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By Frank Fraser Darling.

STUDIES

IN

THE BIOLOGY OF THE FLEECE

OF THE

SCOTTISH MOUNTAIN BLACKFACE

BREED OF SHEEP

---ooOoo---

"In the same fleece, diversity of wool
Grows intermingled, and excites the care
Of curious skill, to sort the several kinds."

THE FLEECE -- John Dyer, LL.B. 1757.

Scottish Mountain Blackface Shearling Rams.

Plate I.

a.

b.

a. Scottish Mountain Blackface Ewe.
b. Scottish Mountain Blackface Ram Lamb.

Plate II

C O N T E N T S

INTRODUCTION

Improvement of the fleece of the Scottish Mountain Blackface breed of sheep is of urgent necessity to sheep owners, although the desirable expression of such improvement is a matter upon which opinion is far from unanimous. However, before any policy can be followed with reason or confidence, a wide but detailed knowledge of the nature and composition of the Scottish Blackface fleece is necessary.

Literature concerning the Blackface fleece is scanty. Crew and Blyth (1) described the types of fibre to be found in the lamb fleece. Blyth (2) gave the results of a micrological examination of the three types of fibres in the fleece, and A. F. Barker (3) wrote on the weight analyses of staples from two Blackface rams. Articles of a popular nature dealing with the Blackface sheep, or with wool in general, make scant mention of this fleece and are not helpful.

The present work was begun in the autumn of 1928. It seemed that a knowledge of the observable facts of the Blackface fleece, biological and environmental, should be obtained. The questions arose:- How does this fleece differ from those of other types of British sheep? What kinds of fibres constitute the staple? In what proportions do they occur and is there marked differentiation in

different areas of the body? Are these proportions stable, or do they alter with age, season, or sex? What effect has geographical situation on each or any of the constituent classes of fibres in the fleece?

This thesis treats the fleece of the Scottish Blackface as a biological population and some account is given of the distribution of the different fibre classes, -- which are described throughout as wool, long hair, and kemp -- of their differential movement due to season and age, i.e., of the stability or variability of the proportions of the fibre types, and of the inferences which may be drawn from the data collected. In addition, guarded speculation has been made with regard to the future of Blackface wool as an export commodity. A short history of the breed is given, making particular reference to the fleece.

Data are presented of the analyses of four staples from each of:-

23 Ram lambs, aged approximately 6 months.

60 Shearling rams, aged approximately 1 year 6 months.

29 Two-shear rams, aged approximately 2 years 6 months.

17 Three-shear rams, aged approximately 3 years 6 months.

10 Four-shear rams, aged approximately 4 years 6 months.

11 Aged rams.

40 Ewe-hoggs,[x] aged approximately 1 year,

one hundred and ninety individuals in all. In addition, periodical analyses were made of shoulder staples from a Blackface ram, and thirteen samples from different areas of the body of another ram were analysed.

Photographs of a typical staple of Blackface wool and of the constituent portions, as well as of wools of similar character are appended. The samples analysed have been filed in the manner described on p./2 and labelled for reference, at the Animal Breeding Research Department of the University of Edinburgh.

[x] Only two samples were taken from 36 of the ewe-hoggs.

A SHORT HISTORY
OF THE
SCOTTISH MOUNTAIN BLACKFACE BREED

The origin of the Mountain Blackface type of sheep in Britain is not known, but it is probable that the breed is not indigenous to this country. At the time of the Roman invasion, through Saxon times, and during the reigns of the early Edwards, when Britain was renowned for her soft wools, the Blackface type of sheep is not mentioned. Macmillan (4) says that black faced sheep were in the valley of the Esk in 1460, but he does not give the source of his information*. Youatt (5) gives James IV. of Scotland the credit for their introduction into the Forest of Ettrick early in the sixteenth century.

The Spanish Armada, which is often called upon to provide an origin for the introduction into this country of breeds of livestock with obscure histories, has been suspected of bringing the first Blackface type of sheep to our shores. Unsupported as this speculation may be by definite evidence, it is significant that the sheep of the Western Pyrenees, near the Atlantic seaboard, are distinctly of the Blackface type and the wool of these sheep is almost indistinguishable from that of the Scottish Blackface (see Plate VII.)

* Probably Hector Boethius.

However, the Scottish Blackface breed, the most carefully developed of the several breeds of the Mountain Blackface type, probably found its way into Scotland from Northern England, and Low (6) gives credence to this view. In early days it was probably more local in its distribution than at present, and opinions were sharply divided as to its merits over the rival Cheviot. For example, James Hogg in his autobiography alludes to the Blackface as "That curse of the community of the Ettrick "Forest, the original blackfaced breed." During the eighteenth century, when stock husbandry in the Highlands changed so dramatically from cattle to sheep production, it was the Blackface breed which populated the northern hills in a very few years, reaching even to the outer islands. Sir Archibald Sinclair of Ulbster, that indefatigable champion of fine wooled sheep, looked with horror upon the Blackface creeping northwards,- "these shaggy fierce creatures", as he called them in 1791,- and it is due very considerably to his early efforts that the Cheviot and Border Leicester are now so common in Sutherland and Caithness.

There is no doubt that the breed reaches its highest expression in the hills of Southern Scotland, and in the early days of Blackface activity the breed was alluded to as the Linton breed, from the village of West Linton at the foot of the Pentlands (20).

An idea of its excellent mutton conformation was conveyed in the expression of "short sheep" which was given to the Blackface in everyday language.

The wool of this breed, although of somewhat secondary commercial consideration, has received great attention in certain directions at the hands of the breeder. The price of the wool has been consistently low. The sheep breeder looks upon the fleece of the Blackface as being an ideal covering for an animal in a cold wet climate. The presence of hair longer than the wool in the fleece serves excellently to shed rain. This character has been jealously retained in the breed and the fleece has received the breeders' attention in so far as the development of this type of coat is concerned. For example, many individuals are noticeably deficient in the covering of the withers and a good depth of wool and hair on this area is a characteristic much sought after in rams, and is one which may be responsible for a considerable difference in price of two animals otherwise equally good. Obviously, if the withers are not well covered, excellence in rain-shedding quality of the covering of the shoulders and ribs is almost worthless. The tendency of the breed to grow a woolly forelock and wool on the legs, known collectively as "muff," has been checked to a considerable extent, especially in the flocks south of the Forth, since woolliness of

the legs detracts from the ability of the sheep to move freely in snowy weather. Similarly, snow freezing on a heavy forelock is apt to obscure the vision.

It will be understood therefore, that the Blackface fleece has received attention, almost purely, in so far as it affected the physical well-being of the sheep. However, during the latter half of the nineteenth century, when the trade in Blackface wool for carpet manufacture had become firmly established, some of the Lowland breeders, notably Charles Howatson of Glenbuck and the Cadzows of Borland, observed the possibility of developing extraordinarily the long hair of the fleece, which produced at once a fleece of greater weight and of greater value for carpet making. The showyard developed this as a fashion and fixed it, though a small number of breeders north of the Forth still preferred the medium length, more woolly fleece. This tendency to produce a very long harsh fleece reached a zenith in the decade before 1914, when staples of twenty to twenty-four inches in length were common in shearling rams prepared for the sales and shows. Such an exaggeration, however, tended to produce an animal unfitted for a free hard life on the heather hills, owing to the mechanical difficulty of free movement over rough country and in snowy weather with such a fleece.

It was found too, that the lambs of long-wooled ewes had difficulty in reaching the udder when very young.

Even at the height of the long harsh staple fashion, there were those who realised that Blackface wool was finding a more and more specialised market and the feeling that a modification of the fleece was necessary in order to increase the outlets (and consequently the price) for Blackface wool is exemplified in the proposal of Mr. Archibald Mitchell of Clockeil to the Highland and Agricultural Society in 1903, to offer a premium for a new dress material composed largely of Blackface wool (7).

