THE INFLUENCE OF IMPORTATIONS ON THE

NEW ZEALAND PEDIGREE JERSEY BREED AND

THE LEVEL OF INBREEDING 1895-1950

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A THESIS

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TABLE OF CONTENTS

INTRODUCTION

Of the 1,845,000 dairy cows in milk in New Zealand in January 1950, 85% were either purebred or grade Jersey cattle (A & P Statistics 1950). With the exception of the Island of Jersey no other country has such a predominance of this breed and it is of interest to both the animal husbandman and the geneticist, to trace not only the growth of the breed in this country but also the changes in its structure during the last half century. There is at present no authoritative information available relating to the breeding methods employed by New Zealand dairy farmers and the lack of comprehensive records of performance in the Jersey breed as a whole makes it unlikely that the selection policies of the last fifty years will ever be adequately presented. The dependence of the more popular breeders on the importations during the present century is, however, generally recognised but no attempt has yet been made to measure the influence of these much popularised animals on the breed as a whole. If imported animals differ in their genotype from New Zealand-bred animals, then a general prefer-ence for the former or their descendents should gradually change the average genotype of the breed. That such a preference exists is suggested by Fahimuddin (1952). He found that the Jersey breed was divided into strata and that the herds using imported sires were in the upper and the most important strata. There is no way of calculating whether imported and New Zealand-bred animals do differ genetically, but estimates of the proportion of the genes in the breed as a whole for which imported animals are ultimately responsible are of interest for several reasons.

First, these estimates would indicate the approximate rate at which real genetic changes within the breed could take place. Secondly, in general imported animals have been held to be superior in type to the average New Zealand-bred Jersey and the disproportionate importance of imported animals or their progeny would in the absence of performance details suggest an

emphasis on type among the selection criteria of the past half century.

Further there is no information concerning the part of mating systems in the development of the New Zealand Jersey breed. It is generally thought that many breeders practice mild line-breeding with an occasional out-cross and that many believe in the existence of certain well defined families within the breed such as the "Majestys", "Owlers", "Dreaming Sams" etc. Measures of inbreeding and of tendencies for the breed to split into families are entirely lacking, however, and the present study was designed to supply such information.

Owing to the lack of pedigree information for grade cattle the present study has been restricted to registered animals. However, since about 70% of the sires used in the New Zealand commercial herds are registered animals (New Zealand Dairy Board,1950) the picture obtained for the registered section of the breed will provide an indication of the over-all situation in the breed as a whole.

HISTORICAL ASPECTS OF JERSEY IMPORTATIONS

Authentic records of the New Zealand Jersey breed are
available only since 1902 when the New Zealand/Cattle Breeders'
Jersey
Association was formed.

The early history of the breed overseas has been
described by Prentice (1942) but accounts of the breed in New
Zealand prior to 1902 are sketchy in the extreme.   Gilmer (1939)
has described the introduction of the first Jersey in 1862 and
many of the subsequent importations can be ascertained from the
extended pedigrees of animals registered in the first New Zealand
Jersey Cattle Breeders' Association herd books and those
published by the Canterbury Agricultural and Pastoral Association
(Christchurch) between 1886 and 1899.

During the latter part of the 19th century importations
were mainly from Australia, Jersey and England (see Appendix I)
but since the first World War Canada and America have become
exceedingly important as sources of pedigree stock.   As far as
can be ascertained, up to 1950, 279 bulls and 225 cows have been
imported (see Appendix I).   The country from which they have been
imported and the relative importance of countries during different
periods is shown in Table 1.

During the period 1862-1900 there was a tendency for
cows and bulls to be imported in equal number.   From 1900 to
1920 cows predominated but since 1920 bulls have been more
popular.

Jersey Island as the home of the breed has always been
the most highly thought of source of importations.   However the
expenses and risks involved in shipping animals from Jersey to
New Zealand has restricted the trade to modest proportions.
Most important, however, in determining the source of importat-
ions has been Government legislation relating to disease control.
Consequent upon the amendment to the Stock Act of 1908. there
have with a few exceptions, been no importations from Australia
since 1915.   Similarly in 1925, importations from England were
stopped though four years later an amendment to the Act allowed

English cattle to enter New Zealand if they first underwent a
quarantine period in Tasmania before arrival in New Zealand.

TABLE 1: Jersey importations 1862-1950 distributed according to
country of export and year of entry into New Zealand.

Exporting country	Year of Importation											
	1862-1900		1901-1910		1911-1920		1921-1930		1931-1940		1941-195	
	M	F	M	F	M	F	M	F	M	F	M	F
Jersey	10	6	5	4	13	22	43	40	20	7	38	23
U.S.A.	1		3	4	1	2	25	19	22	1	12	
Canada						5	24	4	18	5	1	
Australia	1	8	7	18	3	17						
England	4	2	5	9	7	6	1	2				
Not known	10	20	4	1	1							
Total	26	36	24	36	25	52	93	65	60	13	51	23

M ... male importations
F ... female importations

The Stock Act has been amended from time to time, the
situation during 1951 being summarised as follows (Hankin,1951):-

Countries from which importations permitted	Remarks
United Kingdom and Eire United States Canada Tasmania	Subject to 14 days quarantine in Britain and 40 days in New Zealand 30 days quarantine in New Zealand 30 " " " " " 30 " " " " " Imports from all other countries prohibited.

Prior to 1944 there appear to have been no restrictions
on the merit of the animals imported.   The earliest regulations
relating to importations were introduced in 1912 by the New
Zealand Jersey Cattle Breeders' Association.   They related

mainly to registration procedure after landing.   In 1944 the
New Zealand Jersey Cattle Breeders' Association decided to refuse
registration to imported animals whose performance or pedigree
details failed to comply with certain standards as may be laid
down from time to time.

In June 1950 new regulations were introduced by the
New Zealand Jersey Cattle Breeders' Association (New Zealand
Jersey Cattle Breeders Assn. 1950).   These included specific
qualifications for both type conformation and production.
These are included in ██ Appendix II.

During the 19th century importations of cattle into New
Zealand were essential, primarily to avoid inbreeding, and to a
lesser extent to increase numbers.   During the present century,
however, the purpose of importations has been to improve the merit
of New Zealand-bred animals.   It was widely held by breeders that
once Jerseys had been bred in New Zealand for a few generations
they lost their desirable "Island type".   To retain this was, in
their opinion, all important and to this end cattle were imported
to help preserve the Jersey Island standards of appearance.

MATERIAL AND METHODS

The general pattern of breed analysis was first enunciated by Wright and McPhee (1925) and used by them in studying the breeding systems used in the Shorthorn breed in Britain between 1810 and 1920. The technique that these two workers developed is an extremely useful one for the estimation of average values of inbreeding and relationship over whole breeds.

It may be conveniently divided into two parts, first the method of sampling a cattle population and secondly, the method of sampling each individual animals pedigree.

Sampling of populations

McPhee and Wright (1925) obtained their random samples by ascertaining the number of pages in the appropriate herd book occupied by heifer registrations in the year in question and then dividing this range into such regular intervals as would yield the desired number of individuals on taking the first animal at the top of the page.

For several reasons it was found impossible in the present study to adopt this method as a uniform procedure. In the early herd books published by the New Zealand Jersey Cattle Breeders' Association, there are many instances of animals not being registered until ten or more years after their birth. To meet this difficulty, the animals registered in the first eight herd books (up to 1911) were listed according to their year of birth. Owing to the small number of heifers registered annually it was found necessary to consider the registration in two successive years to obtain adequate samples. Thus the 1905 sample of one hundred heifers was drawn from the 197 registered heifers born during 1903 and 1904. Similarly the 1910 sample was drawn from the 518 heifers born during 1908 and 1909.

In herd books subsequent to Volume VIII (1911) animals registered were usually born in the year preceding the year of herd book publication but McPhee and Wright's (1925) method of

sampling by pages still had to be adjusted because of the low number of annual registrations.   For example in 1915, 801 females were registered on fifty five pages.   To obtain a sample of one hundred animals it was found necessary to choose two animals at random on the first page and then list every fifteenth animal from each of them.   From Volume XXII (1925) onwards there were sufficient pages to enable the sample to be chosen according to McPhee and Wright's (1925) method.

The present study has been confined to the pedigrees of registered females since the selection of bull calves for registration is a potential source of bias (Robertson and Asker 1951).   The Jersey breed has expanded enormously in New Zealand and there is good reason to believe that almost all of the heifers that live are registered (Stewart 1952).   For this reason the parents of registered heifers may be taken as representative of the breeding stock in use at that time.

It was decided to analyse the breed at five years intervals since this period corresponded with the only estimation of generation intervals in New Zealand pedigree Jerseys (Stewart 1951).   Each of the following *herd-book* years were sampled - 1905, 1910, 1915, ... and so on to 1950.   The size of each sample relative to the population from which it was drawn is shown in Table II.

TABLE II: The proportion of the registrations included in each sample.

Year	No. of heifers registered	Sample size	Per cent
1905	197	100	50.76
1910	422	100	23.70
1915	801	100	12.48
1920	2,013	100	4.97
1925	4,993	100	2.00
1930	8,853	100	1.13
1935	10,116	100	0.99
1940	9,356	100	1.07
1945	12,923	100	0.77
1950	19,100	100	0.52

For the 1905 and 1910 samples, all the animals born in the two previous years were listed and random samples taken.   The

remaining samples were drawn from the herds books published in the years shown (see text).

Sampling Individual Pedigrees

The construction of complete pedigrees going back up to ten or more generations and involving hundreds of animals would be an extremely laborious procedure. For this reason Wright and McPhee's (1925) method with some modifications described by Robertson and Asker (1951) has been employed.

Originally the method consisted of tracing back one line of a pedigree from both the sire and the dam of every animal in the sample. The choice of whether in any particular case to draw a line through a male or female was decided by tossing a coin. It is necessary that the sample lines be chosen at random, for common ancestors are more likely to be males than females in livestock breeding. Thus direct male or female lines are unsatisfactory as also is a system of alternating male and female ancestors in any one line. If the same animal appears in both the sire's line and the dam's line then the animal is inbred. This is usually known as a "tie". Wright and McPhee (1925) showed that half the proportion of animals in the sample showing such a tie provides an estimate of the average degree of inbreeding in that population. The inbreeding due to a common ancestor A and removed n^s generations from the sire and n^d generations from the dam is $(\frac{1}{2})^{ns+nd+1} (1+F_A)$, where F_A is the inbreeding coefficient of the common ancestor (Wright 1922). The sire has 2^{ns} ancestors in the n^sth generation and the dam 2nd ancestors in n^dth generation. The sample pair of lines is thus only one among 2^{ns+nd} possible lines going back to the common ancestor. If the single pair of lines is a fair sample of the total its contribution must be multiplied by 2^{ns+nd} to obtain an estimate of inbreeding of the whole pedigree. Thus since $\frac{1}{2}^{ns+nd+1}(1+F_A) \ 2^{ns+nd}$ then becomes $\frac{1}{2} (1+F_A)$, it is not necessary to count the number of generations to the closest common ancestor(s) but merely to note that a tie does exist and the animal(s)

responsible for it.   Wright and McPhee (1925) recommended that
where ancestors are responsible for a large number of ties their
inbreeding coefficients should be calculated accurately so that
all of the expression $\frac{1}{2} (1 + F_A)$ is used.   For those which occur
infrequently it is usually sufficient to assume an average degree
of inbreeding equal to that of the breed as a whole at that time.

× Coefficients of Relationship may also be calculated from
these random samples of pedigrees so that estimates may be made
of direct relationship between a large group of animals and a
particular animal (A).   In this case the general formula for
the coefficient of relationship

$$R_{XY} = \frac{\frac{1}{2}n + n^1 (1 + F_A)}{\sqrt{(1 + F_X)(1 + F_Y)}}$$

(where F_X and F_Y are the coefficients of inbreeding of two
individuals X and Y; F_A is that of the common ancestor and
n and n^1 are the number of generations from X and Y to this
common ancestor along the lines in the question)

$$\text{becomes } R_{AY} = \frac{\frac{1}{2}n (1 + F_A)}{\sqrt{(1 + F_A (1 + F_Y)}}$$

Since Y could have 2^n ancestors in the generation in which A
appears, if the single random line is a fair sample, its
contribution must be multiplied by 2^n to obtain an estimate of
relationship between A and Y.   Thus R_{AY} is estimated by
$$\frac{(1 + F_A)}{\sqrt{(1 + F_A)(1 + F_Y)}}$$ if a single random pedigree line is drawn.

If two random pedigree lines are drawn from the descendent and Y
appears in one of them then R   is estimated by $\frac{1}{2} \dfrac{(1 + F_A)}{\sqrt{(1 + F_A)(1 + F_Y)}}$,
in the case of four line pedigrees by $\frac{1}{4} \dfrac{(1 + F_A)}{\sqrt{(1 + F_A)(1 + F_Y)}}$
and so on.

In so far as Y is a sample of the population an estimate
of the relationship between A and the population is provided by
the above coefficient.   By taking a large sample of Y's the

sampling errors are reduced and a reliable estimate of the relationship between a particular individual and the population (R_{APop}) is obtained.

When assessing the relationship of a large group to a particular animal the inbreeding coefficient (F_A) of that animal should be calculated accurately.   Unless these inbreeding coefficients are of reasonable dimensions, however, little error is introduced if they are neglected.   For example if $F_A = 10\%$ and $F_{Pop} = 5\%$ then the expression $\dfrac{1 + F_A}{\sqrt{(1 + F_A)(1 + F_Y)}}$ would reduce to

$\dfrac{1 + .10}{\sqrt{(1 + .10)(1 + .05)}} = \dfrac{1.10}{\sqrt{1.15}} = \dfrac{}{1.02}$ ~~0.95~~.   Clearly the error introduced

by neglecting $\dfrac{1 + F_A}{\sqrt{(1 + F_A)(1 + F_{Pop})}}$ will be small if inbreeding

coefficients are low.   As Wright and McPhee (1925) pointed out the method can be extended to determine the relationship between random individuals of a population or between two sections of a breed and so on. ⋆

Robertson and Asker (1951) state that as the accuracy of the various estimates depends on the total number of ties observed "any method of increasing the possible number of ties with the same amount of labour is advantageous.   This can be done by drawing out more than two lines for each animal."   If the pedigree is drawn out completely to eight great-grand parents (see Fig.I) and a line is drawn at random from each of them then there are $4 \times 4 = 16$ possible inbreeding ties (the same ancestor on both sire and dam's side) so that there are two possible ties per line drawn (see Fig.1) compared with half a tie per line drawn in the two line method shown below.

Fig. 2. Showing the two line method

The percentage inbreeding in both cases is half the actual ties divided by the possible ties.

.McPhee and Wright (1925) suggest that using more than
two lines per animal may be unsatisfactory if the breed tends to
break into distinct families.   There was no indication of such
a tendency in the data used in the present study and the eight
line technique has been adopted.

