

An Investigation of Families and Breeding Lines

Of Holstein-Friesian Cattle in Relation to

Presented as Minor Thesis

Advanced Registry Records.

In Animal Husbandry

by

^{of} R. R. Reynolds, B. S.

The importance of the Holstein-Friesian breed are De
Kol Ed. No. 734 H.-F. H.B. and 412 A. R. O. was im-
ported while yet unborn, she having been bred by Mr. P. De Boer,
the progenitors of the De Kol, Hornsijke and Haggerveld families.

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a descendant from one of these families.

The following information regarding the value of the
above animals was obtained from the Holstein-Friesian Association
of America.
Subject

"De Kol Ed No. 734 H.-F. H.B. and 412 A. R. O. was im-
ported while yet unborn, she having been bred by Mr. P. De Boer,
of Holstein-Friesian Cattle in Relation to
Schellinkout, North Holland. Her dam was De Kol No. 6245 H. F. B.
Advanced Registry Records.
and De Kol Ed was born in this country on March 20th, 1884, or ap-
proximately thirty-one years ago.

She was first lactated at the age of 3-10-2 and is held
to have produced in seven months and 23 days 11,833 pounds of milk,
producing in thirty days Submitted to
71.3 pounds milk. This R. E. Hunt, official taster but was sworn to by
the owner, milker, etc. Asso. Prof. in Animal Husbandry

An Investigation of Families and Breeding Lines
Of Holstein-Friesian Cattle in Relation to
Advanced Registry Records.

The leading dams of the Holstein-Friesian breed are De Kol 2d, Belle Korndyke and Pietertje Hengerveld, because they are the progenitors of the De Kol, Korndyke and Hengerveld families. Scarcely an animal is found whose name does not indicate that it is a descendant from one of these families.

The following information regarding the value of the above animals was obtained from the Holstein-Friesian Association of America.

"De Kol 2d No. 734 H.-F. H.B. and 412 A. R. O. was imported while yet unborn, she having been bred by Mr. P. De Boer, Schellinkout, North Holland. Her dam was De Kol No. 6245 H. H. B., and De Kol 2d was born in this country on March 20th, 1884, or nearly thirty-one years ago.

She was first tested at the age of 3-10-2 and is said to have produced in seven months and 22 days 11,953 pounds of milk, producing in thirty days 1,843 pounds milk, and her best day being 71.3 pounds milk. This was not an official test but was sworn to by the owner, milker, etc. At 4-9-27 her owner, and his dairymaid and milker made a sworn statement that 33.8 pounds butter had been produced from seven days' milk. At 10-11-3 she was officially tested for seven days, producing 21.261 pounds fat from 536 pounds

milk; and it was this test that made her reputation. I say made her reputation, for up to that time no Holstein-Friesian cow or any cow of any breed had produced as much fat under a strictly official test. She was owned while a young cow by J. B. Dutcher & Son, Pawling, New York, and when she made her official test at nearly eleven years old was owned by Henry Stevens & Son, Lacona, New York. She was the dam of five sons; and through these sons as well as to a lesser degree through her daughters, she has become the ancestress of more A. R. O. cows than any other cow of the breed. As she was very largely white in color, many of our breeders took to the breeding of Holstein-Friesians largely white; but since the larger number of great producers among Holstein-Friesians show predominance of black, there is now a lesser demand for the light colors.

Belle Korndyke No. 13913 H.-F. H. B. and 1449 A. R. O. had as sire Silvan Hartog No. 8161, dam Kate Korndyke No. 238 D.-F. H. B., and she was bred by S. H. Blanchard, Mexico, New York, being born on March 17th, 1888. She was an old cow when she was first officially tested and produced at the age of 10-9-13, 20.615 pounds fat from 509.8 pounds milk. She also was owned by Henry Stevens & Sons, Lacona, New York, at the time of her test, and through her sons we have the cattle known as the Korndykes."

Pieterdje Hengerveld No. 24137 was owned by H. H. Tuttle, Lacona, N. Y. Her sire was Mill Pieterdje Netherland No. 7825, dam Netherland Hengerveld No. 13106. She was born March 28th 1890, her record being made at 4 years 10 months and 11 days. She has two daughters and three sons in the advanced registry.

Table I.

Assumed Standard of Classification.

The records of the progeny of each cow under six years old were obtained for three generations from the Advanced Registry Record and arranged according to blood relation and amount of 80% butter produced at a given age. Comparison was made of the producing quality by assuming various standards for a given age.

The pedigrees to the fifth generation of all the Advanced Registry bulls having fifty or more daughters were traced to these cows. See Table VIII.