The advent of the Great War served as another check to the perpetuation of abnormally long harsh fleeces. At this time an embargo was imposed on the export of British wools and the Blackface breeders found their market almost wholly cut away. Letters to the Highland and Agricultural Society (8) asked why Blackface wool could not be used for the manufacture of blankets and military clothing. It was inadequate for this purpose, except some of the softer fleeces from the Highlands and West of Scotland. Although the embargo, as far as it affected Blackface wool, was lifted subsequently, it had served to point out a moral and after the War the breeders concentrated on growing a strong fleece of reasonable length. Such fleeces are numerous, but the wool of the breed as a whole shows far

greater variation than is desirable. Further mention of this variation and the presence of kemp will be found elsewhere. (p.41)

Blackface wool was exported formerly to America and many Continental countries, but since the War, the bulk of the annual clips has gone to Italy and America. In addition, Britain uses Blackface wool in her small carpet industry. A recent development is the use of Blackface wool in mattress making in Italy and Czecho-Slovakia.

The modification of the Blackface fleece by cross-breeding has been the subject of several experiments in the past. In each instance, the quality of the mutton or the high degree of hardiness of the Blackface has been deficient in the crossbred animal. Improvement by selection within the breed, principally in the direction of the elimination of kemp and black spots from the fleece, appears to be the accepted policy of both scientist and breeder at the present time. Other modifications are the subjects of controversy.

TECHNIQUE

For the purposes of these analyses it was considered necessary to ascertain at which points on the sheep's body it would be possible to cut four staples affording a representative idea of the nature of the individual fleece for comparison with others. Staples were cut from thirteen loci on a Blackface shearling ram, six months after shearing, and examined in the manner to be described. The areas of the body from which samples were taken are indicated in Figure I., p. 13 . Beneath is Table I. giving the results of the analyses of the staples. From a perusal of these analyses, it was decided that the continuance of usual practice, namely, taking one sample from each shoulder and one from each haunch would meet requirements. The close similarity of samples 2., 3., 4. and 5. (see Figure I) indicates that a sample from the point of the shoulder is fairly representative of a large area of the fore quarters of the sheep and if one shoulder sample tends to be abnormal, the defect in sampling may in some measure be compensated by the staple taken from the other shoulder. A higher degree of irregularity is noticeable in the analyses of the staples from the hind quarters. The fact that a greater amount of wool may be observed in the covering of the neck, and a higher proportion of hair and kemp in the samples from the hock and tail loci, than in the

shoulder and haunch areas respectively, does not detract from the value of the shoulder and haunch as representative sampling points, for the relative area which they serve for sampling is very much greater than the area which the neck, hock and tail represent.

The staples of a Blackface fleece are usually separate from each other from the skin to the tips, except during the few weeks before clipping, and it is easy to locate the points of the shoulders and haunches in order to choose a representative staple of approximately one thousand fibres without pulling, breaking, or disarranging the component fibres in any way. The staples were cut as close to the skin as possible and by one cut of the scissors, otherwise a large number of severed fragments of fibres would have hindered the subsequent analyses.

The staples were separated and counted on black velvet by drawing out the longest fibres, the long hairs, first, which could be laid aside usually in toto before counting the wool fibres. When most of the wool fibres had been counted, the kemps were removed so that the shorter and finer wool fibres could be disengaged and counted. Drawing out the fibres was accomplished most easily from the distal end of the staple and ten or twenty fibres could be drawn at once. Only the kemp and shorter wool fibres needed single attention. The three portions of the staple were weighed and the percentages by

count and weight of each fraction calculated to the nearest 0.5 of 1.0 per cent. The samples were filed by placing the component portions in folders designed for this work, consisting of black unglazed paper, approximately foolscap size, folded as represented in Figure II. Reference numbers and notes were written on the flap in white ink. The object of using this type of folder was to demonstrate easily and rapidly small samples of wool against an appropriate background.

Analyses of Staples from Different Areas of the Body.

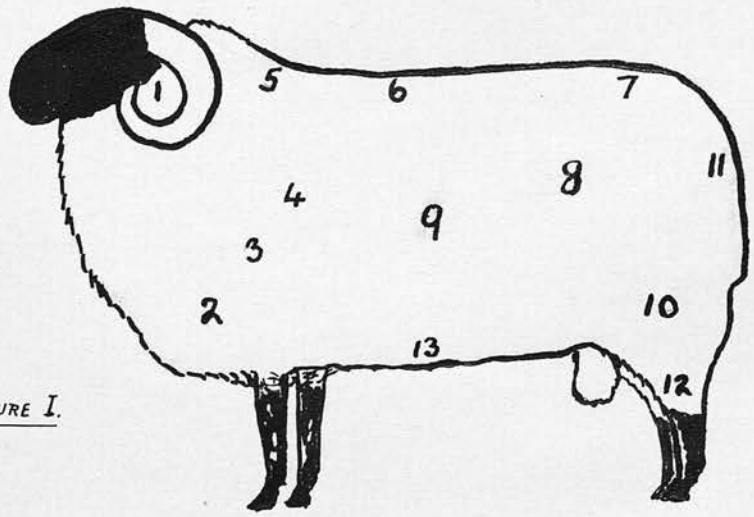


Figure I.

Table I.

Sample	Count Per Cent.			Weight Per cent.		
Number	Wool.	Long Hair.	Kemp.	Wool.	Long Hair.	Kemp.
1	78·00	19·50	2·50	28·50	68·50	3·00
2	73·25	23·25	3·50	33·50	63·50	3·00
3	71·50	25·00	3·50	25·75	71·25	3·00
4	73·00	23·50	3·50	33·50	65·00	1·50
5	74·50	23·00	2·50	33·00	65·50	1·50
6	70·00	16·00	14·00	43·50	48·75	7·75
7	70·50	25·50	4·00	32·50	65·00	2·50
8	61·50	22·50	16·00	28·00	59·00	13·00
9	64·00	33·50	2·50	20·00	78·00	2·00
10	66·50	27·00	6·50	18·00	74·50	7·50
11	47·75	37·00	15·25	17·00	75·00	8·00
12	47·00	37·50	15·50	18·50	75·50	6·00
13	Sample Too Tangled to separate, but contained considerable Kemp and no long hair					

METHOD OF FOLDING PAPERS FOR FILING SAMPLES OF WOOL.