An Actual pedigree drawn out completely to eight
great-grandparents and a line ✶ drawn at random from each of
them is shown below.
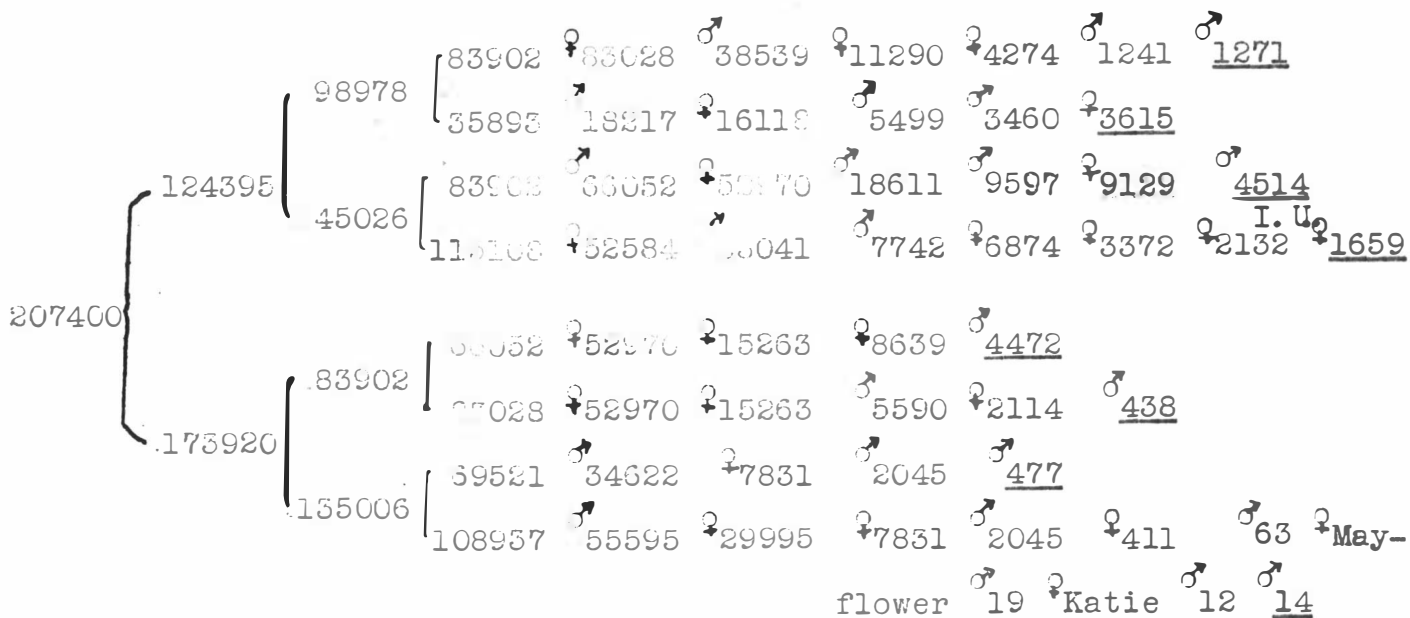
As Robertson and Asker (1951) point out a small
proportion of close matings as for example a half-sib mating
giving four ties (see Fig. 1) contribute greatly to the standard
error of the final estimate of the average inbreeding coefficient.
Consequently it was decided in the present study to examine the
pedigrees back to the four grandparents for each "sample" year
of a much larger sample than the sample of one hundred heifers subjected
to the eight-line pedigree technique.   From this larger sample
the extent of close breeding or "current" inbreeding was estimated
and to it added the estimate of the long-term inbreeding obtained
from the tie method already discussed to obtain the total
inbreeding.

INFLUENCE OF IMPORTATIONS ON THE NEW ZEALAND JERSEY BREED.

Imported cattle have always played a prominent part in the history of the New Zealand Jersey breed. Subsequent to the initial importations in 1862 there has been a steady if not large entry of Jerseys from overseas. These imported animals have generally been regarded as superior to New Zealand-bred stock and as such have tended to elevate the herds in which they were used to something akin to a nucleus status (Fahimuddin, 1952). The actual importance of these imported animals as sources of hereditary material in the breed as a whole, has however, never been measured. Such information is of value not only to help in the interpretation of past and present trends but also to assist in predicting the potential rate of spread of desirable genes throughout the breed in future.

The interest of the majority of breeders is focussed on individual animals and in this study an attempt has been made to measure the direct relationship of the imported animals to the breed as a whole. In addition the contribution of all animals imported during certain fairly well defined periods has been estimated in order to assess the possible rate of change in the gene complex of the breed due to the possibly widespread use of imported animals and their descendants.

The genetic histories of certain cattle populations have been studied in some detail.
The most important of these are as follows:

Breed	Country	Authors
Shorthorns (British)	U.S.A.	Wright & McPhee (1925)
Jersey	Britain	Smith (1928)
Ayrshires	Britain	Fowler (1932)
Holstein Friesians	U.S.A.	Lush et al (1936)
Brown Swiss	U.S.A.	Yoder & Lush (1937)
Hereford	U.S.A.	Willham (1937)
Aberdeen Angus	U.S.A.	Stonaker (1943)
Friesian	Britain	Robertson & Asker (1951)

Robertson and Asker (1951) are however the only workers to specialise in the influence of importations during certain periods and their methods have been adopted for this study (see page 10).

Bulls Imported

Cows Imported
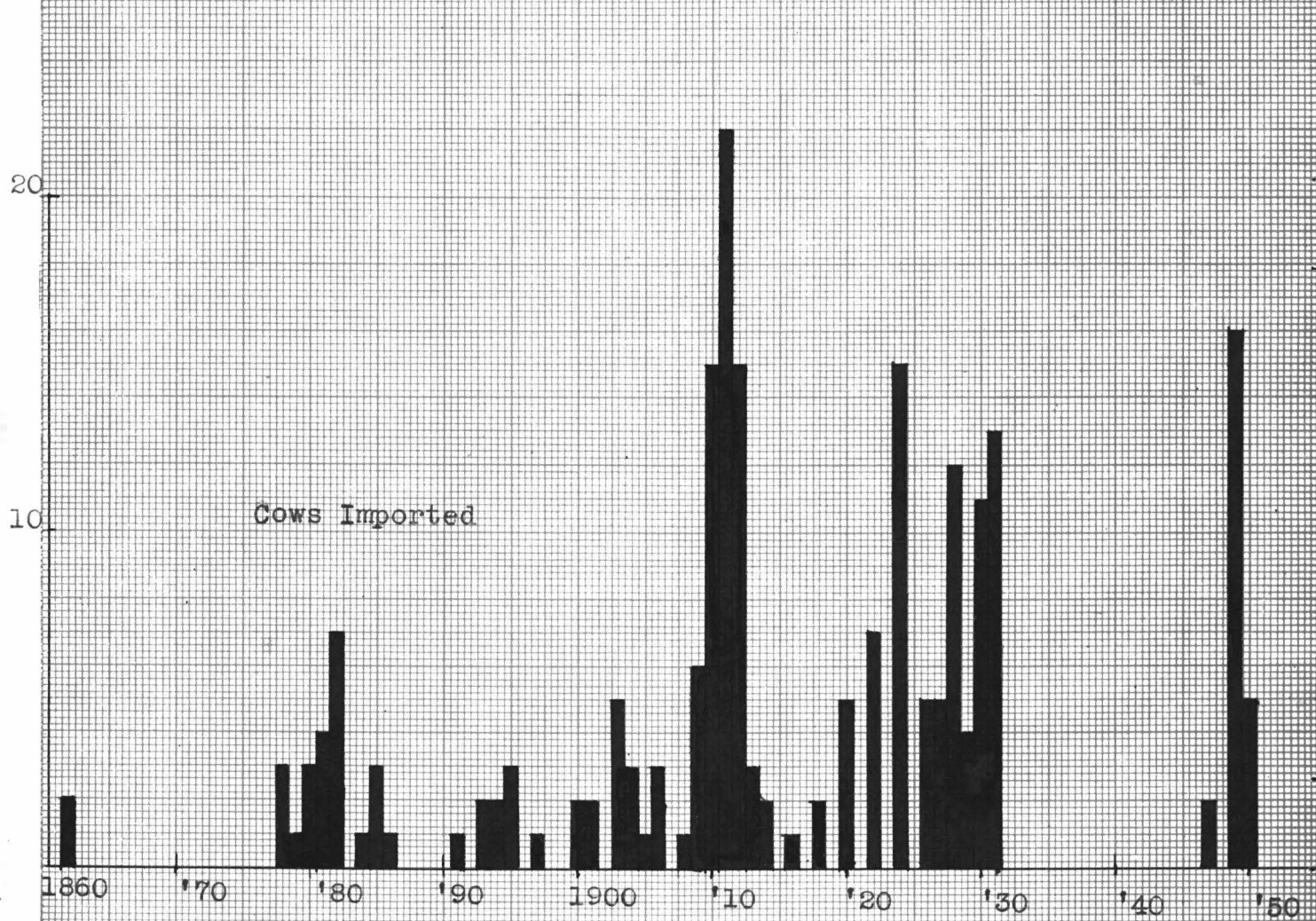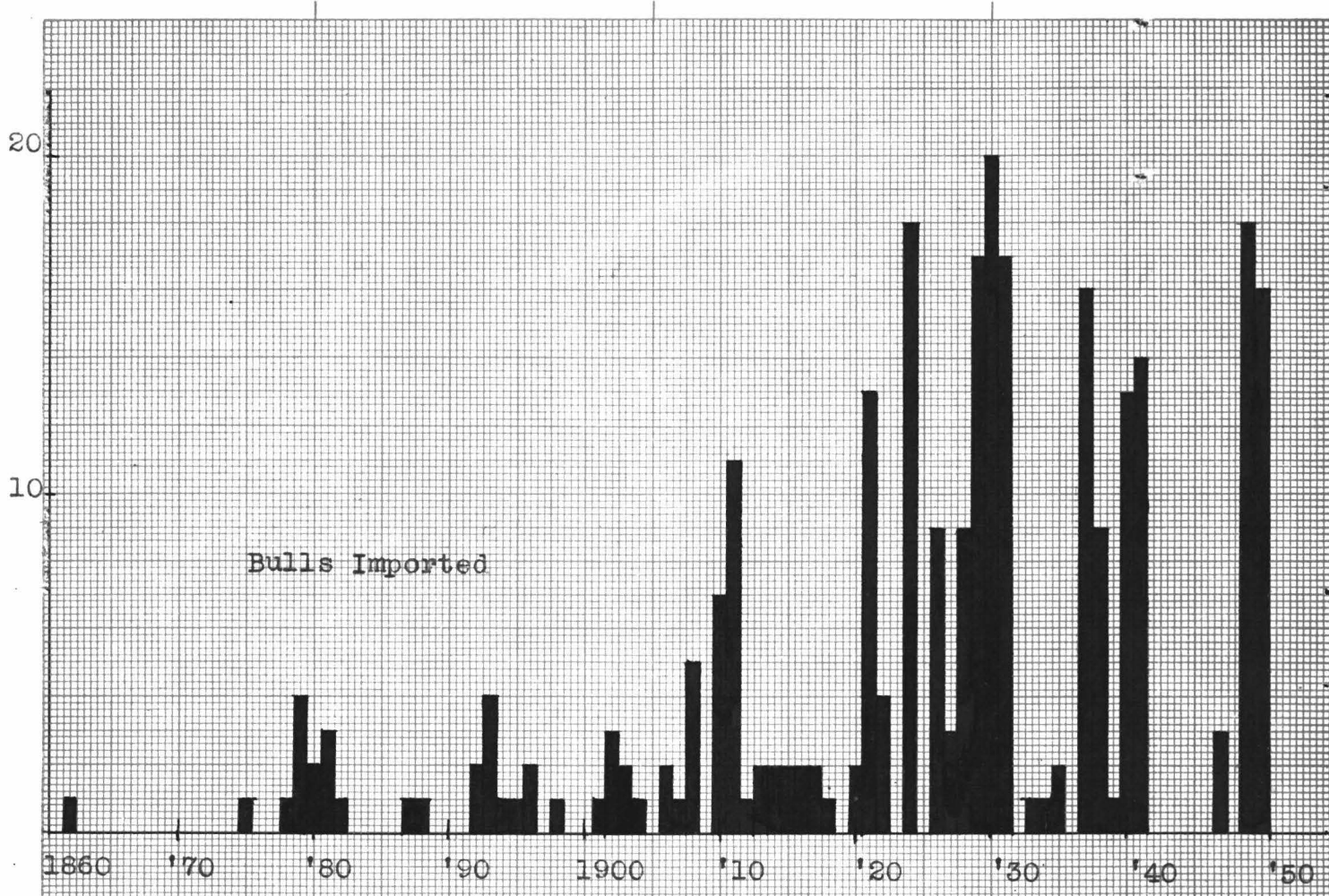
Fig. 3   Jersey Importations 1860-1950.

The first stage in the present study was to complete the
eight line pedigrees for the ten samples each of 100 animals
drawn from registrations in 1905, 1910, 1915, ... 1950 as shown
in Fig. 1.   All lines terminated either at an imported animal or
at a New Zealand-bred animal born prior to 1896.   A list of all
Jersey animals imported into New Zealand was made and their date
of birth, date of importation and country of birth recorded where
information was available (see Appendix 1).   Those imported
animals fell into fairly clearly defined groups (see Fig.3).   It
was then decided to divide the importations into six groups
according to the ten year period during which they entered New
Zealand.   Animals in New Zealand before 1896 were classed as
Foundation Stock.   These classes together with the number of
bulls and cows comprising them are shown in the Table III.

TABLE III: Numbers of Jerseys imported into New Zealand during
ten-year periods between 1896-1945 and since 1946.

Group	Details	Bulls	Cows
Foundation	Animals introduced before 1896 or bred in New Zealand before this date	23	33
1st group	Animals imported between 1896-1905	10	14
2nd group	Animals imported between 1906-1915	35	67
3rd group	Animals imported between 1916-1925	42	38
4th group	Animals imported between 1926-1935	79	50
5th group	Animals imported between 1936-1945	53	-
6th group	Animals imported between 1946-1950	37	23

"Foundation" animals would have been subdivided further if
complete pedigree records had been available but in the absence
of these it was decided to treat them as one group.

