777.4	359.0	6.37	Not	compl	eted	
Edith R.....	3-356	4844.9	267.0	5.51	4-351	5484.2	272.8	4.97
Increase		932.5	92.0	.86				
% increase.....		19	34					
Nora	2-53	7145.8	366.1	5.12	3-188	6701.6	354.9	5.29
Nebr. Girl.....	1-314	5254.8	314.4	5.98	2-342	6540.9	374.7	5.73
Increase		1891.0	51.7	-.86		160.7	-19.8	-.44
% increase.....		36	17			2	-5	
Lucy	2-50	5443.6	287.0	5.27	3-102	6351.2	340.4	5.36
Lily	1-263	5129.5	253.3	4.94	2-306	6340.0	317.0	5.00
Increase		314.1	33.7	.33		11.2	23.4	.36
% increase.....		6	13			2	7	
Glimmer	2-83	6477.0	342.9	5.25	4-194	7604.9	401.7	5.28
Owl's Gold.....	1-250	6383.2	282.6	4.42	2-304	5874.9	253.4	4.30
Increase		93.8	60.3	.83		1730.0	148.3	.98
% increase.....		1.4	21			29	58	
Glory	2-302	5561.5	336.6	6.05	4-95	6306.2	385.8	6.17
Grace	2-139	5603.0	309.5	5.52	3-123	7229.0	402.1	5.56
Increase		-41.3	27.1	.53		-922.8	-16.3	.61
% increase.....		-1	8			-13	-4	
Dulcie	2-42	5530.9	322.0	5.82	3-177	5512.4	324.9	5.89
Dora	1-353	4330.7	229.5	5.29	3-73	7144.8	361.7	5.06
Increase		1200.2	92.5	.53		-1632.4	-36.8	.83
% increase.....		28	40			-23	-10	
Delight	2-66	4639.7	297.5	6.41	Not	compl	eted	
Dora	1-353	4330.7	229.5	5.29	3-73	7144.8	361.7	5.06
Increase		309.0	68.0	1.12				
% increase.....		7	30					

TABLE 5—Comparison of the Production of Prince Ormsby Mercedes DeKol's Daughters with that of their Dams.

Name	First Lactation				Second Lactation			
	Age Yrs.-Days	Lbs. Milk	Lbs. Fat	% Fat	Age Yrs.-Days	Lbs. Milk	Lbs. Fat	% Fat
Kittie	2-243	14978.3	585.6	3.93	4-13	18382.1	716.2	3.90
Katy	2-13	10864.2	339.0	3.12	3-36	18538.0	619.0	3.34
Increase		4114.1	246.6	.81		-145.9	97.2	.65
% increase		38.0	73.0			-1.0	16.0	
Allie	2-328	13217.3	515.2	3.90	4-56	14063.2	554.1	3.94
Alma	1-283	5459.4	196.6	3.60	2-170	8159.5	274.8	3.37
Increase		7757.9	318.6	.30		5903.7	279.3	.57
% increase		142.0	162.0			72.0	102.0	
LaVerna	2-331	14374.7	482.5	3.36	4-76	17762.5	614.6	3.46
LaMay	2-150	9374.2	260.7	2.78	3-95	14552.1	434.4	2.99
Increase		5000.5	221.8	.58		3210.4	180.2	.47
% increase		53.0	85.0			22.0	42.0	

TABLE 6—Comparison of the Production of King Segis Hengerveld Vale's Daughters with that of their Dams.

Name	First Lactation				Second Lactation			
	Age Yrs.-Days	Lbs. Milk	Lbs. Fat	% Fat	Age Yrs.-Days	Lbs. Milk	Lbs. Fat	% Fat
Mildred	2-191	10736.8	356.8	3.32	3-289	12443.3	412.6	3.32
Merry Eyes	1-204	5827.6	200.9	3.45	2-186	12678.4	420.9	3.32
Increase		4909.2	155.9	-.13		-235.1	-8.3	.00
% increase		84.0	78.0			-2.0	-2.0	
Ellen	2-207	13863.0	478.9	3.45	3-300	15773.2	567.8	3.79
Estanna	1-361	6734.2	229.4	3.41	3-26	7713.6	267.3	3.47
Increase		7128.8	249.5	.04		8059.6	300.5	.32
% increase		106.0	109.0			104.0	112.0	
Roxeva	2-253	17625.5	588.0	3.32	3-347	19361.3	673.2	3.47
Roxanna	5-133	7212.2	281.4	3.90	6-129	9972.0	367.5	3.70
Increase		10413.3	306.6	-.58		9389.3	305.7	.23
% increase		144.0	109.0			94.0	83.0	
Eve	2-290	14920.6	498.4	3.62	Not	Comple	ted	
Essie	2-118	11242.4	354.5	3.40				
Increase		3788.2	143.9	.22				
% increase		34.0	41.0					
Qualla	2-175	14134.0	479.3	3.39	3-363	18110.5	625.5	3.45
Quatrain	2-36	14959.2	432.7	2.89	4-3	16028.6	582.7	3.30
Increase		-825.2	46.6	.50		2081.9	42.8	.15
% increase		-6	11					
Allie	2-328	13217.3	515.2	3.90	4-56	14063.2	554.1	3.98
Alta	2-253	13242.2	464.5	3.44	Not	Comple	ted	
Increase		24.9	-50.7	-.46				
% increase		?	-9.0					