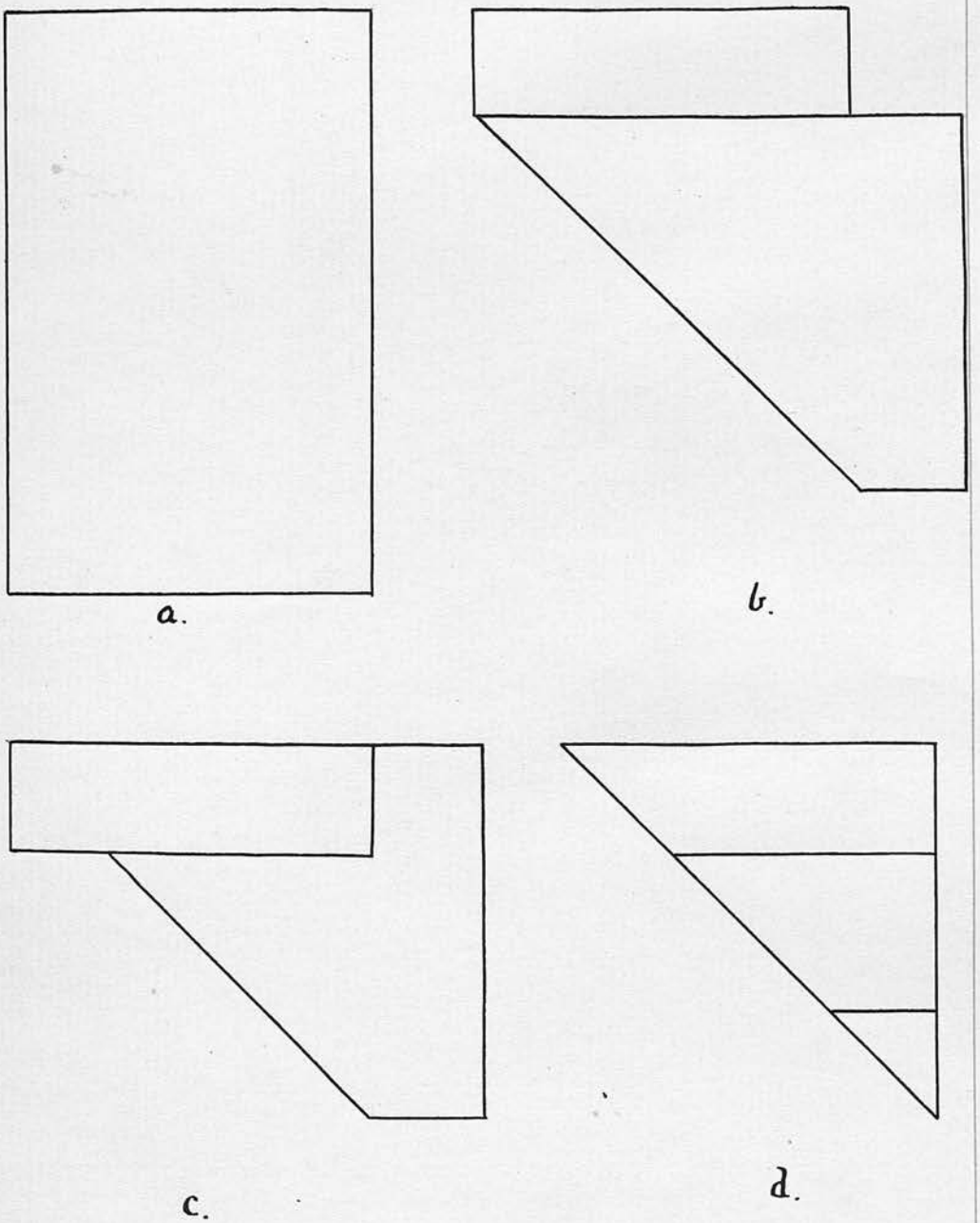
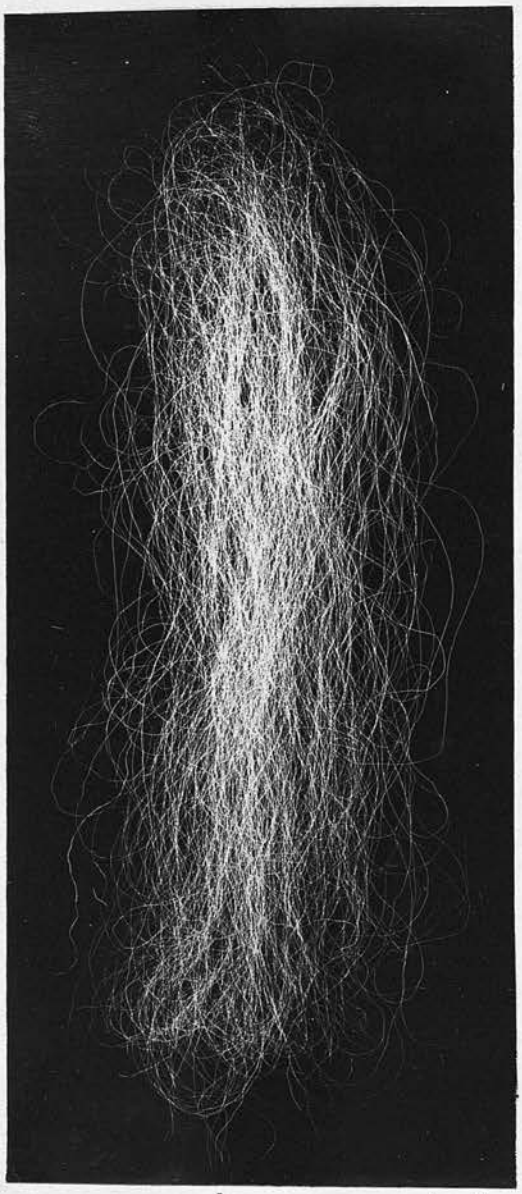


FIGURE II

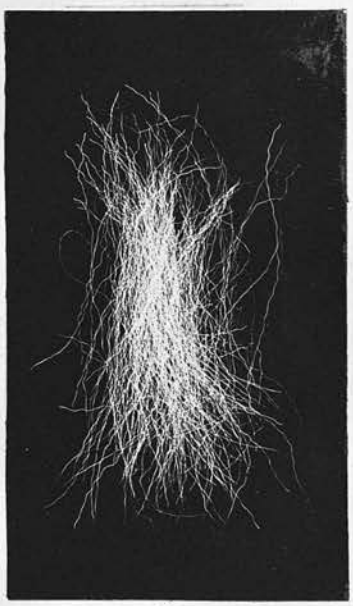
HALF NATURAL SIZE.

A SHOULDER STAPLE OF WOOL FROM A BLACKFACE RAM.

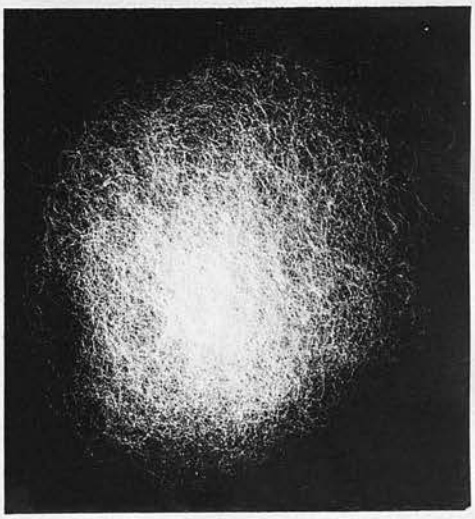
PLATE III.



b.



c.



a.

HALF NATURAL SIZE.

THE THREE COMPONENTS OF THE BLACKFACE FLEECE.
ANALYSIS OF STAPLE SHOWN IN PLATE III.

a. WOOL.
b. LONG HAIR.
c. KEMP.

PLATE IV.

THE COMPOSITION AND CHARACTERISTICS OF THE BLACKFACE FLEECE.

On the Blackface sheep, the fleece appears as a bulky, long, rather open covering of staples tapering obviously to the distal end. Until about two months before shearing time these staples are separate from each other from the tip to the wider proximal portion. During February and March for rams and somewhat later for ewes, the discrete nature of each staple becomes lost in the great majority of individual animals. Numerous crossing fibres, chiefly wool, are found passing proximally from one staple to those adjacent. These seem to bind the innermost portions of the fleece into a more or less coherent whole.

If some staples are cut from the fleece and examined it will be found that there are three distinct types of fibre in the fleece: these are:-

1. Fine wool fibres, irregularly crimped, of varying length, usually very lustrous and generally of between 48's and 56's British Wool Count, or even higher. A feature of this fine wool is its extreme softness, which in many individuals is only equalled by the best class of Shetland wool. The fibres are not medullated and have no peculiar histological structure to distinguish them from many other wool fibres.

They are occasionally pigmented and if so are coloured along their whole length. This fine wool is an annual growth, being shed in the spring months.

2. Long, straight, hair-like fibres, very much thicker than the wool fibres in the same staple and invariably longer. These fibres are medullated and some examples show heterotypic growth, i.e., a kemp-like tip, a straight hair-like middle portion, and an almost woolly proximal end. Duerden (9) has described these latter fibres at some length. The occurrence of some distinctly heterotypic fibres in this class does not merit the whole group being given the name of heterotype. The majority are not heterotypic and their best description is long hair-like fibres. For the sake of brevity they are alluded to throughout this thesis as "long hairs", though this short description does not imply that they are to be unreservedly called hair in the generally accepted sense of the word. Neither are they to be confused with the short hair of the face and legs. It is curious that to find pigmented long hair-like fibres is an exceptional occurrence, unless there is a definite black patch in the fleece. In each staple the long hairs are of almost regular length. After shearing, the long hairs grow faster than the wool fibres and they are of continuous growth, not being shed annually as the wool fibres. The long hairs are frequently lustrous, except at

the tip, which usually becomes weathered and brittle.
3. Stiff, short kemp fibres, sharply pointed at the tip. These fibres may be straight, or uniformly waved in one plane. They are widely medullated, and having a strong refractive quality (probably owing to the air content of the medulla) appear much whiter than the other fleece fibres. The kemp may be white, black, brown, or parti-coloured. Considering the large amount of literature describing the nature of kemp (10, 11., 12., 13., 14.) it is unnecessary to describe these fibres in further detail, except to add that kemp appears to grow in the early spring months and to be shed in late autumn.