Animals imported "in utero" were classed as imported
animals where they appeared in the eight line pedigrees but they
have not been included in the lists in Appendix 1.
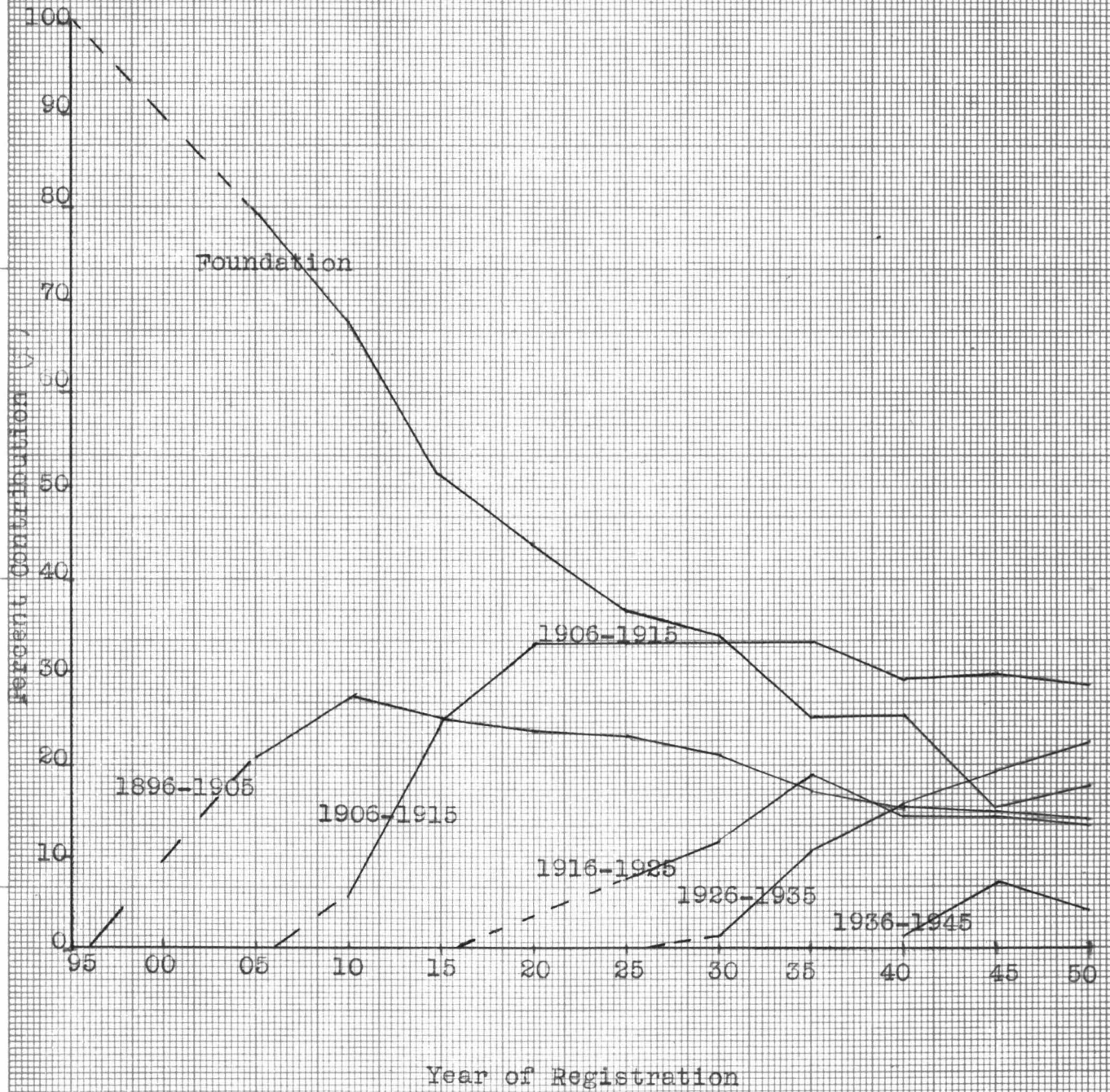
Fig. 4   Showing the contribution of Foundation Animals
and Importations during ten year periods on the
Jersey breed at five year intervals 1905-1950.

The effect of the different importations on the breed at five yearly intervals is shown in Table IV and Figure 4.

TABLE IV: The percentage contributions of different importations to the Jersey breed at different periods.

Periods	Effect of different groups in percentages						
	1st	2nd	3rd	4th	5th	6th	7th
Herd Book Year	Foundation	1895 to 1905	1906 to 1915	1916 to 1925	1926 to 1935	1936 to 1945	1946 onwards
1905	79.2	20.8	-	-	-	-	-
1910	67.5	27	5.5	-	-	-	-
1915	51.0	24.6	24.4	-	-	-	-
1920	43.6	23.6	32.8	-	-	-	-
1925	36.5	23.0	33.0	7.5	-	-	-
1930	33.2	20.9	33.1	11.5	1.25	-	-
1935	24.2	17.0	33.1	15.4	10.25	-	-
1940	25.0	15.2	29.1	14.2	15.4	1.0	-
1945	14.9	14.7	29.9	14.5	19.2	6.7	-
1950	17.7	13.9	28.5	13.1	22.2	3.9	0.5

The contribution of the foundation animals has decreased from 100% in 1895 to 17.7% in 1950 and the relative effects of importations during the subsequent ten-year periods may be clearly seen from Figure 4.   Several features are worthy of note.

(a) The effect of importations during each ten-year period reaches a maximum value and then decreases.

(b) Early importations reach a maximum value more rapidly than later importations.   This is due to the relatively few pedigree Jersey cattle registered during these early years (Stewart,1952).   The one exception, the effect of 1936-45 importation, which reached an apparent peak in 1945, is probably due to sampling errors.

(c) As would be expected the effects of large importations is greater than small importations.   This is the probable

explanation for importations during the period 1916-25
failing to reach as high a maximum contribution to the
breed as did the subsequent period.

(d)   It is possible that individual animals in one period were
more favoured than those in the other groups thus
accentuating the contribution of a particular period.
This aspect will be discussed fully in a subsequent section
(see page 16).

Clearly the gene complex of a breed may be relatively
rapidly altered even in the absence of the technique of
artificial insemination.   During a period of fifty five years
or approximately eleven cattle generations more than 85% of
the original genes have been replaced.   The rate of replacement
of these foundation genes is of interest

by 1905 20.8% of the foundation genes were replaced
by 1915 49.0% of the foundation genes were replaced
by 1925 63.5% of the foundation genes were replaced
by 1935 76.2% of the foundation genes were replaced
by 1945 85.1% of the foundation genes were replaced.

The rapid replacement of genes in the early years was probably
the result of deliberate selection for "imported" genes.   In
the latter stages there was probably no deliberate selection
against foundation genes as few, if any, published pedigrees trace back
more than thirty years.   The continued replacement of these
foundation genes was probably the automatic consequence of
selection in favour of recently imported genes.   The way in
which these rapid changes have been effected is clear when the
structure of the New Zealand Jersey breed is considered.
Fahimuddin (1952) has shown that the pedigree breed is in six
strata, each stratum obtaining its sires from those above it.
The top strata include those herds which use imported sires.
These herds in turn supply other pedigree herds with sires which
in turn supply bulls to other pedigree herds and so on.   Thus
within two or three generations one imported sire may have
hundreds of grandsons and great-grand sons.

Figure 4 suggests that the contributions of the
foundation animals and the different importation groups may not
alter greatly in the future.   With the exception of 1926-35
importations,contribution from each period has remained relatively
stable during the interval 1935-1950.   This may well indicate
a lessening in the emphasis on imported animals as such and a
tendency to select animals on performance rather than implied
superiority due to "blue blood".   Alternatively it may indicate
that certain imported individual animals may be held in high
esteem and that in endeavouring to preserve their excellence
many breeders line-breed to them and thus preserve the relative
importance of the period during which they were imported.   Both
factors may be of importance.   That selection on performance is
receiving increasing emphasis is apparent from the expansion of
the sire progeny testing service of the New Zealand Dairy Board
(1951) and the growth of merit registers based on more than one
lactation in the case of dams (ibid).   These services however
have only received recognition during the last decade and it is
unlikely that they have exerted an influence on the general
picture as yet.   To determine the importance of individual
animals a further examination of the ten samples of 100 heifers
was made.

THE IMPORTANCE OF INDIVIDUAL ANIMALS

Importance of individual animals in some breeds has
been studied by overseas workers.   The more important among their
findings are shown (see page 17) and it is clear that certain
animals have contributed enormously to some breeds.

Country	Author	Year of pub-licat-ion	Breed	Important Individual	Direct Relat-ionship to Breed	Year studied
U.S.A.	McPhee and Wright	1925	Shorthorn (Beef)	♂Favourite ♂(252) ♂Champion of England	55.2±2.3 45.5±2.3	1920 1920
U.S.A.	McPhee and Wright	1925	Shorthorn (Milk)	♂Favourite ♂Champion of England	56.1±1.6 42.1±1.6	1920 1920
U.S.A.	Lush et al	1936	Holstein Friesian	♀De Kol 2nd	10%	1931
U.S.A.	Yoder and Lush	1937	Brown Swiss	♂William Tell ♂College Boy	9.2% 9.1%	1909 1929
U.S.A.	Willham	1937	Hereford	♂Anxiety 4th Beau Brummel	18.5% 24.6%	1930 1930
U.S.A.	Stonaker	1943	Aberdeen Angus	♂Black Prince of Tillyfour ♂Hanton ♂Breasted Jock	24.1% 29.1% 25.9% 28.8% 24.1% 21.5% 22.3% 18.9% 23.4% 21.3% 15.5%	1900 1910 1920 1930 1939 1900 1910 1920 1930 1939 1939

An estimate of direct relationship of any animal to the breed may be derived from the proportion of lines which pass through it.   Thus if there are 800 lines (8 x 100) and eight lines pass through or terminate at one animal then that animal has a direct relationship of one per cent to the breed (see page 9   ).

Table V shows those animals which had a direct relation-ship to the breed of at least 2% in two or more of the samples
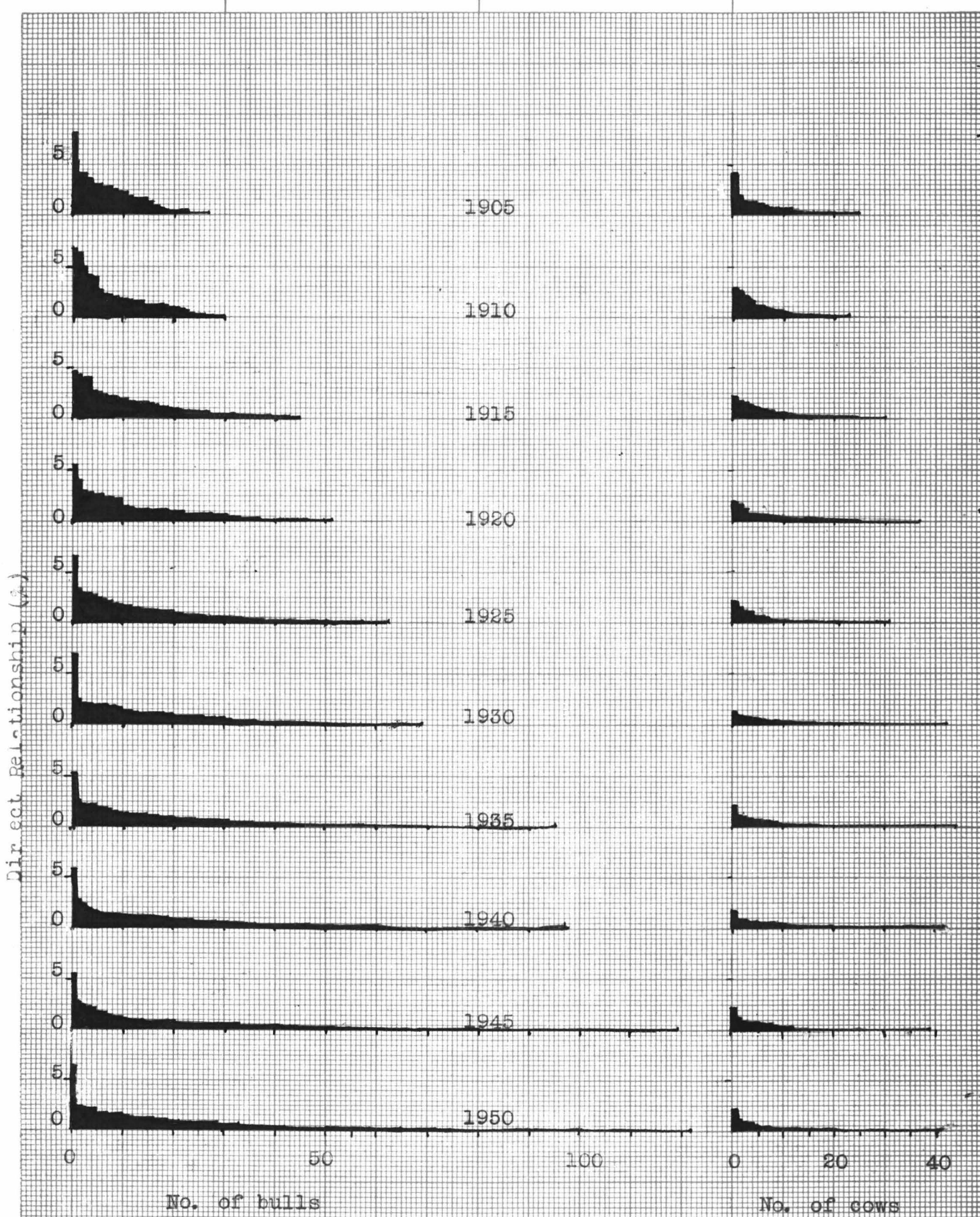
Fig. 5 The distribution of individual animals according to
their direct relationship to the breed at five-yearly
intervals 1905-1950.

TABLE V: Total relationship of prominent animals to the various samples.

Reg. No.	Period of Import-ation	Direct percentage relationship to the breed in									
		1905	1910	1915	1920	1925	1930	1935	1940	1945	1950
		Bulls									
P.A.*		2.75	1.37	1.0	0.87	0.75	0.37	0.25	0.37	0.37	0.50
4		2.87	2.5	1.12	1.0	0.75	0.37	1.87	0.75	0.75	0.50
14		10.37	8.0	5.12	3.25	4.25	3.12	1.50	1.62	0.87	1.0
22		2.12	2.75	3.25	3.50	2.37	2.50	2.87	2.50	1.25	1.50
41	Foundation	3.12	2.87	2.12	1.00	0.62	0.62	0.62	0.25	0.12	0.37
57		3.50	8.50	5.62	5.12	3.75	2.62	1.50	1.75	1.25	1.25
68		5.75	5.00	3.37	3.00	2.62	1.37	3.25	1.75	0.87	1.50
91		4.37	3.25	2.62	3.25	1.87	1.62	1.37	1.12	0.37	1.87
97		3.87	2.12	2.00	1.25	2.12	1.12	0.50	1.12	0.12	1.00
20		2.00	2.25	1.87	2.87	3.00	2.50	1.25	1.12	1.00	0.87
46		3.50	6.25	5.50	6.87	8.12	8.62	6.62	7.25	7.00	7.87
73	1896-1905	5.12	1.87	2.87	2.75	2.12	1.50	1.12	1.00	0.37	0.37
123		3.87	5.12	2.62	1.62	1.62	1.12	0.87	0.50	0.50	0.25
252		2.00	2.00	2.50	1.87	2.25	1.12	1.62	1.50	1.75	1.37
424		-	1.50	5.12	3.00	3.50	2.12	2.12	1.75	1.75	2.00
438	1906-1915	-	-	1.37	1.25	3.12	2.12	2.25	2.87	2.25	1.87
477		-	-	2.50	3.75	3.75	2.50	2.50	1.62	3.12	1.62
3058		-	-	-	0.25	0.37	1.50	1.50	1.62	2.75	2.75
4514	1916-1925	-	-	-	-	0.50	2.75	3.0	3.37	3.5	2.87
42346	1926-1935	-	-	-	-	-	-	-	0.37	3.0	3.0
		Cows									
Ohio^x	Foundation	2.37	2.50	2.25	1.50	1.62	1.75	1.62	1.25	0.75	1.37
Fancy Orange^x	"	5.12	3.50	2.62	2.37	2.50	0.75	0.50	0.87	1.12	0.87
Rose 504	"	1.62	3.25	1.25	2.25	1.75	1.25	1.25	0.50	1.50	0.37
853	1906-1915	-	-	0.25	-	0.50	-	2.62	2.00	2.75	2.75

* Pride of Australia.

x Not registered in the New Zealand Jersey Herd Book.

studied.   The highest direct relationship of an individual animal
to the breed at any one sampling date was that of Bull 14 (Cicero
2nd).   The heifers registered in 1905 derived one tenth of their
genes from this sire which was imported in 1884 from Jersey Island.
The contribution of this bull to the breed has, however, become
steadily less important and in 1950 the direct relationship of
Cicero 2nd to the breed was estimated at one per cent.

The most important imported animal for which it was
possible to measure the direct relationship was bull 46 (K.C.B.)
which was imported from England in 1902.   The relatively large
and consistent contributions of importations during the period
1896-1905 (see Figure 4) is due mainly to the importance of
K.C.B.   Almost fifty years after this sire was imported his direct
relationship to the breed was almost 8%.   In other words about
one in every twelve genes in the breed is probably derived from
K.C.B.