The assumption was made that a cow 1 year and under 2 years old with a record of 16 pounds of 80% butter is equal to a cow 2 years and under 3 years with a record of 20 pounds. These and similar amounts are assumed as the standard for Table No. I which furnishes a basis for comparing the producing quality of the progeny of these cows. A cow classed as a one-year old is over 1 and less than 2 years old, other classes similar.

See Table No. I.

By arranging the progeny of each cow in tables with regard to age comparison of the producing quality of each animal can be made. Table No. II shows the number of progeny and amount of butter produced by each animal as a one-year-old.

See Table No. II.

Table II shows that De Kol 2d., Pietertje Hengerveld, and Belle Korndyke did not have a single daughter in the one year old class. De Kol 2d. has eleven grand-daughters, one making above 16 pounds, two between 12 and 14 pounds, six made 10 to 12 pounds, and two produced under 10 pounds. Pietertje Hengerveld had two grand-

Table I.

Assumed Standard of Classification.

Age.	Class. 1st. Standard	Class 2d. Standard	Class 3d. Standard	Class 4th. Standard	Class 5th. Standard
1 year and under 2 years.	Above 16	14 - 16	12 - 14	10 - 12	Under 10
2 years.	20	16 - 20	12 - 16	10 - 12	Under 10
3 years	24	20 - 24	15 - 20	10 - 15	Under 10
4 years.	26	20 - 26	15 - 20	10 - 15	Under 10
5 years.	30	25 - 30	20 - 25	15 - 20	Under 15

daughters both producing 10 to 12 pounds. Belle Dorndyke has eleven grand-daughters, one producing above 16 pounds, six between 12 and 14 pounds, three between 10 and 12 pounds, and one under 10 pounds.

On comparing the producing qualities of the grand-daughters by per cent, De Kol 2d. has 9.09% in 1st. Class, the same for Belle Korndyke, with Pietertje Hengerveld missing. In Class II all are absent, while in Class III De Kol 2d. has 18.18%, with 54.09% for Belle Korndyke. Class IV, De Kol 2d. has 54.54%, Pietertje Hengerveld 100%, and 27.2% for Belle Korndyke. In Class V De Kol 2d. has 18.18% to 9.09% for Belle Korndyke.

The number of great grand-daughters as one year old are as follows:

De Kol 2d 69; above 16 pounds three, 14 to 16 pounds ten, 12 to 14 pounds nineteen, 10 to 12 pounds twenty-five, under 10 pounds twelve.

Pietertje Hengerveld has 25 great-grand-daughters, one making above 16 pounds, 8 between 14 and 16 pounds, 7 from 12 to 14 pounds, 6 from 10 to 12 pounds, and 3 under 10 pounds.

Belle Korndyke has 46 great-grand-daughters. Two made above 16 pounds, six from 14 to 16 pounds, sixteen from 12 to 14 pounds, ten from 10 to 12 pounds, and six below 10 pounds.

When compared by per cent De Kol has 4.34%, Pietertje Hengerveld 4.00%, and Belle Korndyke 4.34% in Class I.

In Class II De Kol 2d has 14.49%, Pietertje Hengerveld 32.00%, and Belle Korndyke 13.04%.

Class III De Kol has 27.5%, Pietertje Hengerveld 28.00%, and Belle Korndyke 34.7%.

Class IV De Kol has 36.2%, Pietertje Hengerveld 24.00% and Belle Korndyke 34.7%.

Class V shows 17.3% for De Kol 2d, 12.00% for Pietertje Hengerveld and 13.04% for Belle Korndyke.

There was not a single daughter making a record as a one year old.

The three cows produced twenty-four grand-daughters; De Kol eleven, Pietertje Hengerveld two, and Belle Korndyke eleven. Most of these cows made very low records.

One hundred and forty great-grand-daughters made their records as one year olds. De Kol 2d is the progenitor of sixty-nine, Pietertje Hengerveld twenty-five, and Belle Korndyke forty-six.

See Table No. III.

De Kol 2d is the only cow having a daughter making a record as a two-year old, this one producing less than 10 pounds of butter in seven days. She has thirty grand-daughters; of this number six made over 20 pounds, five between 16 and 20 pounds, nineteen between 12 and 16 pounds, with the last two classes vacant.

Pietertje Hengerveld has twenty-three grand-daughters; four produced between 16 and 20 pounds, fourteen between 12 and 16 pounds, and five between 10 and 12 pounds.

Table No. III.

Blood Relation with Number and Per cent of Cows 2 Years Old

Producing a Standard Amount of 80% Butter in 7 Days.