Each staple of the fleece is strongly individualistic. Some fleeces are found where staples differ in length very markedly even when adjacent.

A detailed description of the structure of the fibres of the Blackface fleece is given by Blyth (1).

Biologically, the Blackface fleece is a natural type of sheep's covering artificially exaggerated by man. In most wool breeds the aim has been to eliminate hair-like fibres and kemp from the fleece and produce an even length of wool; not so, however, in the Scottish Blackface. The long hair fraction has been developed, and the kemp -- which according to Ewart (15), Duerden (16) and

others may be the remains of the primitive hair of the wild sheep -- has not been eliminated completely. It is not possible to state whether the long hairs of the Blackface fleece are in any way represented in the fleece of the wild sheep, whether they may be analogous to the intermediate fibres of Ovis vignei described by Crew and Blyth (17), or whether they may be these fibres modified and elongated by selection or evolution. These possibilities have not been lost sight of during this investigation, but no contributory proofs have been advanced.

From the standpoint of the biologist and physiologist, a study of the Scottish Blackface sheep and its fleece should provide excellent material for the ultimate discovery of facts concerning the mechanism governing the growth of the different types of fibre.

Geographical differentiation. An interesting study is provided by the different kinds of Blackface fleeces which are typical of certain districts. At once the question arises: Are such differences the effect of genetic constitution or of environment? It is probable that both of these factors are responsible.

In Lanarkshire the strongest type of fleece is produced, which means really that the long hairs reach their greatest development on the sheep in this district. If wool fractions from Highland or

Western areas were placed alongside wool fractions from Lanarkshire, it would not be easy to differentiate between the two groups. It is the long hair which expresses the character of the fleece as regards the several well known market types. In Peeblesshire the fleeces are slightly softer than in Lanarkshire, but in the south-west of Scotland they are markedly so, and the clip from this area constitutes a distinct market type. Blackfaces in the Rhinns of Galloway grow a softer fleece still and the long hairs are not nearly so well developed. This type of fleece prevails in the Western Highlands and Islands and it is from such that Harris tweed and similar coarse clothing materials are made. In the Central Highlands the fleeces are a little stronger than in the West, whilst in southern Perthshire and in Stirlingshire the coats are verging on the softer Peeblesshire and Dumfriesshire types of fleeces. In Angus and the few parts of Fife where Blackfaces are kept, the fleeces are strong and similar to the Lanarkshire ones.

It is worthy of mention that the hard type of fleece praised for its rain-shedding qualities is the type which cannot be grown in those parts of Scotland where the rainfall is highest.

The Highlands and western grazings are constantly importing rams from the Lowland hills to improve or maintain the quality of the fleeces

from such farms, i.e., the quality as judged by Blackface breeders. This seems certainly to be effectual in the first generation, but unless rams from the South are constantly used, the fleeces soon revert to the soft characteristic type of Blackface wool from such areas. These facts indicate that environment plays a very important rôle in the character of the fleece.

THE DIFFERENTIAL GROWTH RATE AND SHEDDING PERIODS OF THE FIBRE TYPES.

The three fibre classes have strongly individualistic habits of growth which are of interest. To obtain the results displayed in Table II., a staple of wool from the point of the right shoulder of a shearling Blackface ram was cut on the first day of each month from July 1st 1929 to May 1st 1930 inclusive. The ram was shorn to within half an inch of the skin on May 9th 1929, and he was chosen for this investigation mainly because of his previous capacity to grow an even length of staple. The samples were analysed in the manner described under "Technique" p. 10 . In addition, the lengths of two hundred wool fibres from each staple and one hundred long hairs were measured in centimetres. In this particular ram kemp did not appear in the shoulder area. The manner of random sampling was as follows:- As the wool fibres were drawn from the staple for counting they were laid on the velvet approximately in order of length, down to the very shortest and finest fibres. The sample was rolled up, from the fine short fibres passing to the coarser long wool ones, with the help of a needle held in each hand. The "roll" was then halved by the needles along the direction of the

fibres. One half was then equally divided and a quarter of the original sample became available for measurement - see Figure III

"Rolled" Sample in Cross Section.

FIGURE III

Occasionally a few fibres had to be drawn from or returned to the remainder of the sample to make up the number of two hundred fibres. The monthly count and weight percentages have been plotted on Graphs I&II p. 28 . Graphs IIIa and IIIb p.29 show the frequencies of the various lengths of the two fibre classes from month to month. The means of the monthly fibre lengths are indicated in Graph IV p.30.

Plate V. represents the first sample taken for examination on July 1st 1929. It was apparently very "kempy" and it was difficult to see from a casual examination of the fleece that there was any wool present at all. A detailed examination of one staple, however, showed that fine wool fibres were present close to the skin. The explanation of the extreme harshness of the other fibres is as follows:-

The wool portion of the fleece of the Blackface is an annual growth. In the spring months, in a short space of time - but not simultaneously - the wool fibres are cast off from the skin and the

production of wool fibres stops for some time. The formation of the cot has been dealt with adequately by Fraser Roberts (18). The long hairs are not shed annually as far as can be observed, and certainly they are not cast synchronously with the wool fibres. The long hairs, then, at this time find a habitat cleared of competition and they take advantage of the cessation of growth of the wool fibres to give a greater expression of growth by becoming coarser. In the Blackface breed it is not usual to shear the sheep very close to the skin. Therefore after the fleece is removed, the thickened ends of the long hairs become the outer coat and give the sheep the appearance of being covered wholly by a growth of stiff kemp-like hair.

In June the wool portion is beginning to grow again and Graph I p.28 shows the gradual increase in the percentage of wool fibres throughout the summer and autumn, until by November a full complement is attained. This explains the wide variation in the lengths of the wool fibres, a range of variation which increases month by month. This very great range renders the means of the monthly wool lengths plotted on Graph IV p.30 insignificant as means, but they serve to indicate the comparative growth rate of the wool and long hair fibres. In January 1930 a short staple seems to have been taken, unfortunately.

The ram used for the fleece growth rate

observations did not grow kemp in the shoulder, but from general knowledge and the observations of others (19) it is known that kemp begins to grow in the early months of the year. From sheep casually examined periodically, the kemp appears to increase in length very quickly in its early growth. In October or November, apparently, it is cast.