Clearly individual animals had more opportunity to become
important in the breed in the early years when the breed was small.
Relatively few of the later importations attain a direct
relationship of 2% to the breed, the most outstanding of these
being Bull 42,346 (Brampton Dreaming Sam).

It is noticeable that fewer cows appear in Table V
despite the relatively large numbers of females imported in the
early phases of the Jersey breed's development in this country.
Further these dams owe their individual importance to popular
descendants rather than their own popularity.   For example Orange
Rose is important only because her son Cicero 3rd (Reg.No.15)
was popular.   All lines trace back to Orange Rose through Cicero
3rd.   Similarly Ohio Fancy owes her inportance solely to the
popularity of her son Waikato Fancy (Reg.Bull.No.114).

The lessening importance of individual imported animals
can be seen from Figure 5 in which the individual importance of
all imported bulls and cows contributing to each sample is shown.
From this information it appears likely that further importations

will have relatively small individual effects on the breed as a
whole.   This may be modified, however, should breeders accept
artificial insemination and an imported sire or some of his
progeny be stationed at an Artificial Insemination Centre.

      Clearly some of the importation periods do owe their
importance in part to a few individual animals.   This is
particularly so in the case of the 1896-1905 importations and
K.C.B.   But it is not possible at this stage to determine whether
contributions of certain individuals remain relatively high in
subsequent periods of breed history due to deliberate breeding
practices such as line breeding or whether it is due to the
widespread use of individual animals and their progeny when the
breed was small.   This aspect is dealt with in a subsequent
section (page 21).

INBREEDING IN THE NEW ZEALAND JERSEY BREED

In the last section attention was drawn to the varying importance of individual imported animals and to the relative contributions made by some of them to the breed at various defined intervals. It was not clear however whether the relationship of the breed to some of these animals was preserved deliberately by inbreeding or by the widespread use of a large number of the close descendants of individual animals throughout the breed, particularly when it was small. If line-breeding has been practised one would expect the breed to be split into a number of "families" or "strains" the members of each bearing a closer relationship to each other than to members of other families. There is a tendency among many New Zealand breeders to class some herds as belonging to particular strains - the "Majesty", "Owler", "Dreaming Sam" etc. strains are examples of these but just how important such classifications are is by no means clear.

The amount of inbreeding which occurs within a breed is also of interest to the geneticist since it provides an estimate of the loss of heterozygosity during a given period. The herd books of the New Zealand Jersey Cattle Breeders' Association have been closed since 1905 and consequently, as in any closed population, the breed is probably becoming more homozygous each year at the approximate rate of $\frac{1}{3S} + \frac{1}{8D}$, where S is the number of sires and D the number of dams used in the breed each year (Lush 1945). In the 1948 herd book 3970 bulls sired the 15,819 heifers registered (Fahimuddin 1952). Consequently the increase in homozygosity from this source is so small as to be negligible. However if line-breeding has been widely employed then the average inbreeding coefficient of individuals comprising the breed may be high and the increase in homozygosity correspondingly important.

Estimates of the increase in homozygosity in certain closed populations have been made by overseas workers.

Their estimates are summarised as follows:-

Country	Breed Studied	Author	Year of Publication	Total inbreeding in per cent
U.S.A.	Shorthorn (in Britain)	Wright and McPhee	1925	26.0
Britain	Jersey	Smith	1928	3.9
Britain	Ayrshire	Fowler	1932	5.3
U.S.A.	Holstein Friesian	Lush et al	1936	4.0
U.S.A.	Brown Swiss	Yoder and Lush	1937	3.8
U.S.A.	Hereford	Willham	1937	8.1
U.S.A.	Aberdeen Angus	Stonaker	1943	11.3
Switzerland	Brown Swiss	Scinchetti	1934	1.0
Norway	Telemark	Berge	1930	7.0
Britain	Friesian	Robertson and Asker	1951	1.21

The large differences in the amount of inbreeding apparent in various breeds arise partly from pedigrees being traced to more remote dates in some breeds than in others. Lush (1946) states that had pedigree details for the British Shorthorn breed been available only as far back as 1810 instead of to 1780 the total inbreeding descernible would have been 11% instead of 26%.

The first problem in the present study was to decide upon a date to which all changes in the estimates of the inbreeding coefficient of the breed could be related. Pedigree details before herd books were published in New Zealand were meagre and for this reason it was necessary to assume that the inbreeding coefficient of the Jersey pedigree population in 1895 was zero. Each of the eight lines of the 100 pedigrees in the ten samples was extended back either to an animal imported since 1895 or to the first New Zealand-bred animal in the line born during or earlier than 1895. In addition, owing to the lack of extended pedigrees for many imported animals it was assumed

that all imported animals were neither inbred, nor related to each other, nor related to animals born in New Zealand prior to their importation.

The total inbreeding averaged over a whole population may be conveniently divided into three parts:-

(1) The current inbreeding - due to relationship in the parental and grand-parental generations (sib or parent-offspring mating).

(2) The long term inbreeding - due to relationship of important animals to the whole breed which are likely to appear beyond the grand-parental generation in both the top and bottom halves of pedigrees.

(3) The inbreeding due to the separation of the breed into strains.

In estimating the total inbreeding, distinction was made only between 'current' and 'non-current' inbreeding; this latter term comprises both the long-term inbreeding and that due to the separation of the breed into strains.

The estimation of current inbreeding. The estimates of 'current' inbreeding were calculated from the eight-line pedigrees and additional pedigrees of animals drawn at random from the appropriate herd-book (see Table VI). These estimates showed relatively little variation in the periods sampled. The number of matings examined and the results of the estimates of 'current' inbreeding are shown in the Table VI.

TABLE VI: Current inbreeding.

Year Sampled	Matings in sample	Type of mating					Current inbreeding
		Half sibs		Full sibs	Parent offspring		
		Paternal	Maternal		Sire Dtr.	Dam Son	
		%	%	%	%	%	%
1903-04 -05	192	4.5	-	-	1.04	-	0.84
1908-09 -10	356	2.55	-	0.56	2.24	-	1.01
1915	300	4.7	-	-	1.33	-	0.91
1920	300	4.7	-	-	1.00	0.33	0.91
1925	300	5.7	-	-	2.33	-	2.91
1930	300	7.7	0.33	-	0.33	0.33	1.16
1935	500	5.6	-	-	0.80	0.20	0.95
1940	500	4.6	0.20	-	0.20	0.20	0.74
1945	500	5.4	0.6	-	1.00		1.00
1950	500	3.0	-	-	0.20	0.20	0.47

Of the 3748 matings sampled, 36 or almost 1% were sire-daughter, five were dam-son, two were full brother-sister and 184 or almost 5% were half-sib.   It is surprising that during the fifty year period, nearly one in every twenty matings was between half-sibs - the vast majority of them related to each other through a common sire.

The 93 paternal half-sib matings in 1935, 1940, 1945 and 1950 were analysed to determine the ages of the parents when mated.   The results are given in Table VII.

TABLE VII: 93 paternal half-sib matings distributed according to age of parents at mating.

Age of sire at mating	Age of dam at mating			Total
	-1.6	1.7-2.6	2.7-	
-1.6	30	6	6	42
1.7-2.6	5	7	7	19
2.6-		1	31	32
Total	35	14	44	93

Of the 93 bulls involved in paternal half-sib matings 42 were "yearlings" when the matings occurred and 35 of the 93 dams were "yearling" heifers.   It is doubtful whether many such matings would be planned by breeders.   On some occasions it is likely that yearling bulls and heifers by the same sire may be run together so that a breeder could avoid having to purchase a bull.   On other occasions inbreeding may have been deliberately practised but with the absence of performance records for both parents when they were yearlings this is hardly likely.   The most likely possibility is that very many of the "yearling" half-sib matings were accidental.   Whether such tentative conclusions apply in the case of matings between older half-sibs is not clear but it appears reasonable to conclude that at least a third and possibly more of the current inbreeding during the period 1935-1950 was not deliberate.

The estimation of 'non-current' inbreeding. The estimation of non-current inbreeding (the long term inbreeding plus that due to the separation of the breed into strains) was made from the 100 eight line pedigrees drawn from the appropriate herd books after omission of the current inbreeding in them. Within each pedigree there were 16 possible ties (see Figure 1) so that for each sample there were 1600 possible ties. An estimate of the inbreeding is derived from the division of the actual number of ties by twice the possible ties (see pages 8-10). The results are given in Table VIII along with the current inbreeding for the appropriate years. The sums of the current and non-current inbreeding gave estimates of the total inbreeding at different periods and these are also shown.

TABLE VIII: Total Inbreeding

Year of sample	Current I. B. %	Non-current I.B.		Total I. B. %
		Ties	% inbreeding	
1903, 04 and 05	0. 84	50	1. 56	2. 40
1908, 09 and 10	1. 01	57	1. 78	2. 79
1915	0. 91	45	1. 40	2. 31
1920	0. 91	57	1. 78	2. 69
1925	1. 29	40	1. 25	2. 54
1930	1. 16	51	1. 61	2. 77
1935	0. 95	55	1. 73	2. 68
1940	0. 72	56	1. 75	2. 47
1945	1. 00	51	1. 59	2. 59
1950	0. 47	60	1. 87	2. 34

The standard error of the estimate of total inbreeding is .018 for the 1000 eight line pedigrees examined.

The total inbreeding has remained remarkably uniform throughout the fifty years studied. This is due no doubt to the assumptions already mentioned that imported animals were neither related to each other nor inbred. Thus each importation appearing in the pedigrees would be the equivalent of an out-cross. The opportunities for ties appearing would be restricted since many of the lines terminated between 1950 and 1895 and thus

the number of individuals appearing is reduced.

Estimation of long-term inbreeding. This component of the
total inbreeding, due to the concentration of the whole breed on
few ancestors was obtained by first calculating the average
relationship between possible mates chosen at random within the
breed. This component is usually known as inter-se relationship
within the breed. The long-term inbreeding is equal to $\dfrac{r}{2-r}$
where r is the relationship between pairs of animals drawn at
random from the breed. For practical purposes the long-term
inbreeding can be taken as equal to half the inter-se relationship.

The samples of 100 heifers drawn from each period and
for which eight-line pedigrees had been constructed were
divided into two groups of 50 in order to obtain a measure of the
sampling error of the final estimate. Within each sub-sample
of 50 eight-line pedigrees the average relationship of the 50
sires to every other dam except his actual mate was calculated.
In each of these 2450 (50x49) hypothetical matings there were
16 possible ties (see page 10). Therefore the total number
of ties obtained was divided by 16x2450 to estimate the average
inter-se relationship. The expected long-term inbreeding is
then one half of the inter-se relationship. The results are
given in Table IX along with the standard error from two
estimates for each period.

TABLE IX: Inter-se relationship and resultant expected
long-term inbreeding.

Year of sample	Number of random matings	Inter-se relation- ship %	Resultant expected long-term inbreeding %
1903, 04, 05	4900	2.98	1.49±0.13
1908, 09, 10	4900	2.84	1.42±0.11
1915	4900	2.00	1.00±0.07
1920	4900	1.88	0.94±0.06
1925	4900	2.08	1.04±0.06
1930	4900	1.94	0.97±0.07
1935	4900	1.36	0.68±0.05
1940	4900	1.46	0.73±0.05
1945	4900	1.56	0.78±0.05
1950	4900	1.62	0.81±0.07

With the exception of the relatively high values during the first two periods the expected long-term inbreeding has remained comparatively uniform. Again this is probably partly the result of treating imported animals as unrelated to the New Zealand-bred animals and other importations.

Estimation of inbreeding due to development of "strains". Now if the expected long-term inbreeding (that which would occur if matings within the breed were at random) is subtracted from the 'non-current' inbreeding (that which has actually occurred in the same group of animals) an estimate of deliberate inbreeding corresponding to attempts on the part of breeders to split the breed up into strains is obtained. These estimates are given in the Table X.

TABLE X: Expected inbreeding and inbreeding due to development of strains.

Year of the sample	Non-current inbreeding	Expected long-term inbreeding	Inbreeding due to development of strains
	%	%	%
1903, 04, 05	1. 56	1.49	0. 07
1908, 09, 10	1. 78	1.42	0. 36
1915	1. 50	1.00	0. 40
1920	1. 78	0. 94	0. 82
1925	1. 25	1.04	0. 21
1930	1. 61	0. 97	0. 64
1935	1. 73	0. 68	1. 05
1940	1. 75	0. 73	1. 02
1945	1. 59	0. 78	0. 81
1950	1. 87	0. 81	1. 06

The amount of inbreeding due to strain differences is small. It has increased during the fifty years reviewed but in 1950 when it had reached its maximum value it was approximately equal to only one per cent.

From these estimates of 'current' inbreeding, 'non-current' inbreeding, and the inbreeding due to deliberate line-breeding, it is possible to partition the total inbreeding into the three components already mentioned (see page 23) as shown in Table XI.

TABLE XI: Inbreeding partitioned into three components.

Year	Current inbreeding %	Long-term inbreeding %	Strain inbreeding %	Total inbreeding %
1903, 04, 05	0.84	1.49	0.07	2.40
1908, 09, 10	1.01	1.42	0.36	2.79
1915	0.91	1.00	0.40	2.31
1920	0.91	0.94	0.82	2.69
1925	1.29	1.04	0.21	2.54
1930	1.16	0.97	0.64	2.77
1935	0.95	0.68	1.05	2.68
1940	0.72	0.73	1.02	2.47
1945	1.00	0.78	0.81	2.59
1950	0.47	0.81	1.06	2.34

Up to 1920 long-term inbreeding was the most important component of the total inbreeding.   From 1920 to 1930 current inbreeding made the greatest contributions, but since that date 'strain' inbreeding appears to have been the most important. However it should be remembered that a considerable part of the contribution made by strain inbreeding is probably due to accidental close matings.

Compared with the breeds quoted at the beginning of the section the total inbreeding in the New Zealand Jersey breed is low.   The estimates made however suffer from the assumption that all imported animals were not inbred nor related to each other nor to New Zealand-bred animals and their descendants. That such is not the case is apparent from the pedigrees of imported stock that are available.   Such differences in the data however do not greatly detract from the value of the results obtained.   From these it is clear that 'close' line-breeding is not as frequent as is commonly held by breeders, and that strain differences in the breed as a whole are of negligible importance.

IMPORTATIONS AND TYPE CLASSIFICATION

Despite the recording facilities and associated services such as Life-time Registers and Sire Surveys now available in New Zealand (New Zealand Dairy Board,1951) the eye appeal of dairy cattle still remains an important factor in selecting breeding stock.   In fact emphasis on type appears to be increasing and most of the better farmers in the Dominion want animals of fashionable appearance as additions to their herds.   Animals which do not rate highly on type assessment on the average bring much lower prices than animals that do (Wright Stephenson,1951).

Dairy type standards were originally set in the Show ring but in this country owing largely to the scattered population, the difficulties of transport and the paucity of Shows, relatively few animals have been exhibited in the past.   This together with other limitations of the Show ring has led Breed Societies to introduce type classification programmes in which qualified classifiers appointed by their Breed Society visit breeders' herds and rate animals according to their appearance.

The importance attached to type as a means of assessing producing ability and breeding worth has been given emphasis by the widely held view among breeders that Jersey cattle in this country deteriorated in appearance due to the different environment as compared with that of the Channel Islands.   Official attempts to encourage selection against this "deterioration" were two-fold, one, the introduction of a type classification scheme in 1928 and the other, the encouragement of importations from recognised overseas sources.   It was generally held that imported animals would leave progeny closer to the desirable "Island type" than those animals with a predominance of New Zealand-bred animals among their immediate ancestors.