Name and Number.	Blood Relation.	Total No. Cows.	Above 20 lbs.		Pounds 16 - 20		Pounds 12 - 16		Pounds 10 - 12		Under 10 lbs.	
			No.	%	No.	%	No.	%	No.	%	No.	%
De Kol 2nd No. 734	Daughter	1										1-100
	Grand Daughter	30	6-20.00	5-16.46	19-63.33							
	Great Grand Daughter	79	6- 7.59	52-65.80	21-26.58							
Pietert- je Hengerveld No. 1139	Daughter											
	Grand Daughter	23		4-17.30	14-60.80	5-21.70						
	Great Grand Daughter	124	5- 4.03	15-12.09	73-58.86	28-22.58	3- 2.41					
Bell Korndyke No. 1449	Daughter											
	Grand Daughter	61	5- 8.19	19-31.15	31-50.81	5- 8.19	1- 1.62					
	Great Grand Daughter	249	27-10.84	66-26.50	116-46.63	32-12.46	8- 3.21					

Belle Korndyke has sixty-one grand-daughters as two year olds; five make over 20 pounds, nineteen between 16 and 20 pounds, thirty-one between 12 and 16 pounds, five from 10 to 12 pounds, and one below 10 pounds.

As great-grand-daughters De Kol 2d has seventy-nine with records as follows; above 20 pounds six, 16 to 20 pounds fifty-two, 12 to 16 pounds twenty-one.

Pieterkje Hengerveld has one hundred and twenty-four great-grand-daughters; five producing above 20 pounds, fifteen between 16 and 20 pounds, seventy-three 12 to 16 pounds, twenty-eight 10 to 12 pounds, and three less than 10 pounds.

Belle Korndyke exceeds in number of great-grand-daughters having two hundred and forty-nine as follows: over 20 pounds twenty-seven, 16 to 20 pounds sixty six, 12 to 16 pounds one hundred and sixteen, 10 to 12 pounds thirty-two, and eight produced less than 10 pounds.

De Kol 2d has one daughter producing 9.908 pounds of 80% butter in seven days. Of the thirty grand-daughters 20% produced above 20 pounds, 16.46% 16 to 20 pounds, and 63.33% 12 to 16 pounds. The great grand-daughters are, 7.59% producing above 20 pounds 65.8% from 16 to 20 pounds, and 26.58 from 12 to 16 pounds. Pieterkje Hengerveld has no daughters and only grand-daughters in three classes. From 16 to 20 pounds 17.3%, 12 to 16 pounds 60.8%, and 10 to 12 pounds 21.7%. Her great-grand daughters are, above 20 pounds 4.03%, 12 to 20 pounds 12.09%, 12 to 16 pounds 58.8%, 10 to 12 pounds 22.58%, and under 10 pounds 2.41%. Belle Korndyke has no daughters. Her grand-daughters produced as follows:

Blood Relation with Number and Per Cent of Cows Three Years Old

Producing a Standard Amount of 80% Butter in 7 Days.

8.19% above 20 pounds, 31.15% from 16 to 20 pounds, 50.81% from 12 to 16 pounds, 8.19% from 10 to 12 pounds, and 1.62% below 10 pounds. Her great grand-daughters are two hundred and forty-nine in number, the following per cent being found in each class: 10.84% produced above 20 pounds, 26.50% between 16 and 20 pounds, 46.63% between 12 and 16 pounds, 12.46% between 10 and 12 pounds, and 3.21% below 10 pounds. De Kol 2d has one daughter making a record as a two year old. Belle Korndyke has sixty-one grand-daughters. Pietertje Hengerveld twenty-three, and De Kol 2d thirty. Over half of these cows produced from 12 to 16 pounds of butter.

The number of great grand daughters increased to ~~four~~ hundred and fifty-two. Belle Korndyke holds the record again being progenitor of two hundred and forty-nine. Pietertje Hengerveld one hundred and twenty four, and De Kol 2d seventy-nine.

In this table Belle Korndyke was progenitor of over half the total number of daughters and grand daughters.

See Table No. IV.

In Table IV Pietertje Hengerveld stands alone as the only cow with a daughter in the three year old class. This one produced between 15 and 20 pounds of butter

De Kol 2d has thirty-seven great-grand-daughters classed as follows: three making a record of over 24 pounds, eight between 20 and 24 pounds, twenty-four between 15 and 20 pounds, and two between 10 and 15 pounds. The number of great-grand-daughters is over five times as great as the number of grand-daughters. Of this number eighteen made above 24 pounds, forty-three produced between 20 and 24 pounds, and one hundred and thirty-three are found to produce between 15 and 20 pounds.