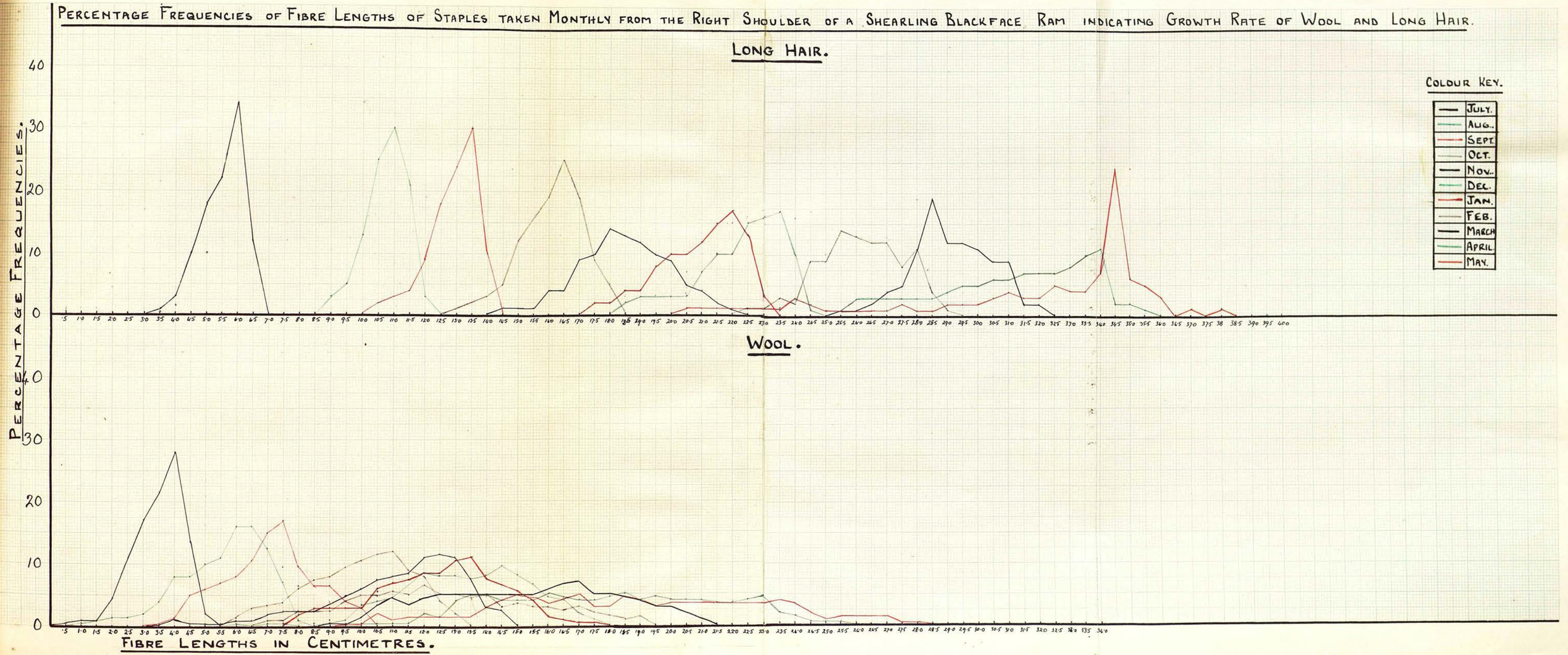
In wild sheep the wool fraction of the fleece is cast annually and the short outer coat allows the wool to be shed from the fleece freely. The Blackface sheep follows this ancestral habit physiologically, but not mechanically, for owing to the extraordinary development of the long hairs, the wool when shed is unable to escape to the exterior of the fleece. It remains imprisoned by the long hairs as a cot. The hair continues to grow, and if the sheep is not shorn, a similar happening takes place the following year. The writer has been shown the fleece of a Blackface ewe which, running free in a deer forest, had not been clipped for four years. Although much worn, four distinct cots were obvious, with the long hairs running through the whole, binding the fleece into an inseparable mass.

Count and Weight Percentages, and Mean Monthly Lengths of Wool and Long Hair in Staples from Right Shoulder of a Shearling Blackface Ram.

TABLE II.

Month of Sampling	Count per cent.		Weight per cent.		Mean Monthly Length.	
	Wool	Long Hair	Wool	Long Hair	Wool	Long Hair
					c.ms.	c.ms.
July.	62·0	38·0	39·4	60·6	3·48	5·59
August.	65·5	34·5	33·4	66·6	5·55	10·85
September.	70·0	30·0	38·0	62·0	7·05	12·90
October.	80·0	20·0	41·4	58·6	9·90	15·58
November.	80·5	19·5	43·8	56·2	11·08	18·50
December.	80·5	19·5	44·0	56·0	12·12	22·27
January.	80·5	19·5	48·6	51·4	12·58	20·92
February.	82·75	17·25	43·8	56·2	13·39	26·18
March.	80·0	20·0	43·4	56·6	15·21	29·12
April.	80·5	19·5	48·4	51·6	17·80	31·18
May.	81·0	19·0	50·0	50·0	18·84	31·81

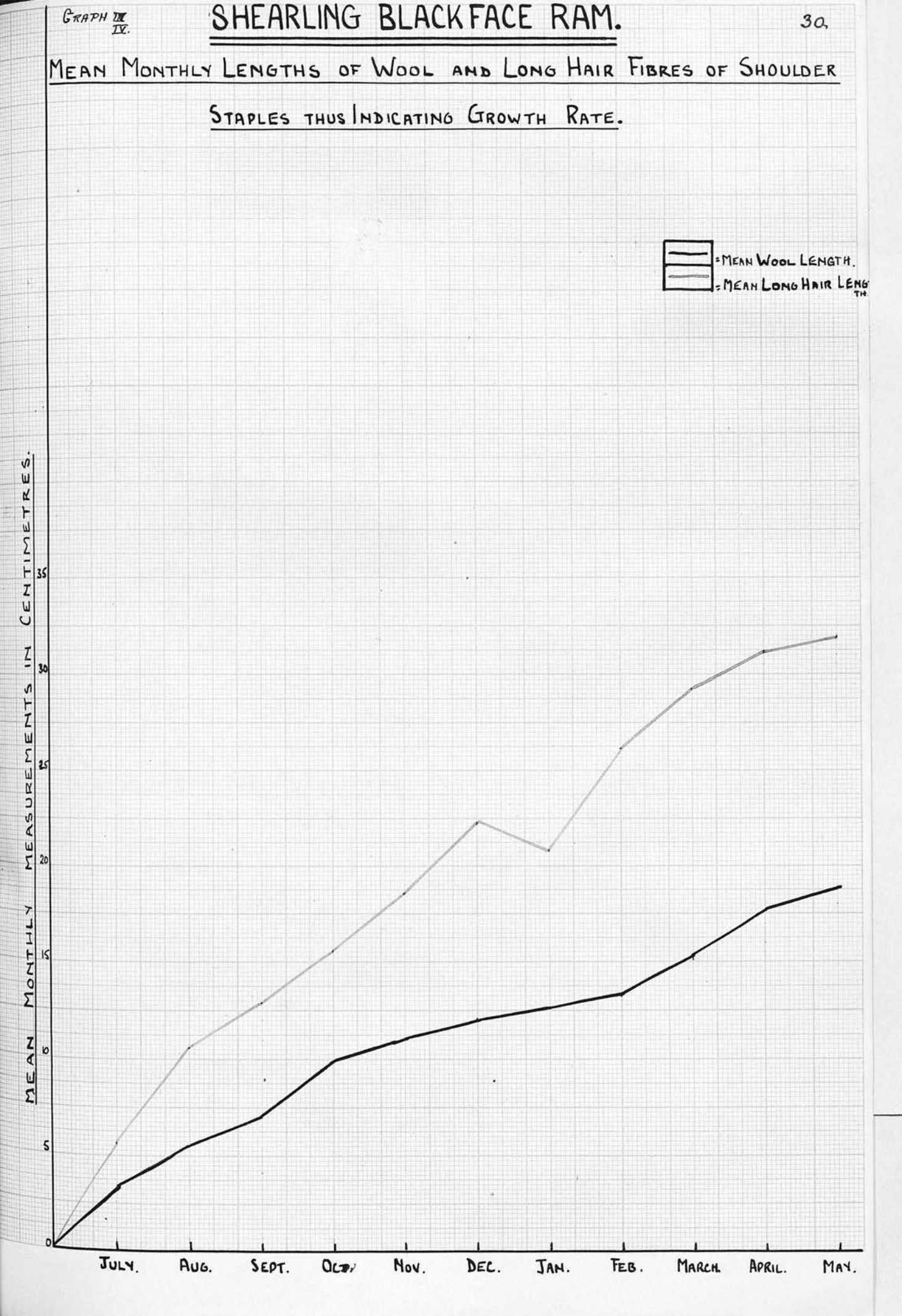
PERCENTAGE FREQUENCIES OF FIBRE LENGTHS OF STAPLES TAKEN MONTHLY FROM THE RIGHT SHOULDER OF A SHEARLING BLACKFACE RAM INDICATING GROWTH RATE OF WOOL AND LONG HAIR.