Unfortunately the Classification Scheme was until 1946 on an entirely voluntary basis and as regulations have only recently been passed which make the Scheme virtually compulsory from 1st July 1952, it is too early to ascertain whether imported

animals do have a higher proportion of animals of desirable appearance among their offsprings than New Zealand-bred animals.

However, if in the past imported animals have effected improvements in type on their immediate progeny and if deterioration subsequently took place unless further imported blood was introduced one would expect to find a greater proportion of the heredity of the animals of the best appearance to be descended from more recent importations than animals in lower classification classes.

To this end samples of 50 heifers registered in 1945 were taken from each of the three official classes of the New Zealand Jersey Cattle Breeders' Association classification list published in the 1949 Advanced Register of Merit. These have been analysed by the eight line pedigree technique described earlier (page 8), each line terminating at an imported animal or a New Zealand-bred animal born before 1896. Eligibility for the three classes is as follows (New Zealand Jersey Cattle Breeders' Ass.,1951):-

V.H.C. (very highly commended) class:- Animals of particularly good outstanding type, showing true Jersey quality, well finished, with good carriage and above all a well-shaped capacious udder.

H.C. (Highly commended) class:- Cows of sound type; but lacking the same breed quality and finish of V.H.C. class. Catchment and shape of the udder are essential features and there must be no outstanding faults.

C. (commended) class:- Cows of plainer type but showing fair amount of dairy quality, with no really serious faults, and with the udder of reasonable quality. No cow shall be penalised through accident or defect that are clearly not hereditary.

North Island:- Cows under three years nine months of age not to be eligible for classification.

South Island:- Cows will only be classified biennually and any cow not under two years nine months of age is eligible for
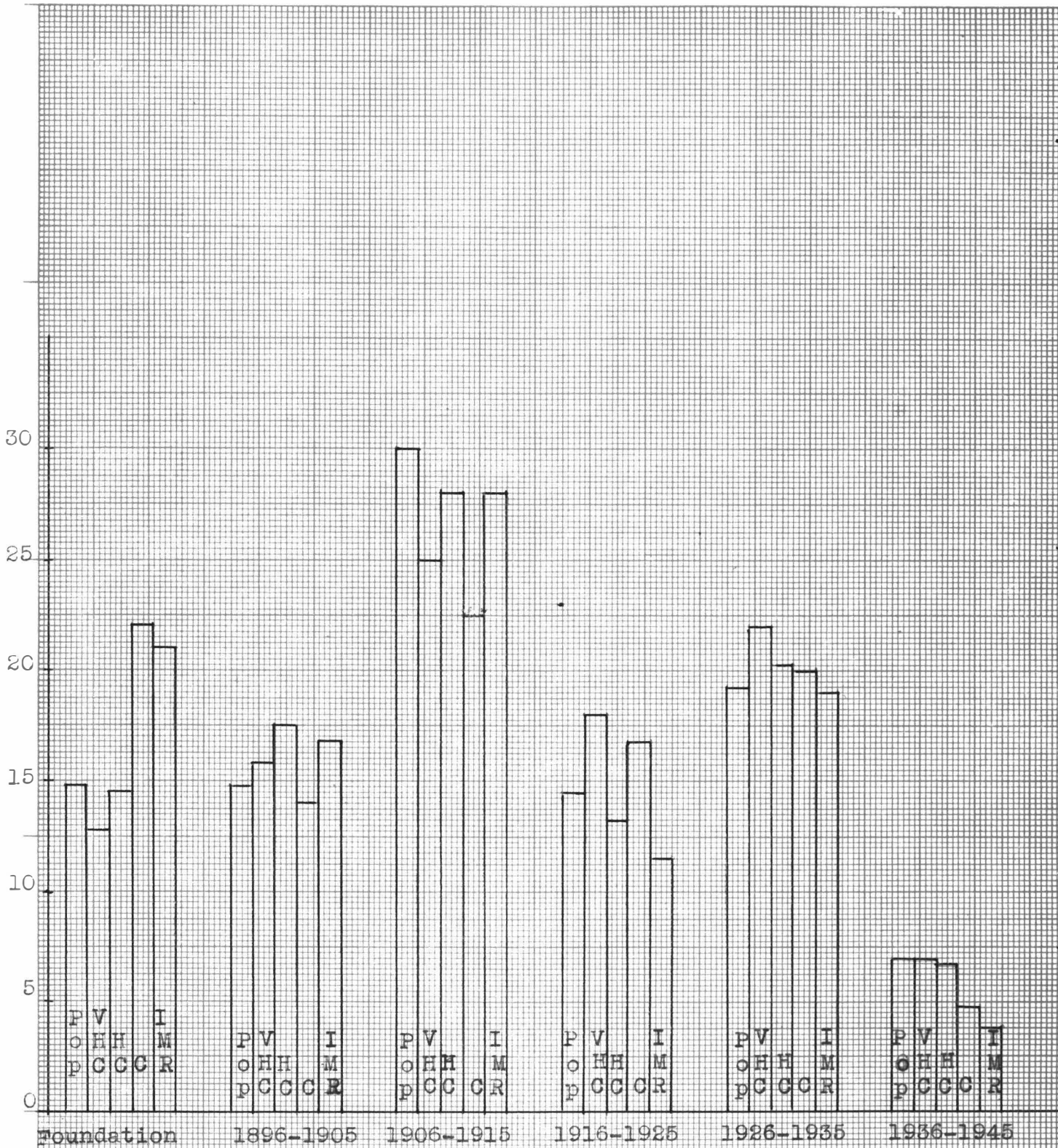
Fig.6 Showing the percentage contribution of each Importation Period to samples of the Population, V.H.C.s, H.C.s, C.s, I.M.R.s, born in 1945.

classification.

In addition a sample of 50 cows registered in 1945
was taken from the 1949-50 Intermediate Merit Register issued
by the Herd Recording Council of the New Zealand Dairy Board.
Entry into this register is based solely on production perform-
ances (New Zealand Dairy Board,1951).   Eight line pedigrees
were constructed as for the classified animals and within each
sample the 400 lines (50 animals, 8 lines each) were grouped
according to the period during which the imported animal at
which the line terminated was brought into New Zealand.   Each
of the four groups have been compared with the sample of 100
heifers drawn from the 1945 Herd Book as described previously
(page   7) and used to assess the importance of various
importations on the four samples already described and all born
in 1945.

Table XII (see page 32) shows an estimate of the genes
in each of the samples which may be attributed to importations
during the five specified 10-year periods between 1896 and 1945
and the foundation stock-animals in New Zealand before 1896.
The estimates are also shown in Fig. $_6$ in which histograms have
been drawn to illustrate the estimated contribution of each
period to the population and to the four classes of cattle under
consideration derived from it.   The histograms should be
studied in conjunction with the results of the statistical
analysis appended to Table XII.   Interpretation is further
facilitated if the contribution of each period to the population
sample is expressed as 100 and used as a base to express
contributions to the remaining samples.   These results are
shown in Figure 7.

If importations tend to raise the type rating of their
immediate offspring above that of the population as a whole one
would expect the more recent importations (the 1926-35 and
1936-45 importations) to contribute more to the V.H.C.'s than to
the C.'s or, in other words, one would expect the V.H.C.'s to
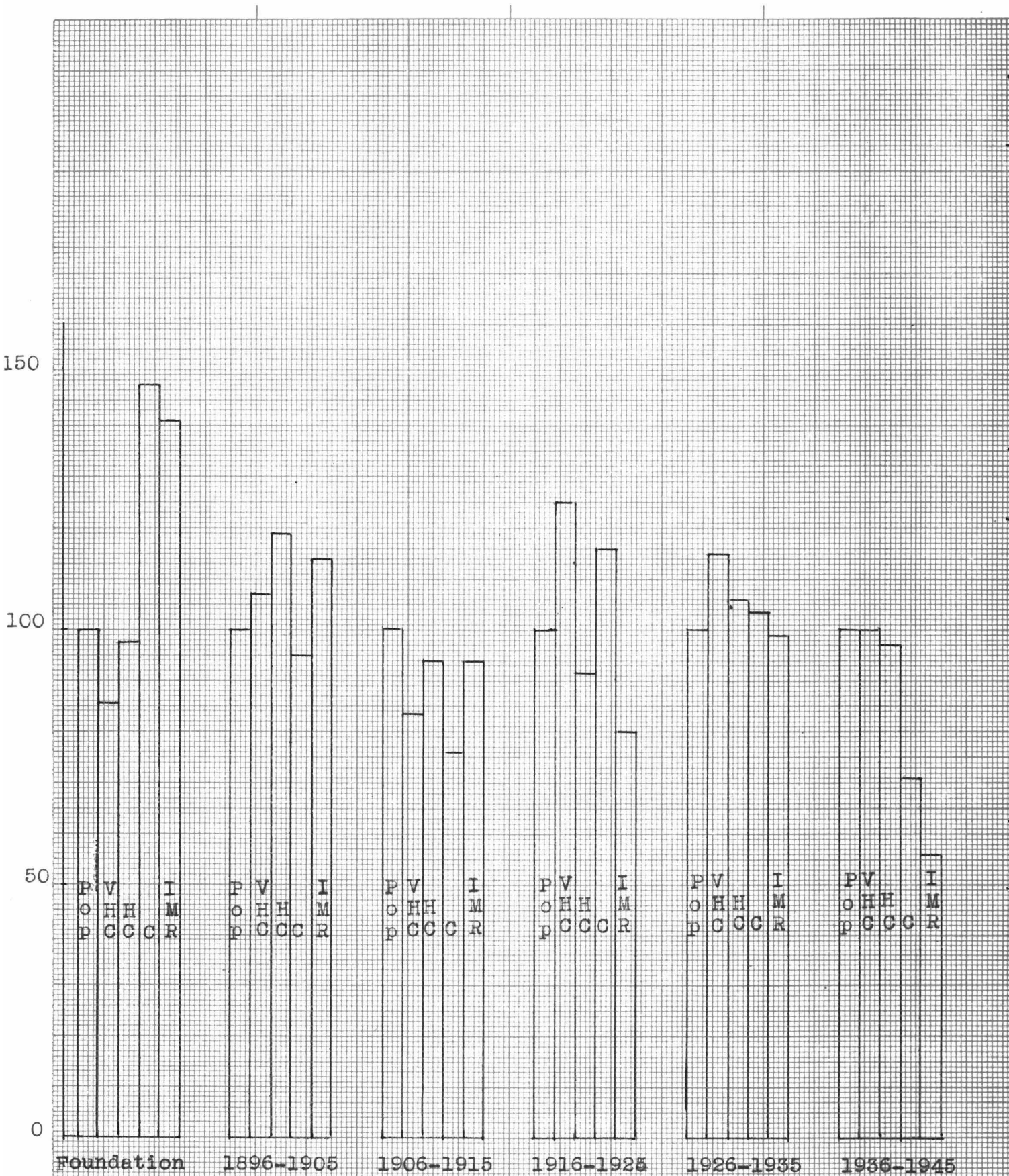
Fig. 7 Showing the contribution of each Importation Group
to samples of the Population, V.H.C., H.C., C., I.M.R.,
(Population expressed as 100), born in 1945.

obtain less of their genes from the foundation animals and
early importations than do the C.'s. In general this appears
so but the differences between the contributions by any one
period of importations to V.H.C.'s and C.'s do not attain
statistical significance (see Table XII).

TABLE XII: Estimates of the contribution of Foundation animals
and importations during five subsequent ten-year
periods to samples of the Population, V.H.C., H.C.
C. and I.M.R. dams registered in 1945.

Period	Population	V.H.C.	H.C.	C.	I.M.R.
Foundation	14.87	12.75	14.50	22.00	21.00
1896-1905	14.75	15.75	17.50	14.00	16.75
1906-1915	29.87	24.75	28.00	22.50	28.00
1916-1925	14.50	18.00	13.25	16.75	11.50
1926-1935	19.25	22.00	20.25	20.00	19.00
1936-1945	6.75	6.75	6.50	4.75	3.75

Statistical Analysis

** Chi square P < 0.1

* Chi square P < 0.5

Period	Class	V.H.C.	H.C.	C.	I.M.R.
Foundation	Population V.H.C. H.C. C.	—	— —	** ** **	** ** * —
1896-1905	Population V.H.C. H.C. C.	—	— —	— — —	— — — —
1906-1915	Population V.H.C. H.C. C.	—	— —	** — —	— — — —
1916-1925	Population V.H.C. H.C. C.	—	— —	— — —	— * — —
1926-1935	Population V.H.C. H.C. C.	—	— —	— — —	— — — —
1936-1945	Population V.H.C. H.C. C.	—	— —	— — —	* * — —

Further it would be anticipated that the V.H.C.'s would consistently show a greater proportion of recently imported genes than the population sample. Reference to Figure 7 shows that though this is the case for the 1916-25 and 1926-35 importations, the 1936-45 importations is approximately equally important in the population, V.H.C. and H.C. samples. Sampling errors may be of importance in the analysis but one must conclude on the available evidence that there are no clear indications that animals rated highly on type classification owe their superior rating to ancestors recently imported into New Zealand. The apparent failure of importations to effect improvements in type ratings may be due to one or more factors. The standards adopted by the classification committees may differ widely from those obtaining on Jersey Island. The New Zealand environment differs from that in the Channel Islands and this may well be reflected in differences in appearance in the stock in the two environments. Selection for a Channel Island type under New Zealand conditions may represent an endeavour to correct environmental effects rather than genetic defects. Lastly, the classification scheme may not in practice provide suitable statistics for a study such as this. Differences of opinion within and between classification committees operating in the same and different years do occur and the fact that an animal may qualify for different type ratings in different years suggests that classification for type is on an opinionative rather than a measureable basis.

The significant differences between the contribution of the 1936-45 importations to the population and V.H.C. samples compared with the I.M.R. sample are noteworthy. These differences and the important contributions made by the foundation stock to I.M.R. dams registered in 1945 suggest that the recent importations have not on the average been of great importance in contributing genes necessary for constant production at a reasonably high level.

SUMMARY

1. Some genetic aspects of the New Zealand pedigree Jersey
    cattle breed have been studied by a population-sampling
    and pedigree-sampling method.

2. The 256 bulls and 192 cows imported into New Zealand since
    1896 have had a large effect on the Jersey breed and of
    the genes present in the 1950 heifer registrations only
    about one-sixth (17.7%) derive from animals in New Zealand
    before 1896.

3. Importations were classified according to their date of
    entry into New Zealand, ten-year intervals being chosen.
    The relative importance of each group varied with the
    number of imported animals comprising it, the size of the
    breed when the group was imported, the interval between
    the date of birth of the heifers sampled and the period
    of importation, and the popularity of individual animals
    in the different groups of imported animals.   One sire
    contributed 10% of the genes present in the 1905 heifer
    registrations but had only a direct relationship of 1% to
    the 1950 heifer registrations.   A second sire imported in
    1902 had a direct relationship of almost 8% to the breed
    in 1950.

4. The degree of inbreeding referred to 1895 as zero has
    remained uniform at about $2\frac{1}{2}\%$.   This is probably
    underestimated because of the assumption necessitated by
    the absence of complete pedigree details for all imported
    animals that they were neither related to each other nor
    inbred.