Pietertertje Hengerveld has twenty-two grand-daughters; two produced above 24 pounds, six between 20 and 24 pounds, nine between 15 and 20 pounds, and five from 10 to 15 pounds. Her great-grand-daughters number ninety-three; three produced above 24 pounds, fourteen from 20 to 24 pounds, forty-four from 15 to 20 pounds, and thirty-two from 10 to 15 pounds.

Belle Korndyke has fifty-four great-grand-daughters producing as follows: nine above 24 pounds, eleven from 20 to 24 pounds, twenty-five from 15 to 20 pounds, and nine from 10 to 15 pounds. Her number of great-grand-daughters is in a smaller proportion than De Kol 2d and Pietertertje Hengerveld, -the total number being one hundred and thirty-eight; nine above 24 pounds, thirty-nine from 20 to 24 pounds, sixty-one from 15 to 20 pounds, and one produced below 10 pounds.

When the production is compared by per cent instead of numbers, De Kol 2d has as grand daughters 8.10% producing above 24 pounds, 21.62% from 20 to 24 pounds, 64.86% from 15 to 20 pounds, and 5.40% from 10 to 15 pounds. As great-grand-daughters producing above 24 pounds she has 9.27%, from 20 to 24 pounds 22.16%, and from 15 to 20 pounds 68.55%.

Pietertertje Hengerveld has one daughter or 100% producing from 15 to 20 pounds of butter, while her great-grand-daughters are more varied. 9.09% produce above 24 pounds, 27.27% from 20 to 24 pounds, 40.9% from 15 to 20 pounds, and 22.72% from 10 to 15 pounds. As great-grand-daughters 3.22% produce above 24 pounds, 15.05% from 20 to 24 pounds, 47.31% from 15 to 20 pounds and 34.40% from 10 to 15 pounds.

Blood Relation with Number and Per Cent of Cows 4 Years Old

Producing a Standard Amount of 80% Butter in 7 Days.

Belle Koendyke has no daughters; however, her grand-daughters are as follows: 16.66% above 24 pounds, 20.37% from 20 to 24 pounds, 46.29% from 15 to 20 pounds, and 16.66% from 10 to 15 pounds. Her great-grand-daughters are as follows: 6.52% produce above 24 pounds, 28.11% between 20 and 24 pounds, and .72% below 10 pounds.

Table No. V.

Grand Daughter	48	4	8.33	23	47.91	21	43.75
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De Kol 2d and Belle Korndyke have one daughter each. For both cows this one produced between 20 and 26 pounds, or 100% of progeny in this class. De Kol 2d has forty-eight grand-daughters producing as follows: above 26 pounds four or 8.33%, from 20 to 26 pounds twenty-three or 47.91%, from 15 to 20 pounds twenty-one or 43.75%. As great-grand-daughters De Kol 2d has two hundred and seventy-one producing as follows: above 26 pounds twenty-three or 8.48%, from 20 to 26 pounds ninety-nine or 36.53%, from 15 to 20 pounds one hundred and forty-eight or 54.61% and one producing from 10 to 15 pounds or .36%.

Pieterdje Hengerveld has no daughters but has twenty-nine grand-daughters with the following records: three or 10.34% produced above 26 pounds, seven or 24.13% from 20 to 26 pounds, eighteen or 62.07% from 15 to 20 pounds, and one or 3.10% from 10 to 15 pounds. Her great-grand-daughters number seventy-one. Six or 8.45% produced above 26 pounds, nineteen or 26.76% between 20 and 26 pounds, thirty-eight or 53.52% from 15 to 20 pounds, and eight or 11.26% from 10 to 15 pounds.

Belle Korndyke has forty-five grand-daughters, twelve or 26.66% producing above 26 pounds, nineteen or 42.22% between 20 and 26 pounds,

Table No. V

Blood Relation with Number and Per Cent of Cows 4 Years Old

Producing a Standard Amount of 80% Butter In 7 Days.

Name And Number.	Blood Relation	Total No. Cows.	Above	Pounds-	Pounds	Pounds	Under 10
			26 lbs.	20 - 26	15 - 20	10 - 15	Pounds.
			No. %	No. %	No. %	No. %	No. %
De Kol 2nd.	Daughter	1		1 100			
	Grand Daughter	48	4- 8.33	23- 47.91	21- 43.75		
	Great Grand Daughter	271	23- 8 .48	99- 36.53	148-54.61	1- .36	
Pietertje Hengerveld	Daughter						
	Grand Daughter	29	3- 10.34	7- 24.13	18- 62.07	1- 3.10	
	Great Grand Daughter	71	6- 8.45	19- 26.76	38- 53.52	8-11.26	
Bell Korndyke	Daughter	1		1- 100			
	Grand Daughter	45	12- 26.66	19- 42.22	14- 31.11		
	Great Grand Daughter	104	7- 6.73	55- 52.88	40- 38.46	2- 1.92	

Blood Relation with Number and Per Cent of Cows 5 Years Old

Producing a Standard Amount of 80% Butter in 7 Days.

and fourteen or 31.11% from 15 to 20 pounds. One hundred and four have her for their great-grand-mother whose records are; seven or 6.73% producing above 26 pounds, fifty-five or 52.88% from 20 to 26 pounds, forty or 38.46% from 15 to 20 pounds, and two or 1.92% between 10 and 15 pounds.