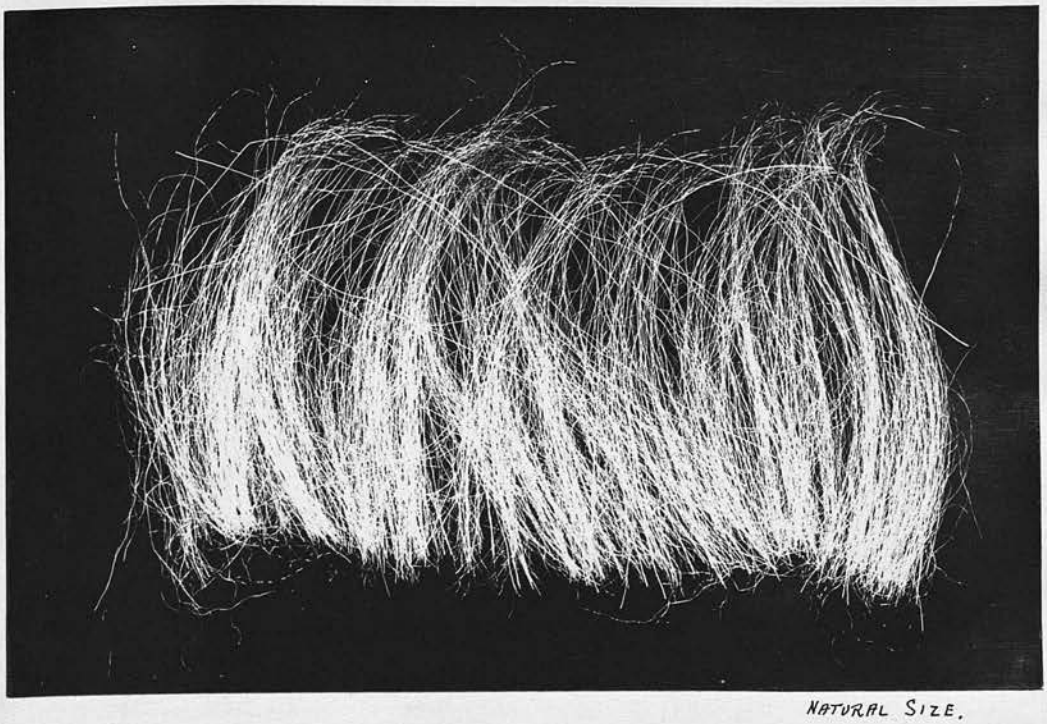


GRAPH III IV.

SHEARLING BLACKFACE RAM.

MEAN MONTHLY LENGTHS OF WOOL AND LONG HAIR FIBRES OF SHOULDER STAPLES THUS INDICATING GROWTH RATE.





NATURAL SIZE.

SHOWING THE NATURE OF THE BLACKFACE FLEECE
A FEW WEEKS AFTER SHEARING.

PLATE V

DISCUSSION

From examination of the results of the staple analyses and of the statistical treatment of these results, certain facts relating to the composition, disposition, character and growth of the fleece become obvious.

1. There is a marked difference in the wool--long hair--kemp relationship in different parts of the fleece. The averages show that by count and weight percentages there is more wool and less kemp in the shoulder than in the haunch in all the age classes examined. Reference to the staple analyses show that this statement is true for the large majority of the fleeces examined, but striking exceptions do occur. The shearling ram B.58 is an example. Against the class averages of the shoulder counts -- 77.4(± 0.35)% wool, 19.6(± 0.36)% long hair and 3.0(± 0.38)% kemp -- this animal exhibits an average shoulder count of 64.0% wool, 21.0% long hair and 15.0% kemp. Whereas the class average of the haunch counts are 69.6(± 0.49)% wool, 21.8(± 0.49)% long hair and 8.6(± 0.53)% kemp, B.58 gives 77.25% wool, 22.0% long hair and 0.75% kemp. It appears that the type of fleece usually to be found on the shoulders has grown on the haunches and vice versa. This is much more an interesting happening than if either the shoulder or haunch type of fleece had wholly covered the fleece. It seems to point to

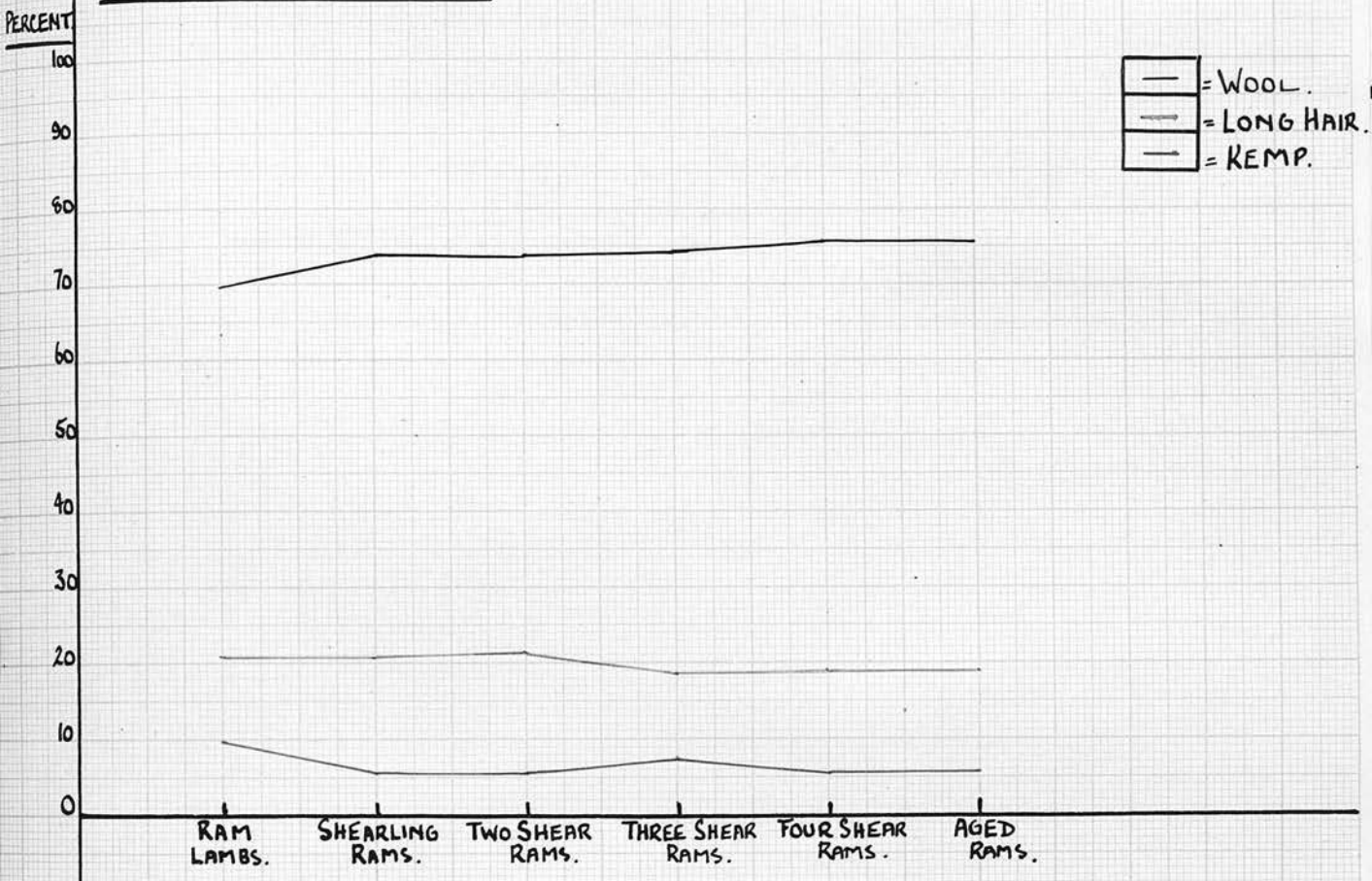
the fact that some definite physiological mechanism is responsible for the growth of certain types of fleece on different areas of the body. Again, the different character of two adjacent areas on the dorsal aspect of the fleece lends colour to the suggestion. Especially is this so if the fleeces of old ewes are studied, for at varying ages from three years onwards the saddle area of the ewe's fleece becomes rough and kempy, whilst the area directly anterior to this, over the withers, becomes woolly and thin, the long hairs dropping out. These observations are true for rams' fleeces also, but to a lesser extent. The lines of demarcation between these areas are very well marked and are particularly noticeable when a considerable number of old ewes are examined in sequence. The transition from woolliness to kempiness from shoulder to haunch is gradual and is only perceptible in the living animal on parting the fleece.