5. The inbreeding measured was partitioned into its three
    components, current, long-term and strain inbreeding.
    Prior to 1920 long-term inbreeding due to the relationship
    of individual animals to the breed was the most important
    component.   Between 1920 and 1930 current inbreeding due
    to relationships in the parental and grand-parental

generations made the greatest contributions but since 1935 'strain' inbreeding has been the most important.

6. From the Intermediate Merit Register and the Type Classification results samples of registered heifers born in 1945 were studied. There was no clear indication that animals rated highly for type owed their superiority to genes derived from recent importations. Similarly, the findings indicated that recent importations have been no more important in contributing to animals qualifying for the I.M.R. than to the breed as a whole.

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LIST OF IMPORTED BULLS 1862-1950

Date of Import-ation	Name	N.Z.J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Reference (see end of list)
1862+	The old Marquis	–	–	Jersey	Thos. Syers	1,3
1875+	Tudor	–	–	"	T. Summers of Melbourne	1,3
1878	Langstone	49	–	England	J. Strucky	1,3
1879	Jersey	41	–	Jersey	T.G. Blueitt	3
Before 1880+	Garibaldi	–	–	–	–	3
Before 1880	Tragan	–		Jersey	–	1,3
Before 1880+	St. Peter	–	–	–	–	1,3
1880+	Malabrand	–	–	–	–	1,3
1880+	The Marquis	–	–	–	Thos. Syers	1,3
1881	Pride of Australia	–	–	–	T. Morrin	1,3 (Reg. Bull 47)
1881	Billy 1st	4	1881	England	H.P. Hill	3
Before 1882+	Angler's Boy	–	–	–	–	3(Reg. Bull 58)
1882	Cicero IInd	14	3/82	Jersey	T. Morrin	1,3
1887+	Neat Boy	–	–	–	–	1,3
1888	Sir James	104	8/84	–	Borona	3
10/1892	Dry Monopole	22	4/92	England	G. Gould	3
11/1892	Monopoly	68	4/92	"	" "	3
1893	Laurier	–	–	–	–	3(Reg. Bull 114)
1893	Magnet's Boy	57	11/92	Australia	F.E. Jenning	3
2/1893+	Emperor	–	7/92	Jersey	–	3
1893	Retford Boy	91	4/92	–	C. Day	3
1894	Sailor Boy 66th	97	11/93	Jersey	"	3
12/1895	Sir Gilbert	325	7/95	"	F.A. White	3
10/1896	Golden Brown	123	10/96	"	A. Buchanan	3
1896+	Jasper	–	/95	"	–	5
5/1898	New Zealand's Exile	73	1/98	U.S.A.	C. Day	3

Date of Import-ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Reference (see end of list)
2/1901	Magnet's Boy	58	3/00	Australia	P. Hunter	3
8/1902	Abundance	1	9/01	"	J. Jennins	3
8/1902	K. C. B.	46	7/01	England	G. Gould	3,4
8/1902	Silver King (Strucky's)	252	7/01	"	J. Strucky	3
1903	Doctor	20	7/01	"	F. L. Right	3
1903	Star Bright	183	/04	-	J. A. Macrean	3
7/1904	Lark Spur's Optician	222	7/04	-	P. Hunter	3
1906	Yankee Sweet	536	8/07	U. S. A.	A. E. Watkin	3
6/1906	Tosie's Melia Ann King	407	8/05	"	Griffiths & Cornwall	3,4
11/1907	Campanile's Sultan	424	4/06	Jersey	Bequest	3,4
1908	Dalesman	433	7/07	"	C. Goulter	3
11/1908	Eminant's Fountaine	438	2/07	U. S. A.	C. G. C. Dermer	3
11/1908	Majesty's Fox	477	4/07	Jersey	S. R. Lancaster	3
1908	Goddington	597	4/07	England	G. Gould	3
1908	Lord Twylish	2435	1/05	Jersey	H. E. Watson	3
5/1909	Brighton Twylish	419	8/07	Australia	" "	3
1909	Golden Swan	606	7/08	England	A. Moreland	3
1910+	Charm's Lord Twylish	979	7/09	-	C. Day	3
1910+	Fancy's Carnation's Fox	1020	8/09	-	"	3,4
1910+	Fancy's Lord Twylish	1336	9/10	Australia	J. A. McCrea	3,4
1910+	Liryclear Lad 4th	1339	2/09	"	W. J. Hall	3
1910+	" Lad 6th	1340	8/09	"	" "	3
1910+	Lord Maitland	1341	5/09	"	" "	3
10/1910	Soumise Majesty	1271	4/09	Jersey	C. Goulter	3
1911+	Golden Crest	1048	10/10	"	" "	3
4/1911	Molina's General	1147	4/10	"	Bayly Heady and Hancock	3

Date of Import -ation	Name	N.Z.J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Reference (see end of list)
1911+	The Squire	1272	3/10	Jersey	C. Goodsona	3
10/ 1911	Ashton Bob	1330	1/11	England	E. Eagle	3
10/ 1911	Roberts	1343	4/10	"	" "	3
1911-	Duchess' Fox	1381	8/10	Australia	F. Marriner	3
11/ 1911	Rozel's Sultan	1443	3/07	Jersey	W. Vaughan	3
11/ 1911	Silver Lock's Duke	1449	6/09	"	J. G. Harkness	3
11/ 1911	Una's Nobility	1478	4/10	"	W. Vaugan Harkness	3
11/ 1911	Victor	1480	1/10	"	J. G. Harkness	3
12/ 1911	Cute's Rozel Lad	1610	3/11	"	Roberts	3
1912+	Wastewood Barren	2240	3/11	England	J. R. Corrigan	3
1913+	Robinhood	2239	6/11	"	" "	3
1913+	Lord Nelson	2037	7/11	Australia	W. J. Hall	3
1914+	Barron Twylish	2868	10/12	"	P. Hunter	3
1914+	Petune's Noble	3011	4/12	England	E. Griffiths	3
1915+	The owals Victor	3058	2/13	Jersey	F. J. Watson	3
1915+	Attration's Fox	3529	7/13	-	F. E. Hellyer	3
1916+	V. C.	4472	11/15	England	A. Moreland & Sons	3
1916+	Maiden's Glory Lad	5347	9/15	Jersey	S. R. Lancaster	3
1917	Viola's Golden Laddie	4514	10/13	U.S.A.	T. S. Cooper & Sons	3
1917	Jessie's Register of Melrose	5686	11/16	Jersey	John Nicolson	3
1918	Canadian	5021	4/17	"	C. Goodson	3
1920+	Matchless Raleigh	9400	10/18	England	F. J. Watson	3
1920+	Majesty's Oxford Sultan	9624	8/18	Jersey	Lancaster	3

Date of Import-ation	Name	N.Z.J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Reference (see end of list)
1921+	Exile of Cloverland	8732	2/19	U.S.A.	C. Stevens	3
1921+	Brampton Bright	9587	12/17	Canada	Wren	3
1921+	" Dark Heir	9588	9/19	"	"	3,4
1921+	Lily's Noble Raleigh	9623	9/20	"	S.R. Lancaster	3,4
1921+	Wotton Red Buoy	9625	4/19	England	" "	3,4
1921+	Picking Raleigh	9661	10/20	Canada	Hopcroft	3,4
1921+	Bright Sultan	9779	3/19	"	Griffiths & Sampson	3,4
1921+	Brampton Merry Boy	10474	9/19	"	F.W. Cornwall	3,4
1921+	Oxford Onyx	10673	9/19	"	Mrs. E. Hellyer	3,4
1921+	Masterful	11040	2/20	Jersey	F.E. Day	3
1921+	Marshal Aldan	11607	4/20	"	S.R. Lancaster	3
1921+	Bowlina's Oxford Noble	13114	4/19	"	Wren Bros.	3
1921+	Sophia's Tornaentor	13337	3/20	U.S.A.	C. Stevens	3
1922+	Jewels Noble Prince	11606	7/21	Canada	S.R. Lancaster	3
1/1922	Clarion	16812	4/21	Jersey	E. Griffiths	3
1922+	Xenia's Oxford Lad	16813	1/22	"	" "	3
1922+	Rower's Beautiful Prince	16825	9/21	U.S.A.	W.J. Hall	3
1924+	Leonard's Wonder	16627	5/23	Jersey	S.R. Lancaster	3
2/1924	Beumlands Tim	16922	8/21	"	H.E. Martin	3
2/1924	Easter Sultan	16923	4/22	"	" "	3
2/1924	Golden Fern's Volunteer	16924	8/21	"	" "	3
2/1924	Les Niemes Ruler	16925	4/22	"	" "	3
2/1924	La Sente's Startler	16926	6/22	"	" "	3

Date of Import-ation	Name	N.Z.J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Reference (see end of list)
2/1924	Napoleonettes Oxford	16927	4/22	Jersey	H. E. Martin	3,4
2/1924	Proposer	16928	7/22	"	" "	3,4
2/1924	Roumanian	16929	4/22	"	" "	3,4
2/1924	Some Sultan	16930	12/22	"	" "	3,4
2/1924	Sunbean's Sultan	16931	4/22	"	" "	3,4
2/1924	Sunny lad	16932	8/22	"	" "	3,4
2/1924	Usurper	16933	6/21	"	" "	3
2/1924	Winning Post	16934	5/22	"	" "	3
2/1924	Xenia's Oxford Lad	16935	4/22	"	" "	3
2/1924	Xenia's Success-or	17785	12/22	"	" "	3
1924	Sybil's Gamboge Dreadnought	24038	8/23	U.S.A.	T. Williams	3
1924	Brampton Milk Mine's Xenia	48351	8/21	Canada	E. Griffiths	3
2/1926	Victor's Hand-some Prince	27528	9/24	U.S.A.	Cooper	3
2/1926	Combination Tidy Prince	27544	11/24	"	"	3
1926+	Sybil's Earl	28020	11/26	Jersey	J. Chynoweth	3
1926+	Viva la France's last son	28084	3/23	Canada	T. Williams	3
1926	Glow Tiddledy-Wink Syrcuse	28681	10/23	U.S.A.	C. Goulter	3
1926	Sybil's Volunt-eer	35407	3/25	Jersey	J. S. Jones	3
1926+	Willowy's Ox-ford Lad	35520	9/25	"	W. Chynoweth	3
1926	Dreamer's Vol-unteer	48355	6/25	Canada	E. Griffiths	3
1926	Floral Dance You'll Do	50420	4/25	Jersey	F. Phillips	3
1927+	Brampton Coy Volunteer	30418	2/26	Canada	F. W. Cornwall	3
1927+	Fairy's Eminant Raleigh	34957	8/24	U.S.A.	Moreland	3
1927	Stella's Silver Boy	38619	11/26	Canada	E. Griffiths	3

Date of Import -ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Reference (see end of list)
7/1928	Oswald's Victor	36627	5/24	U. S. A.	F. Phillips	3
7/1928	Raleigh's Combination Lad	36628	8/47	"	" "	3
7/1928	Tidy Prince You'll Do	36636	7/27	"	Mrs. F. W. Speirs	3
7/1928	Oxford Beau's Pretty Oxford	36658	6/27	"	J. Robb	3
7/1928	Oxford Beau's Combination	36659	10/24	"	A. E. Watkin	3
1928+	Brampton Boy Successor	38615	10/27	Canada	E. Griffiths	3
1928+	" Forward Prince	38616	4/27	"	" "	3
1928+	" Star Standard	38617	9/27	"	" "	3
1928+	" Sybil Forward Star	38618	8/27	"	" "	3
1929+	" Owl Standard	42342	12/27	"	" "	3
1929+	" Oxford Bravo	42343	9/27	Jersey	" "	3
1929	" Wonderful Oxford	42344	7/28	"	" "	3
1929+	Philidora Sultan	42345	4/28	U. S. A.	" "	3
1929+	Brampton Dreaming Sam	42346	4/27	Jersey	" "	3
1929+	" N. B. Volunteer	42483	8/28	"	" "	3
1929+	" Standard You'll Do	42484	10/28	Canada	" "	3
1929+	" Wonder Standard	42485	7/28	Jersey	" "	3
10/ 1929	Eminanta's Fairy Lad	42772	3/28	U. S. A.	A. Moreland & Sons	3
10/ 1929	Fairy Flag's Raleigh	42773	9/28	"	" "	3
10/ 1929	Xenia's Volunteer	42774	5/28	"	" "	3
1929+	Les Niemes Emperor	42827	5/25	Jersey	R. H. Horn	3

Date of Import-ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Reference (see end of list)
1929+	Brampton Combina Mascot	42341	4/28	Canada	E. Griffiths	3
10/ 1929	Irne's Pioneer	43147	9/28	Jersey	Cooper	3
1929+	Lord Aldan's Challenge	43182	7/28	"	"	3
1929+	Golden Prudence	48356	12/28	Canada	E. Griffiths	3
1929+	Poppy's Majesty	50162	8/27	Jersey	T. S. Cooper	3
7/1930	Coronations Oxford Raleigh	52794	10/29	U. S. A.	A. Moreland	3
7/1930	Coronations King Financier	61731	9/29	"	" "	3
1930	Poppy's Right Royal	43149	10/29	"	Cooper	3
1930	Santa Rosa Bowlina	43150	9/29	"	"	3
1930	Brampton Stand-ard Dance	48352	6/29	Canada	E. Griffiths	3
1930	" Volunteer Buster	48353	6/29	"	" "	3
1930	" Volunteer's Son	48354	4/29	Jersey	" "	3
1930	Philidora's Lad	48357	5/29	Canada	" "	3
1930	Beauty's Xenia's Lad	49908	8/29	U. S. A.	F. Phillips	3
1930	Roumanian Volunteer	49909	3/29	"	" "	3
1930	Palantine Volunteer	48877	3/29	"	A. Hazelton	3
9/1930	Mourier's Oxford Noble	43148	2/26	"	T. S. Cooper	3
10/ 1930	Brampton Baronet	50426	8/28	Jersey	" "	3
10/ 1930	Coronation's Cid	50427	5/28	"	" "	3
10/ 1930	General Cow-slip's Pioneer	50428	1/29	"	" "	3
10/ 1930	Nance's Sybil Gamboge	50427	1/30	"	" "	3

Date of Import -ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Reference (see end of list)
10/ 1930	Observer's Pioneer	50430	2/30	Jersey	T. S. Cooper	3
10/ 1930	Surville Sultan's Beau	50431	10/28	"	" "	3
10/ 1930	Sybil's Observer	50432	5/30	"	" "	3
10/ 1930	You'll Do's Prince Cecil	50433	4/28	"	" "	3
3/1931	Brampton Blonde	50093	11/29	Canada	E. Griffiths	3
3/1931	" Trinity Taxpayer	50094	9/29	Jersey	" "	3
3/1931	Vagabond of Oaklands	50095	7/29	"	" "	3
3/1931	Brampton Bafron Standard	51304	4/30	Canada	" "	3
3/1931	" Beauty Standard	51305	2/30	"	" "	3
3/1931	" Design Bob	51306	2/29	Jersey	" "	3
3/1931	" Dreaming la Senate	51307	5/30	Canada	" "	3
3/1931	" Estelle Gamboge	51308	7/29	Jersey	" "	3
3/1931	" Fancy Stale Bread	51309	10/29	Canada	" "	3
3/1931	" Favourite Standard	51310	9/29	"	" "	3
3/1931	" Forward Volunteer	51311	5/25	Jersey	" "	3
3/1931	" Pallas Jim	51312	11/29	Canada	" "	3
3/1931	" Pilgrim it	51313	6/30	Jersey	" "	3
3/1931	" Royal Rexmore	51314	8/29	"	" "	3
3/1931	" Standard Success	51315	7/30	Canada	" "	3
3/1931	" Welcome Lord	51316	9/29	Jersey	" "	3
3/1931	" Challang- ers Peter Pan	51317	9/29	"	" "	3
6/1933	" Standard Compete	72183	2/32	Canada	G. H. Bell	3