DeKol 2d. Be Kol 2d and Belle Korndyke have one daughter each producing between 20 and 26 pounds of butter.

No. 734 The total number of grand-daughters is one hundred and twenty-two. Of this number De Kol 2d is progenitor of forty-eight, Pietertje Hengerveld twenty-nine and Belle Korndyke forty-five. The largest number of records as four year olds was found to produce from 15 to 20 pounds of butter.

Pietertje Hengerveld De Kol 2d ranks first as progenitor of great-grand-daughters, Out of four hundred and forty-six she is the progenitor of two hundred and seventy-one.

No. 1139 The largest per cent of De Kol 2d and Pietertje Hengerveld's great-grand-daughters made between 15 and 20 pounds butter in seven days. The largest per cent of Belle Korndyke's great-grand-daughters made between 20 and 26 pounds butter fat.

Table No. VI.

Belle Korndyke No. 1449 Table VI records all the ancestry five years of age which are noted producers. De Kol 2d has no daughters, however, she has thirty-seven grand-daughters, one or 2.7% produced above 30 pounds, four or 10.81% from 25 to 30 pounds, nineteen or 51.35% between 20

Table No. VI.

Blood Relation with Number and Per Cent of Cows 5 Years Old

Producing a Standard Amount of 80% Butter in 7 Days.

Name and Number	Blood Relation	Total No. of Cows.	Above 30 lbs. No. %	Pounds 25 - 30		Pounds 20 - 25		Pounds 15 - 20		Under 15 Pounds.	
				No.	%	No.	%	No.	%	No.	%
DeKoi 2nd. No. 734	Daughter										
	Grand Daughter	37	1- 2.70	4- 10.81	19- 51.35	13- 35.13					
	Great Grand Daughter	250	9- 3.60	39- 15.60	82- 32.80	120- 48.00					
Pietertje Hengerveld No. 1139	Daughter	1						1- 100			
	Grand Daughter	21		8- 38.09	5- 23.30	8- 38.09					
	Great Grand Daughter	45	2- 4.44	2- 4.44	26- 57.77	15- 33.33					
	Daughter	1				1- 100					
Bell Korndyke No 1449	Grand Daughter	16	4- 25.00	4- 25.00	4- 25.00	4- 25.00					
	Great Grand Daughter	45	5- 11.11	8- 17.77	19- 42.22	13- 28.88					

and 25

pounds, and thirteen or 35.13% from 15 to 20 pounds. De Kol 2d has two hundred and fifty great-grand-daughters. Their records are; above 30 pounds nine or 3.6%, from 25 to 30 pounds thirty-nine or 15.6%, from 20 to 25 pounds eighty-two or 32.8%, and between 15 and 20 pounds one hundred and twenty or 48%.

Pieterkje Hengerveld has one daughter or 100% produce from 15 to 20 pounds, while her grand-daughters number twenty-one. Eight or 38.09% produced between 25 and 30 pounds, five or 23.3% from 20 to 25 pounds, and eight or 38.09% from 15 to 20 pounds. Her great-grand-daughters number forty-five as follows: two or 4.44% produced above 30 pounds, two or 4.44% from 25 to 30 pounds, twenty-six or 57.77% from 20 to 25 pounds, and fifteen or 33.33% 15 to 20 pounds.

Belle Korndyke has one daughter or 100% producing 20 to 25 pounds. Her grand-daughters number sixteen, four or 25% found in the first four classes. As great grand daughters she has forty-five, five or 11.11% producing above 30 pounds, eight or 17.77% from 25 to 30 pounds, nineteen or 42.22% from 20 to 25 pounds, and thirteen or 28.88% from 15 to 20 pounds butter in seven days.

In the five year old class De Kol 2d has no daughters, Pieterkje Hengerveld has one daughter producing 16.903 pounds butter, and Belle Korndyke has one daughter producing 22.476 pounds butter fat in seven days.

The three cows have one hundred and three grand-daughters making their record as five year olds. All of De Kol 2d's were in the three central classes while Belle Korndyke had four in each of the first four classes.