A sharp line demarcating the saddle from adjacent areas on the back in the Blackface sheep -- and incidentally other breeds which are more or less of a primitive nature -- indicates that the contention that the area of the saddle is rougher and contains more kemp because of the greater wear and tear from outside agencies is not valid. It is reasonable to presume that wear and tear of the fleece is not confined to the saddle region but is evenly distributed over the whole of the sheep's back.

Whole Fleece Averages from Blackface Rams of Different Ages.

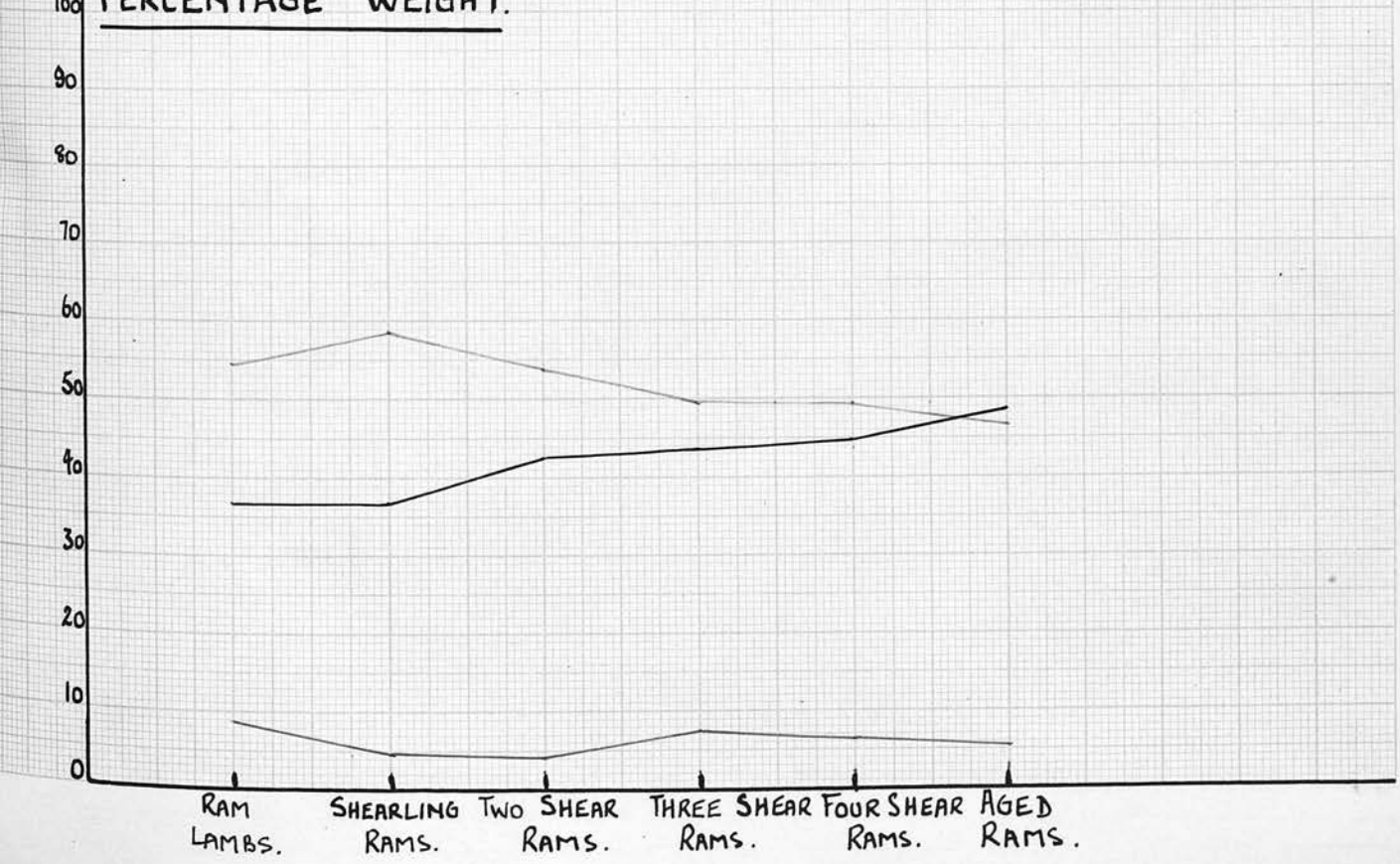
Graph IV V.

Percentage Count.



Graph VI

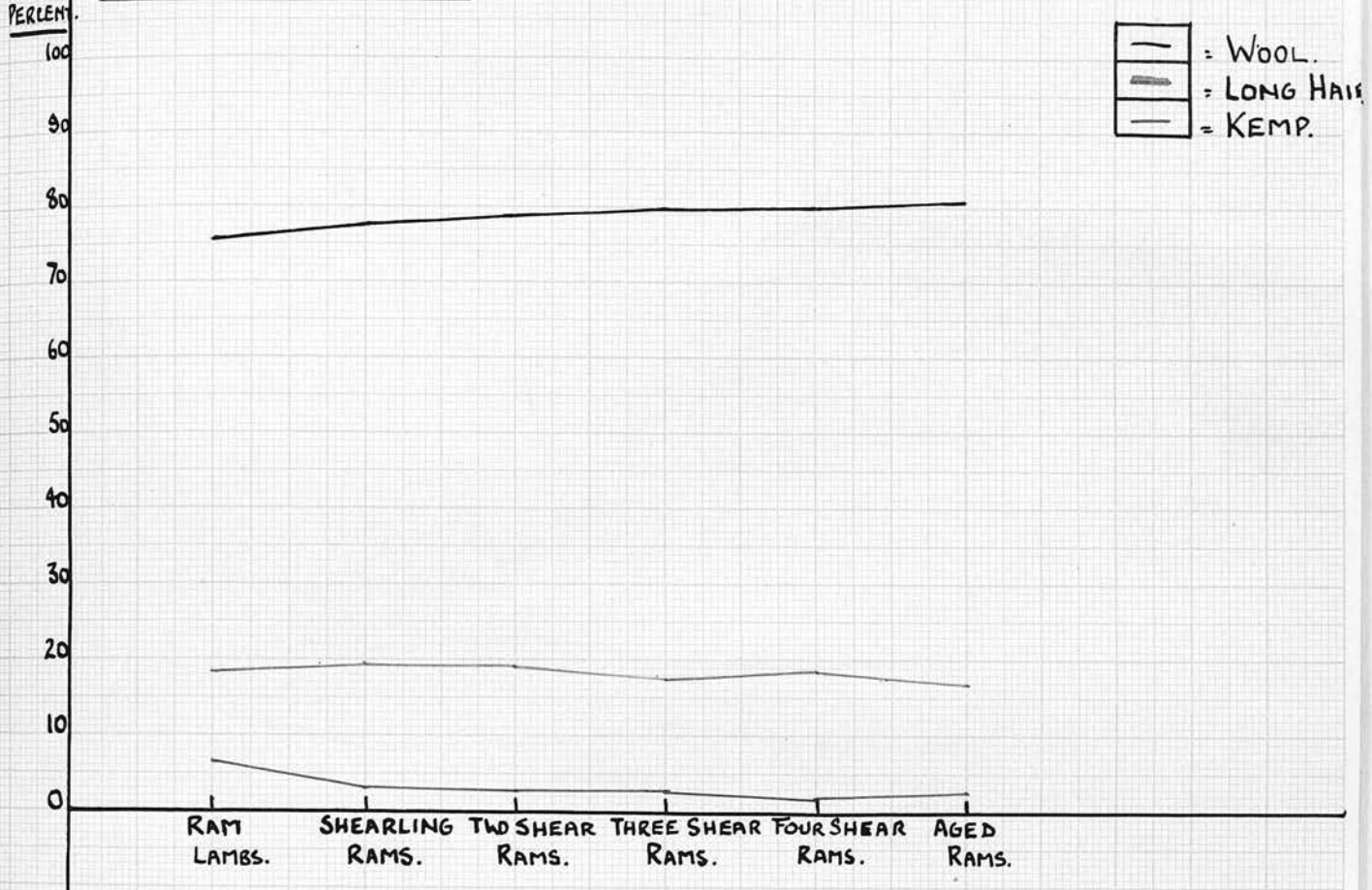
Percentage Weight.