Date of Import -ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Reference (see end of list)
1/1934	Design's Monarch	71784	5/31	Jersey	F. Phillips	3
1/1935	Design's Noble Jester	84585	8/32	"	W. J. Freeth	3
1935+	Rose Marie's Duke	84586	8/32	U. S. A.	W. H. Miers	3
3/1937	Brampton Wonderful Design	94873	8/36	Canada	E. Griffiths	3
4/1937	Successor Champion	94931	8/33	U. S. A.	McMonnies	3
4/1937	Sybil's Star Gamboge	94933	12/29	Jersey	" "	3
1937	Brampton Forward Sultan	95174	10/35	Canada	E. Griffiths	3
4/1937	Coronation Design	95200	1/34	U. S. A.	Wright Stephenson	3
4/1937	Hatherleigh Boy	95201	3/33	Jersey	" "	3
4/1937	Socurette Fern Oxford	95202	11/34	U. S. A.	" "	3
5/1937	Gamboge Flashlight	94926	8/34	"	McMonnies	3
5/1937	It's Arkona's Viscount	94927	6/31	Jersey	" "	3,4
5/1937	Noble's Design	94928	2/35	U. S. A.	" "	3,4
5/1937	Nobly Born Sybil Sultan	94929	1/34	"	" "	3,4
5/1937	Royance Papaver	94930	7/32	"	" "	3,4
5/1937	Susie's Oxford Design	94932	8/34	"	" "	3,4
8/1937	Bravo Nice Lad	95270	9/32	"	Wright Stephenson	3
8/1937	Dreaming Joker	97070	1/36	Jersey	H. S. Fleming	3
11/1937	Brampton Dreaming Royal	106860	8/36	Canada	E. Griffiths	3
1938	" Rockmount Standard	100933	9/35	"	A. Hazelton	3
3/1938	Lobilia Palantine Sultan	100824	2/37	U. S. A.	Wright Stephenson	3

Date of Import -ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Reference (see end of list)
7/1938	Bright Dracom's Royal	103169	8/37	U. S. A.	F. Phillips	3
7/1938	Major Sybil's Design	108125	4/38	"	Wright Stephenson	3
9/1938	Sylva's Golden Dreamer	101348	2/38	"	J. & G. W. Dobson	3
10/ 1938	Brampton Est- ella's R. R.	101433	11/37	Canada	E. Griffiths	3
10/ 1938	" Good Design	101584	5/37	"	G. H. Bell	3
10/ 1938	" Favourite Jester	101697	3/38	"	E. Griffiths	3
10/ 1938	" Flora Standard	108414	10/37	"	N. Z. Loan & Mercantile Agency	3
7/1939	" Basileus Standard	108792	12/38	"	E. Griffiths	3
8/1940	Blonde's Gold- en Rod Design	112979	8/39	U. S. A.	Wright Stephenson	3
8/1940	Fillpail Oak- land Star	112980	9/38	"	" "	3
8/1940	Franchise White Aim (Jr.)	112981	8/39	Jersey	" "	3
8/1940	" Wonderful Aim (Jr.)	112982	10/38	"	" "	3
8/1930	Golden Fran- chise Aim	112983	8/39	"	" "	3
8/1940	" Golden Rod's Blonde Design	112984	7/35	U. S. A.	" "	3
8/1940	Kahoka's Majesty	112985	11/37	"	" "	3
8/1940	Muriel's Dreaming Royalist	112986	11/38	"	" "	3
8/1940	Royalist Dreaming Lad	112987	2/39	"	" "	3
8/1940	Design's Little John	121067	8/40	Jersey	" "	3,4
9/1940	Majesty's Success	121077	8/39	U. S. A.	" "	3,4

Date of Import-ation	Name	N.Z.J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Reference (see end of list)
10/ 1940	Brampton Checkmate Crown	113543	7/39	Jersey	Wright Stephenson	3,4
1940	Sybil Baronet Rover	121079	1/40	U.S.A.	" "	3,4
1941	Prideful Masterpiece	121073	11/40	"	" "	3,4
7/1941	Link's Golden Count	121076	9/40	"	" "	3,4
11/ 1941	Bindle Crystal Star	121063	11/39	"	" "	3,4
11/ 1941	Bindle Royal Hope	121064	3/30	"	" "	3
11/ 1941	Blonde Bess Masterpiece	121065	9/40	"	" "	3
11/ 1941	Blonde's Eminent Design	121066	4/39	"	" "	3
11/ 1941	Fillpail's Beau Aim	121068	10/40	"	" "	3
11/ 1941	" Bright Blonde	121069	9/39	"	" "	3
11/ 1941+	" Standard Design	121070	9/39	U.S.A.	" "	3
11/ 1941	" Wonder Design	121071	10/40	"	" "	3,4
11/ 1941	Franchise Royal Aim	121073	9/40	"	" "	3,4
11/ 1941	Imported Franchise Wonder Peer	121074	8/39	Jersey	" "	3
11/ 1941	Gauntlet Oxford Design	121075	8/38	U.S.A.	" "	3,4
12/ 1941	Franchise Pioneer	121072	10/39	Jersey	" "	3,4
1947	Rush's Noble Designer	164228	8/46	"	J. Aschdale	3,4
1947	Ever Good's Rush's Grandson	164453	1/42	"	G. Walker	3
1947	Jester of Highfields	164785	8/46	"	W.S. McEwen	3
6/1949	Franchise Rex	172522	4/37	"	Wright Stephenson	3

Date of Import -ation	Name	N.Z.J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Reference (see end of list)
6/1949	Grandes Rues Designer	172625	9/47	Jersey	Wright Stephenson	3
1949	Oxford Lad of Highfield	177087	7/48	"	Lancaster	3
6/1949	Another Dreamer	177109	12/47	"	Wright Stephenson	3
6/1949	Chum of Le Catelet	177110	3/48	"	" "	3
6/1949	Curly White	177111	2/48	"	" "	3
6/1949	Design Rush King	177112	7/47	"	" "	3
6/1949	Fair Field Founder	177113	5/47	"	" "	3
6/1949	Haute Vue Ruby Raja	177114	9/47	"	" "	3
6/1949	Jester's Aim	177115	4/47	"	" "	3
6/1949	Les Vaux Farm Cracker	177116	9/47	"	" "	3
1949	Liberator of Highfield	177117	9/47	"	" "	3
6/1949	Louise's Draconian	177118	7/47	"	" "	3
6/1949	Nanic's Draconian Climax	177119	2/48	"	" "	3
6/1949	Reprived	177120	11/47	"	" "	3,4
6/1949	Vain Jester	177121	4/48	"	" "	3,4
1949	Highfield Danial	177402	6/48	"	G. Walker	3,4
1949	Dreaming Cardiff Bowler	173317	5/45	"	Wright Stephenson	3
1950	Brampton B.P. Sere Nader	180829	1/48	Canada	E. J. Clough	3
1950	Beaupre Jester	187662	4/48	Jersey	Wright Stephenson	3,4
1950	Check Maid's Victorious Dreamer	187663	2/49	"	" "	3,4
1950	Dan of Merryvale	187664	8/48	"	" "	3,4
1950	Fairfield Victor	187665	11/48	"	" "	3

Date of Import -ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by		*Reference (see end of list)
1950	Fanny's Dreaming Boy	187666	8/48	Jersey	Wright	Stephenson	3
1950	Green Ville Ginger	187667	4/49	"	"	"	3,4
1950	Hussy's Dreaming Designer	187668	1/49	"	"	"	3,4
1950	La Goville Dreamer	187669	4/49	"	"	"	3
1950	Lone Girl's Designer	187670	4/49	"	"	"	3
1950	Lynn's Stand-ard Lad	187671	3/49	"	"	"	3
1950	Margareth's Designer	187672	3/49	"	"	"	3
1950	Oak Born Cute Draconian	187673	8/49	"	"	"	3
1950	Rochette's Rex 2nd	187674	4/49	"	"	"	3
1950	Winsome Lad	187675	1/48	"	"	"	3
1950	Pivot of Oaklands	187676	11/48	"	"	"	3

+   Estimate only of date of importation.

*   (Reference)

1.   New Zealand Herd Books published by "The Canterbury Agricultural and Pastoral Association".

2.   Jersey the Symbol of New Zealand published by "The New Zealand Jersey Cattle Breeders' Association".

3.   Jersey Herd Books published by "The New Zealand Jersey Cattle Breeders' Association".

4.   Original Certificates as held by "The New Zealand Jersey Cattle Breeders' Association".

5.   New Zealand Farmer and the Stock Breeder (December 1898).

LIST OF IMPORTED COWS 1862-1950

Date of Import-ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Refer-ence
1862	Lusy	-	-	Jersey	Thos. Syers	1
1862	Duchess	-	-	Jersey		2
1878+	Peggy	-	-	-	H.P. Hill	3
1878+	Lady Harriat	-	-	-	-	3
1878+	Empress of Indies	-	-	-	-	3
1879+	Primrose	-	-	England	-	1
1880+	Lady Harris	-	-		-	1
1880+	Silky	-	-	Jersey	-	1
1880+	Fame	-	-		H.P. Hill	
1881+	Fill-Pail 1st	-	-	Australia	Bluiett	1,2,3
1881+	Orange Rose	-	-	Jersey	J. McChosh Clerk	3,(Reg. Bull.15
1881+	Favourite	-	-	-	-	1,(Reg. Bull.8)
1882+ or before	Dairy Maid 1st	-	-	-	-	1,3
1882+	Mulburry 1st	-	-	England	H.P. Hill	3
1882+	Lady Bountiful	-	-	Jersey	J. McChosh Clerk	1
1882+	Jersey Lily	-	-	Australia	J.G. Bluiett	
1882+	Fawn	-	-	-		3,1
1882+	Gurnsey	-	-	-	H.P. Hill	3
1882+	Jersey 1st	-	-	-	-	3
1882+	Montalto Fawn	-	-	-	-	1
1884+	Fuss 2nd	-	-	-	-	1
1885+	Princess	-	-	-	-	1,3
1885+	Rose	-	-	-	-	1,3
1885+	Buttercup	-	-	-	-	3
1886+	Mulberry	-	-	-	H.P. Hill	1,3
1891	Sweet Pea 3rd	60	11/93	Jersey	C. Day	3
1893+	Magnet	-	-	Australia	-	3
1893+	Ohio Fancy	-	-	-	-	3
1894	Eileen	504	8/91	Australia	A. Hodgkin-son	3

Date of Import-ation	Name	N.Z.J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Refer-ence
1894	Neat Irene	605	8/93	Australia	Willis Bros.	3
1895+	Lady Barone	-	-	-	-	4
1895+	Camelia $\overline{VI}$	-	-	-	-	3
1895	Flower girl	1982	9/93	Australia	A.B. Monro	3
1897+	Sardinia	-	-	-	F.A. White	3
1900	Milk Maid 21st	101	12/98	Australia	-	3
1900	Milk Maid $\overline{XIV}$	251	10/99	Australia	Paul Hunter	3
1901	Pencarrow's Queen	50	1900	U.S.A.	-	3
6/1901	Exile's Camon-ica	39	3/99	U.S.A.	-	3
1/1903	Cherry's Countess	172	1/01	England	F.L. White	3
1/1903	Fury	174	12/00	England	" "	3
1/1903	Little Jessie	176	7/01	England	" "	3
3/1903	Viola's Duchess	177	1/03	England	" "	3
1903+	Claribelle	388	8/02	-	-	3
9/1904	Clementine $\overline{IV}$	275	2/04	Australia	J.A. McCrea	3
9/1904	Werribee Aster	280	6/03	"	" "	3
9/1904	Sabeam $\overline{II}$	279	10/03	"	" "	3
1905	Annabelle	511	7/04	"	Paul Hunter	3
6/1906	Melia Ann's Pride	862	4/05	U.S.A.	E. Griffiths	3
6/1906	Melia Ann's Maid	988	10/05	"	" "	3
1/1906+	Coral 333	2486	9/02	Australia	N.Z. Dept. of Agric. Ruakura	3
1/1908+	Hecla's Pride	2183	2/06	"	A.C. Jones	3
1909+	Soumise Lily	853	6/07	Jersey	Chas. Goulter	3
1909+	Tree Grove Lady	905	2/07	England	S.R. Lancast-er	3
1909+	Salvadora	1111	5/07	"	Geo. Gould	3
1909+	Vanilla	1115	3/07	"	" "	3
1909+	Mabel of Concord	1994	8/07	Australia	J. Hall	3

Date of Import -ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Refer- ence
1909+	Sylvanus Sil- ver Locks 1st	1195	/07	Australia	J. Hall	3
1910	Golden flower	1413	5/09	Jersey	Chas. Goulter	3
5/1910	Crystal	1988	6/09	Australia	J. Hall	3
6/1910	Fairy 5th	1989	6/10	"	" "	3
6/1910	Ethelnym	1638	11/05	"	W. J. Hall	3
6/1910	Sheila	1917	9/05	"	W. J. Hall	3
10/ 1910	Lily of Jersey 2nd	1725	1/09	Jersey	C. Goulter	3
1910+	Fladrine	1659	3/09	England	A. Moreland	3, 4
1910+	Prunella	1872	4/09	"	" "	3, 4
1910+	Mary Dean	1993	7/09	Australia	J. Hall	3, 4
1910+	Haxeline	1991	/09	"	" "	3
1910+	Lady Olga	1992	/07	"	" "	3
1910	Fox's Susan	2140	9/08	"	F. Marriner	3
1910+	Miss Terenton VII of Coolangatta	2298	6/07	"	" "	3
1910+	Lady Flora IV	3444	5/05	Jersey	R. D. Harkness	3
1910+	China Aster I	2068	10/08	Australia	F. Marriner	3
1911	May Blossom III	2559	/02	"	Dept. of Agric.	3
8/1911	Mercedes Noble Queen	1774	5/10	Jersey	E. Griffiths	3
1911+	Fairy Chase	1990	7/10	Australia	J. Hall	3
1911+	Bravery	2042	10/10	England	R. G. Lewis	3
1911+	Bridal Vision	2044	10/09	Australia	F. Marriner	3
1911+	Daisy Belle V	2086	9/09	"	" "	3
1911+	Dolly III	2097	10/09	"	" "	3
1911+	Favourite II of Coolang- atta	2130	7/11	"	" "	3
1911+	Ideal fern Brown Fern	2192	11/10	U. S. A.	A. A. White	3
1911+	Ideal fern Girlie	2193	5/09	"	" "	3
1911+	Merry Lass II	2291	11/09	Australia	F. Marriner	3