Showing Blood Relation, Total Number Regarding Ancestry

With Number and Per Cent Found in Each Class.

De Kol 2d leads in the number of great-grand-daughters having two hundred and fifty of which one hundred and twenty produce between 15 and 20 pounds butter in seven days.

Pietertje Hengerveld and Belle Korndyke each have forty-five great-grand-daughters, the greatest per cent of which make their records

in the third class producing between 20 and 25 pounds of butter.

SUMMARY.

De Kol 2d, Pietertje Hengerveld and Belle Koendyke each have two daughters. For each daughter the following number of grand daughters are found. For Belle Korndyke 93.5, De Kol 2d 81.5, and Pietertje Hengerveld 660.5. The following number of great-grand-daughters may be attributed to each grand-daughter: De Kol 2d 5.29, Belle Korndyke 3.11 and Pietertje Hengerveld 2.96. This shows De Kol 2d was more prepotent over her great-grand-daughters or her daughters were bred to better sires.

The per cent of the progeny found in each class clearly shows the prepotency of the progenitor.

The most noticeable influence over the grand daughters of the first class was that of Belle Korndyke, having 16.52% of progeny in first class. De Kol ranked second and Pietertje Hengerveld third.

In class two Belle Korndyke ranks first, De Kol 2d second, and Pietertje Hengerveld third.

In classes three and four some change in order is noticeable; Pietertje Hengerveld ranks first, De Kol 2d second, and Belle Korndyke third.

Table No. VII

Showing Blood Relation, Total Number Regarding Ancestry

With Number and Per Cent Found in Each Class.

Name and Number.	Blood Relation	Total No. of Cows	Class 1		Class 2		Class 3		Class 4		Class 5	
			No.	%	No.	%	No.	%	No.	%	No.	%
De Kol 2nd. No. 734	Daughter	2			1-50						1-50	
	Grand Daughter	163	15-	9.20	40-	23.96	85-	52.14	21-	12.82	2-	1.22
	Great Grand Daughter	863	59-	6.83	243-	28.15	403-	46.69	146-	16.91	12.	1.39
Pieter- Hehgerveld No. 1139	Daughter	2					1-	50.00			1-	50.00
	Grand Daughter	121	7-	5.79	19-	15.70	67-	55.37	28.	23.14		
	Great Grand Daughter	358	17-	4.74	58-	16.20	188-	52.51	89-	24.86	6.	1.68
Bell Korndyke No. 1449	Daughter	2			1-	50.00	1-	50.00				
	Grand Daughter	187	31-	16.52	53-	28.34	80-	42.24	21-	11.22	2-	1.07
	Great Grand Daughter	582	50-	8.59	174-	29.89	252-	43.29	91-	15.46	15-	2.5

SIRE3.

De Kol 2d has the largest number of great-grand-daughters, Belle Korndyke ranks second and Pietertje Hengerveld third.

In the first class Belle Korndyke ranks first, De Kol 2d second, and Pietertje Hengerveld third, this being the same order as found with the grand daughters. In class two ~~De Kol~~ De Kol 2d and Belle Korndyke tie. In class Three, four and five Pietertje Hengerveld presents the largest per cent, De Kol 2d ranking second and Belle Korndyke third.

From the Table the inference may be drawn that Belle Dorn-dyke produced a line that were slightly higher producers than the other lines. The Hengerveld line were low producers as their largest per cents were found in the three lower classes.

De Kol 2d exceeded the others in the number of great grand-daughters, the majority of which were medium producers.

By referring to Table VIII there are twenty-three bulls with fifty or more A. R. O. daughters, named with reference to number of daughters.

Lord Netherland De Kol has one hundred and twenty A.R.O. daughters, the largest number on record. He has thirty-one sons that are sires of tested daughters and ninety-nine daughters that are sires of tested daughters. He has 3.81625 per cent of De Kol blood, tracing to her in three direct lines, twice in the third generation and once in the fourth.

Hengerveld De Kol has one hundred and sixteen A.R.O. daughters

SIRES.

In Table No. VIII in the first column is found the name of the animal and registry number; second, the number of A. R. O. daughters; third, the sons that are sires of tested daughters; fourth, daughters that are dams of tested daughters; fifth, the per cent of De Kol 2d's blood, sixth, the per cent of Belle Korndyke blood, and seventh the per cent of Pietertje Hengerveld's in each animal represented by letters which show the generation in which it appears and the number of times found to the sixth generation.

The letters represent the following:

A, or first generation	-----	25%
B, or second	"	----- 6.25%
C, or third	"	----- 1.5625%
D, or fourth	"	----- .390625%
E, or fifth	"	----- .0976525%

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Lord Netherland De Kol has one hundred and twenty A.R.O. daughters, the largest number on record. He has thirty-one sons that are sires of tested daughters and ninety-nine daughters that are dams of tested daughters. He has 3.515625 per cent of De Kol blood, tracing to her in three direct lines, twice in the third generation and once in the fourth.

Hengerveld De Kol has one hundred and sixteen A.R.O. daughters

Table VIII.

Bulls Which Have Fifty or More A.R.O. Daughters.

Name of Animal.	A.R.O. Daughters	Sons that are Sires of Tested Daughters.	Daughters that are Dams of Tested Daughters.	Per Cent of De Kol 2d Blood, #734	Per Cent of Belle Korndyke Blood #13913	Per Cent of Piert- ertje Hengerveld Blood, #24137.
Lord Netherland De Kol #22187	120	31	99	C - C - D = 3.515625		
Hengerveld De Kol #23102	116	54	73	B = 6.25		
De Kol 2d's But- ter Boy 3a #23260	113	74	47	A - C = 26.5625		
Paul Bests De Kol #22235	103	40	85	B - D = 6.640625		
Homestead Girl De Kol Sarcastic Lad #32558	99	19	23	C - E = 1.6601525		
Pieterkje Hengerveld Count De Kol #23221	98	46	47	B = 6.25		A = 25
Aaggie Cornucopia Johanna Lad #32054	90	41	41	C - E = 1.6601525		
King of the Pontiacs #39037	82	27	10	D = .390625	B = 6.25	
Pontiac Korndyke #25982	77	36	36	E = .0976525	A = .25	
King Segis #36168	77	50	23			
Pearl of the Dairy Joe De Kol #23450	70	9	40	E = .0976525		
De Kol Burke #22991	69	35	42	B = 6.25		
Lilith Pauline De Kol Count #28430	68	32	32	C - D - D - E - E = 2.539055		
Mercedes Julips Pieterkje Paul #29830	66	21	29	E = .0976525		
Homestead Jr. De Kol #28400	63	23	25	D - D - E - E = .976555		C = 1.5625
Pontiac Hengerveld Parthena #39972	62	2	14	C = 1.5625		
Korndyke Queen De Kol's Prince #26025	57	9	31	D - D = .78125	B = 6.25	
Pontiac Butter Boy #23154	57	10	38	B = 6.25		
Earl Korndyke De Kol #24954	56	11	13	D = .390625	A = .25	
Colantha Johanna Lad #32481	55	21	1	E = .09776525		
Aaggie Cornucopia Pauline Count #29642	52	21	12	C - D - D - E = 2.539054		
Changeling Butter Boy #41398	50	4	5	D = 1.5625		
Sir Ormsby Henger- veld De Kol #31212	50	9	14	D - E = .4882775		C = 1.5625

the second largest number recorded, fifty-four sons that are sires of tested daughters, and seventy-three daughters that are dams of tested daughters. De Kol blood is found only once, in the second generation or 6.25 per cent.

De Kol 2d's Butter Boy 3d has one hundred and thirteen A.R.O. daughters ranking third in number, seventy-four sons that are sires of tested daughters and forty-seven daughters that are dams of tested daughters. He has 26.5625 per cent of De Kol blood, occurring once in the first and once in the third generation.

Paul Beets De Kol has one hundred and three A.R.O. daughters, forty sons that are sires of tested daughters and eighty-five daughters that are dams of tested daughters. De Kol 2d's blood is found once in the second and once in the fourth generation to the amount of 6.640625 per cent.

Homestead Girl De Kol Sarcastic Lad has 1.6601525 per cent of De Kol blood being found once in the third and once in the fifth generation. He has ninety-nine A.R.O. daughters, nineteen sons that are sires of tested daughters and twenty-three daughters that are dams of tested daughters.

Pietertje Hengerveld Count De Kol has ninety-eight A.R.O. daughters, forty-six sons that are sires of tested daughters, and forty-seven daughters that are dams of tested daughters. His pedigree shows De Kol blood in the second generation, or 6.25 per cent, and Pietertje Hengerveld blood in the first generation, or 25 per cent.

Aaggie Cornucopia Johanna Lad has ninety A.R.O. daughters, forty-one sons that are sires of tested daughters, and forty-one daughters that are dams of tested daughters. He traces to De Kol 2d

ters that are dams of tested daughters. De Kol 2d's blood is found to the extent of 1.6601525 per cent, once in the third and once in the fifth generation.