Date of Import -ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Refer- ence
1911+	Optician's Briton Countess I̅	2330	8/09	Australia	A. C. Jones	3
1911+	Pet I̅V̅	2346	10/09	"	F. Marriner	3
1911+	Primrose I̅I̅I̅	2351	10/09	"	" "	3
1911+	Silver V̅I̅I̅	2402	8/09	"	" "	3
1911+	Vain Glory	2459	3/10	"	" "	3
1911+	Effingham Duchess I̅	2487	7/09	"	N. Z. Dept. of Agric.	3
1911+	Lent Lily I̅I̅I̅	2488	7/09	"	" "	3
1911+	Milk Maid I̅I̅I̅	2489	3/09	"	" "	3
1911+	Bamboo's Maiden	3454	3/10	Jersey	C. Day	3
1911+	Noble Blue	3455	3/09	"	"	3
1911+	Augustine	3614	8/10	"	W. V. Harkness	3
1912+	Lucy's Flower	2807	3/11	"	R. G. Lewis	3
1912+	Spotted Bloss-ina	2808	6/11	"	" "	3
1912+	Rosebud	2809	–	England	" "	3
1912+	Gipsy Jane	2810	1/11	Jersey	" "	3
1912+	Daisy Brown	2811	2/11	"	" "	3
1912+	Queen Ophir	2812	2/11	"	" "	3
1912+	Pretty Lassie	2919	11/11	England	" "	3
1912+	Wastewood Bell	2922	8/11	"	J. R. Corrigan	3
1912+	Castanet	3007	3/11	Australia	H. Cotter	3
1912+	Coquette	3008	3/11	"	" "	3
1912+	Sussi Gamboge	3133	5/11	Jersey	J. Cockwood	3
1912+	White Stock-ing 4th	3134	12/11	"	" "	3
1912+	St. Clair Olinda I̅I̅	3441	12/11	"	J. G. Harkness	3
1912+	La Sargent's Princess	3445	3/11	"	" "	3
1912+	Oakland's Cowslip	3615	4/11	"	W. V. Harkness	3

Date of Import -ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Refer- ence
1913+	Chief Lady	3920	5/12	Jersey	C. Day	3
1913+	Charming Valentine	3921	7/12	England	J. R. Corrigan	3
1913+	Nebudy	3447	12/11	Jersey	R. D. Harkness	3
1914+	Capsium Lady	4888	10/13	"	T. D. Reid	3
1914+	Guenon's Lady II	4889	12/13	"	" "	3
1914+	Edgeley Noble Lily	12696	4/15	Canada	S. R. Lancaster	3
1918+	Rosy Fortuna	12700	6/16	Jersey	" "	3
1918+	Sultan's Ox- ford Wena	22887	8/16	"	G. Birdsall	3
1919+	Cidaline	14854	1/17	"	E. Griffiths	3
1919+	Sant Faluct Rosedrop	22875	8/13	"	G. Birdsall	3
1920+	Mylady Fanny	12697	11/19	Canada	S. R. Lancaster	3
1920+	Raleigh's Cowslip	12698	8/18	"	" "	3
1920+	Raleigh's Empress	12699	9/18	"	" "	3
1920+	Wottan San Daisy	12701	6/19	England	" "	3
1920+	Betty of Pickering	12738	8/18	Canada	R. Hopcroft	3
1921+	High Stead's Dairylike	14413	8/19	Jersey	F. Day	3
1921+	Opal's Bright Jewel	14944	9/19	Canada	S. R. Lancaster	3
1922+	Daisy M. O.	14412	4/20	Jersey	F. Day	3
1922+	Wottan Plush	14945	7/20	England	S. R. Lancaster	3
1922+	Wottan Sand Girl	14946	6/20	"	" "	3
1922+	Donaya	16686	4/20	Jersey	E. Griffiths	3
1922+	Simple Agnes	16687	4/20	"	" "	3
1922+	Xenia's Marion	16688	4/20	"	" "	3
1922+	Xenia Ruby	16689	6/20	"	" "	3
1923+	Blonde's Bowling	16684	4/22	"	" "	3

Date of Import-ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Refer-ence
1923+	Blonde's Ox-ford Victress	16685	5/20	Jersey	E. Griffiths	3
1924+	Sybils Gypsy	20969	4/21	"	" "	3
2/1924	Brampton Farm Sweet Bread	21237	8/21	"	H. E. Martain	3
2/1924	Ida's Lassy	21238	5/22	"	" "	3
2/1924	La Gloire Braza	21239	12/21	"	" "	3
2/1924	La Maibreria's Blonde	21240	12/21	"	" "	3
2/1924	Natalic's Ninette	21241	1/22	"	" "	3
2/1924	Netina's Fair White	21242	6/22	"	" "	3
2/1924	Odd Trick	21243	4/22	"	" "	3
2/1924	Physical Drill	21244	5/21	"	" "	3
2/1924	Ursame Bowlina	21245	4/21	"	" "	3
2/1924	Xenia's Juillette	21246	4/22	"	" "	3
1924	Saut Faluct Rosedrop	22375	5/16	"	G. Birdsall	3
1924+	Cid's Distract-ion Queen	22493	5/21	"	" "	3
1924+	Darling Beauty	21081	7/22	"	S. R. Lancaster	3
1924+	Lady Pansy Dudly	21082	5/22	"	" "	3
1925+	Dairylike's Day Dream	41646	9/22	U. S. A.	E. Griffiths	3
1925+	Raleigh's Cherry Bud	41647	12/22	Jersey	" "	3
1926	Brampton Lily Langtry	37379	7/25	"	J. Chynoweth	3
1926+	Brampton Lady Cowslip	37378	7/25	U. S. A.	" "	3
1926+	Sybil's Majes-ty's Pride	37492	9/24	U. S. A.	T. Williams	3
1926+	The Cid's Flor-ance Princess	41648	6/23	"	E. Griffiths	3

Date of Import-ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Refer-ence
1926+	The Cid's Tidy Princess	41649	10/23	U. S. A.	E. Griffiths	3
1927	Victor's Fern Match	41650	6/24	"	" "	3
1927	Volunteer's Xenia	41651	7/23	"	" "	3
1927	You'll Do Madeira	41652	7/23	"	" "	3
1927+	Cid's Oxford Daisy	51289	4/25	"	" "	3
1927+	Brampton Vol-unteer's Rosebud	53081	5/21	Jersey	" "	3
7/1928	Simon's Fawn	50294	11/27	U. S. A.	F. Phillips	3
7/1928	The Cid Pretty Jane	50295	11/25	"	" "	3
7/1928	Sultan's Fort-unate Combina	50304	11/27	"	W. J. Hall	3
7/1928	Fortunates Pretty Betsy	50336	11/26	"	A. E. Watkin	3
7/1928	Handsome Lady You'll Do	50337	7/27	"	" "	3
7/1928	Oxford Beau's Distinction	50338	8/27	"	" "	3
7/1928	Xenia's Derby Maid	50356	3/25	Jersey	Dr. A. F. R. Crawford	3
7/1928	Masterman's Golden Marie	50877	4/21	"	J. A. Mitchell	3
7/1928	Volunteers April Lady	50878	4/25	"	" "	3
1928+	Brampton Es-letta's Belle	53078	8/27	Canada	E. Griffiths	3
1928+	" Esletta's Magpie	53079	8/27	"	" "	3
1928+	" Fount-ain's Lusy	53080	3/28	"	" "	3
3/1929	Victoria Wat-fern Belle	59081	8/26	Jersey	T. S. Cooper	3
10/1929	Bowlina's Golden	59077	6/25	U. S. A.	" "	3
1929+	" Sweet Cream	59078	10/28	"	" "	3

Date of Import-ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Refer-ence
1929+	Princess Poppy	59080	5/26	Jersey	T. S. Cooper	3
10/1930	Beauty's Star Baby	68614	7/27	"	" "	3
10/1930	Challanger's Miss May	68615	2/28	"	" "	3
10/1930	Cowslip's Objective	68616	6/24	"	" "	3
10/1930	Gamboge's Maj-estic Sybil	68617	9/29	"	" "	3
10/1930	" Oxford 1st Sybil	68618	4/25	"	" "	3
10/1930	" Vally Sybil	68619	5/30	U. S. A.	" "	3
10/1930	Lynn's Nelly	68620	5/26	Jersey	" "	3
10/ 1930+	Poppy's Count-ess You'll Do	68621	4/28	"	" "	3
10/ 1930+	Successor's Oxford Sybil	68622	4/26	"	" "	3
10/1930	Valiant Count-ess You'll Do	68623	5/30	U. S. A.	" "	3
10/1930	You'll Do Count-ess 2nd	68624	5/25	Jersey	" "	3
1931+	Dreaming Oxford Sybil	59679	10/29	U. S. A.	" "	3
3/1931	Bowlina's Volunteer Maid	69849	3/29	Canada	E. Griffiths	3
3/1931	Brampton Fav-ourite Rose	69850	1/30	Jersey	" "	3
3/1931	" Keeper's Belle	69851	3/28	"	" "	3
3/1931	" Lord's Beauty	69852	8/30	"	" "	3
3/1931	" Oxford Rosalie	69853	10/27	"	" "	3
3/1931	" Standard Dream	69854	6/30	Canada	Imported "	*3
3/1931	" Standard Lady	69855	6/29	"	" "	3
3/1931	" Volunt-eer's Lassie	69856	6/30	"	" "	3
3/1931	" Volunteer's Mina	69857	4/24	"	" "	3

Date of Import-ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Refer-ence
3/1931	Book Hall Paulette	69858	5/25	Jersey	E. Griffiths	3
3/1931	Princess Snowdrop	69859	1/26	"	" "	3
3/1931	Sybil's Sweet Lil	69860	1/26	"	" "	3
1947	Velvetized	251876	3/46	"	J. Archdale Irvine	3
1947	Golden Good-ness	252240	1/45	"	G. Walker	3
6/1949	Clair Val Mayflower	275568	5/47	"	Wright Steph-enson	3
6/1949	Homestill Dainty Lass	275567	3/47	"	" "	3
6/1949	Hylglade's Designing Marie	275570	10/47	"	" "	3
6/1949	L'Artific-ielle	275571	5/47	"	" "	3
6/1949	Leonies Spring-flower	275572	5/47	"	" "	3
6/1949	Les Orenes Wonderful Maid	275573	4/47	"	" "	3
6/1949	Liberator's Jean	275574	7/47	"	" "	3
6/1949	Millais Queen	275575	5/47	"	" "	3
6/1949	Nid Solit-aire Design's Dream	275576	10/47	"	" "	3
6/1949	Seafield White Clover	275577	6/47	"	" "	3
6/1949	Secret Beauty	275578	6/47	"	" "	3
6/1949	Snowdrop of Stirling	275579	3/47	"	" "	3
6/1949	Sweet Design's Rush	275580	8/47	"	" "	3
6/1949	Tobour Cherry	275581	7/47	"	" "	3
6/1949	Victorious Dreamer's Who	275582	7/47	"	" "	3

Date of Import-ation	Name	N. Z. J. Herd Book Number	Date of Birth	Country of Birth	Imported by	*Refer-ence
1949+	Lady Anne 8th	276305	6/44	Jersey	Wright Stephenson	3
1950	Dainty Design-ing Kitty	296990	1/48	"	" "	3
1950	La Croix Maharacia	296991	7/48	"	" "	3
1950	Madura's Maharance	296992	6/48	"	" "	3
1950	West Lynn Snowdrop	296993	2/48	"	" "	3
1950	Perruquine	296994	6/49	"	" "	3

+   Estimate only of date of importation.

*

1.   New Zealand Herd Books published by -
"The Canterbury Agricultural and Pastoral
Association."

2.   Jersey the Symbol of New Zealand published
by "The New Zealand Jersey Cattle Breeders'
Association."

3.   Jersey Herd Books published by "The New
Zealand Jersey Cattle Breeders' Association."

4.   Original Certificates as held by the "New
Zealand Jersey Cattle Breeders' Association."

5.   New Zealand Farmer and the Stock Breeder
(December 1898).

N.Z. Jersey Cattle Breeders' Association

(Incorporated 1902)

P.O. BOX 259, PALMERSTON NORTH

NEW ZEALAND

TELEGRAPHIC ADDRESS:

"JERSEY"

OO

TELEPHONE 5634

PLEASE ADDRESS ALL CORRESPONDENCE
TO THE "SECRETARY, N.Z.J.C.B.A."

BULL IMPORTATION STANDARDS.

The following Standards for Imported Jersey Bulls to New Zealand have been approved by the Council, and will be enforced as from 1st June, 1950.

(1) Every application for the registration of an imported Jersey Bull shall be accompanied by an Export Certificate issued by an approved Society, the relevant Export Certificate and the Transfer Certificate from the owner of such animal to the owner applying for registration in the New Zealand Herd Book.   No Imported Jersey Bull shall be accepted for registration unless the following conditions are complied with:-

(a) Classification Qualifications:

Both the Dam and the Sire's Dam must have a classification rating as follows:-

Jersey Island	H. C.
Australia	V.H.C. or H.C.
Canada & U. S. A.	Excellent or Very Good.

(b) Production Qualifications:

Both the Dam and the Sire's Dam must have qualified for production under either of the undermentioned Standards, and have an average test of 5%.

305 Days' Test.				365 Days' Test.		
375	lb	fat	Junior Two-year-olds	420	lb	fat
415	"	"	Senior Two-year-olds	465	"	"
450	"	"	Three-year-olds	500	"	"
480	"	"	Four-year-olds	535	"	"
500	"	"	Mature	560	"	"

N.B.   Where Dams are milked three times daily this must be stated and for converting such records to twice-a-day milking the conversion factor .83 will be used.

(c) The N.Z. Jersey Cattle Breeders' Association reserves the right to inspect all Imported Jersey Bulls and refuse for acceptance into the Herd Book any animal showing apparent defects in conformation, emphasis being placed upon the particular defect of undershot Jaw, or shark-mouth.

The Council of the New Zealand Jersey Cattle Breeders' Association shall at all times have an absolute discretion to vary any of the foregoing importation regul-- ations, if in the opinion of the Council exceptional circumstances prevail in the Country from whence animals are imported and that such circumstances in the opinion of the Council make it expedient in the general interest of the Jersey Breed in New Zealand that the said regulations should be varied.

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FEMALE IMPORTATION STANDARDS.

The following Standards for Imported Jersey Females to New Zealand have been approved by the Council and will be enforced as from 1st June, 1950.

(1) Every application for the registration of an Imported Jersey Female shall be accompanied by an Export Certificate issued by an approved Society, the relevant Export Certificate and the Transfer Certificate from the owner of such animal to the owner applying for registration in the New Zealand Herd Book. No Imported Jersey Female shall be accepted for registration unless the following conditions are complied with:-

    (a) Classification Qualifications:

Jersey Island	H. C.
Australia	V.H.C. or H.C.
Canada & U. S. A.	Excellent or Very Good.

Any Imported female not classified in the Country from whence exported must be inspected and approved by an Official Inspector of the New Zealand Jersey Cattle Breeders' Association, prior to acceptance in the Herd Book.

    (b) Production Qualifications:

AVERAGE TEST. 5%

305 Days' Test.				365 Days' Test.		
300 lb fat		Junior Two-year-olds		330 lb fat.		
310	" "	Senior Two-year-olds		340	"	"
340	" "	Three-year-olds		370	"	"
370	" "	Four-year-olds		410	"	"
410	" "	Mature		450	"	"

For untested Imported Jersey Female Cattle under the age of three years, the Dam must comply with both the Classification of Type and Butterfat Production record standards as set out above.

    (c) The N.Z. Jersey Cattle Breeders' Association reserves the right to inspect all Imported Jersey Female Cattle and refuse for acceptance into the Herd Book any animal showing apparent defects in conformation, emphasis being placed upon the particular defect of undershot Jaw or shark-mouth.

The Council of the New Zealand Jersey Cattle Breeders' Association shall at all times have an absolute discretion to vary any of the foregoing importation regulations, if in the opinion of the Council exceptional circumstances prevail in the Country from whence animals are imported and that such circumstances in the opinion of the Council make it expedient in the general interest of the Jersey Breed in New Zealand that the said regulations should be varied.