King of the Pontiacs has eighty-two A. R. O. daughters, twenty-seven sons that are sires of tested daughters, and ten daughters that are dams of tested daughters. He traces to De Kol in the fourth generation having .390625 per cent of her blood and to Belle Korndyke in the second generation or 6.25 per cent Korndyke blood.

Pontiac Korndyke has 25 per cent Korndyke blood and .09765 per cent of De Kol blood. He has seventy-seven A.R.O. daughters, thirty-six sons that are sires of tested daughters and thirty-six daughters that are dams of tested daughters.

King Segis has seventy-seven A.R.O. daughters, fifty sons that are sires of tested daughters and twenty-three daughters that are dams of tested daughters.

Pearl of the Dairy Joe De Kol has seventy A.R.O. daughters, nine sons that are sires of tested daughters, and forty daughters that are dams of tested daughters. De Kol 2d blood occurs only once on the fifth generation or .0976525 per cent.

De Kol Burke traces to De Kol only in the second generation or 6.25 per cent. He has sixty-nine A.R.O. daughters, thirty-five sons that are sires of tested daughters and forty-two daughters that are dams of tested daughters.

Lilith Pauline De Kol Count has sixty-eight A.R.O. daughters, thirty-two sons that are sires of tested daughters, and thirty-two daughters that are dams of tested daughters. He traces to De Kol 2d

Earl Korndyke De Kol has fifty-six A.R.O. daughters, eleven in five direct lines, once in the third generation, twice in the fourth and twice in the fifth, possessing 2.539055 per cent of De Kol's blood, and not tracing to Belle Korndyke or Pietertje Hengerveld.

Mercedes Julips Pietertje Paul has .0976525 per cent of De Kol blood occurring once in the fifth generation. He has sixty-six A.R.O. daughters, twenty-one sons that are sires of tested daughters, and twenty-nine daughters that are dams of tested daughters.

Homestead Jr. De Kol has sixty-three A.R.O. daughters, twenty-three sons that are sires of tested daughters and twenty-five daughters that are dams of tested daughters. He traces to De Kol twice in the fourth generation and twice in the fifth or .976555 per cent De Kol blood. Hengerveld blood appears once in the third generation or 1.562 per cent.

Pontiac Hengerveld Parthenea has sixty-two A.R.O. daughters, two sons that are sires of tested daughters, and fourteen daughters that are dams of tested daughters. He has 1.5625 per cent of De Kol blood, this occurring in the third generation.

Korndyke Queen De Kol's Prince traces to De Kol twice in the fourth generation or .78125 per cent showing 6.25 per cent of Belle Korndyke blood in the second generation. He has fifty-seven A.R.O. daughters, nine sons that are sires of tested daughters and thirty-one daughters that are dams of tested daughters.

Pontiac Butter Boy traces to De Kol in the second generation, or 6.25 per cent. He has fifty-seven A.R.O. daughters, ten sons that are sires of tested daughters, and thirty-eight daughters that are dams of tested daughters.

Conclusions.

Earl Korndyke De Kol has fifty-six A.R.O. daughters, eleven sons that are sires of tested daughters, and thirteen daughters that are dams of tested daughters. De Kol is found in the fourth generation or .390625 per cent, while Belle Korndyke appears in the first generation or 25 per cent.

Colantha Johanna Lad traces to De Kol once in the fifth generation, or .0976525 per cent. He has fifty-five A.R.O. daughters, twenty-one sons that are sires of tested daughters and only one daughter that is a dam of a tested daughter.

Aaggie Cornucopia Pauline Count has fifty-two A.R.O. daughters twenty-one sons that are sires of tested daughters, and twelve dams that are dams of tested daughters. He traces to De Kol 2d for times, once in the third generation, twice in the fourth and twice in the fifth, having 3.53905 per cent of De Kol blood.

Changeling Butter Boy has fifty A.R.O. daughters, four sons that are sires of tested daughters, and six daughters that are dams of tested daughters. De Kol blood is found once in the third generation, or 1.5625 per cent.

Sir Ormsby Hengerveld De Kol has De Kol blood in the fourth and fifth generation or .4882775 per cent, and Hengerveld blood in the third generation, or 1.5625 per cent. He has fifty A.R.O. daughters, nine sons that are sires of tested daughters and fourteen daughters that are dams of tested daughters.

Conclusions.

1. With one exception each bull having 50 or more A. R. O. Daughters traces one or more times within five generations to De Kol 2d.
2. Four bulls trace to Belle Korndyke.
3. Three bulls trace to Pietertje Hengerveld.
4. Much of De Kol's prepotency is transmitted through sires.
5. King Segis appears as a prepotent individual possessing individual qualities rather than blood relations.