Averages of Shoulder Staples from Blackface Rams of Different Ages.

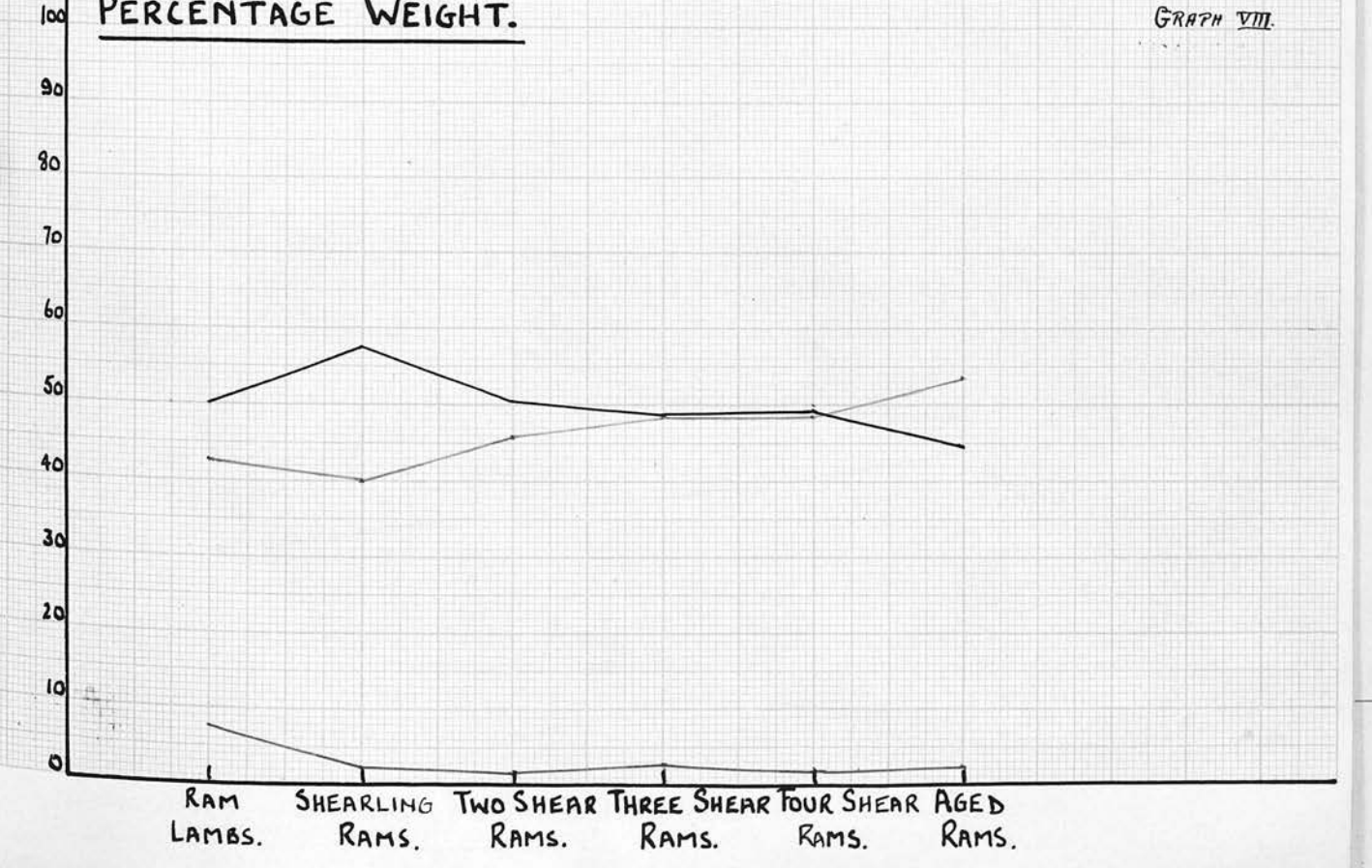
Graph VII

Percentage Count.



Percentage Weight.

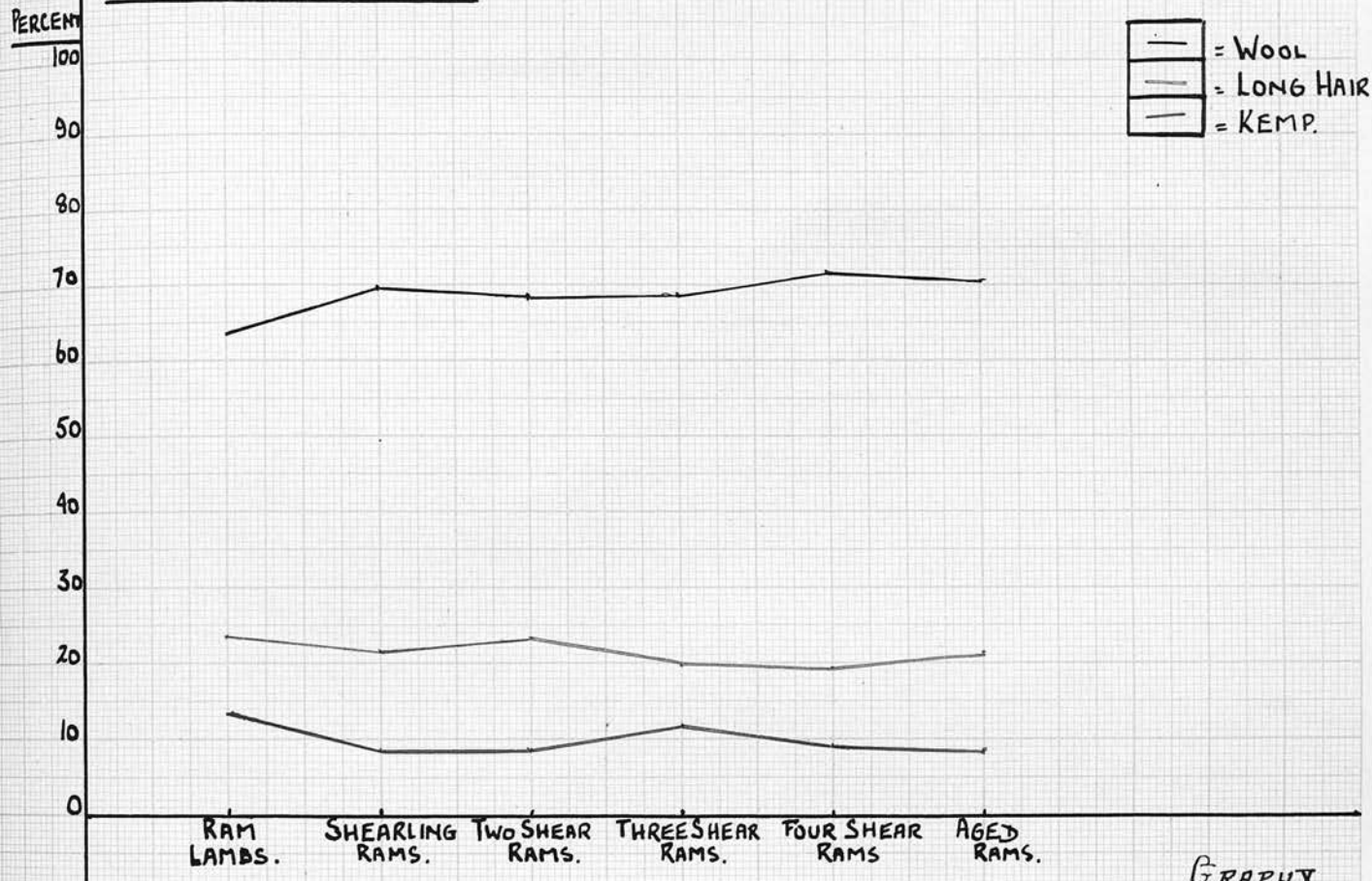
Graph VIII.



Averages of Haunch Staples from Blackface Rams of Different Ages.

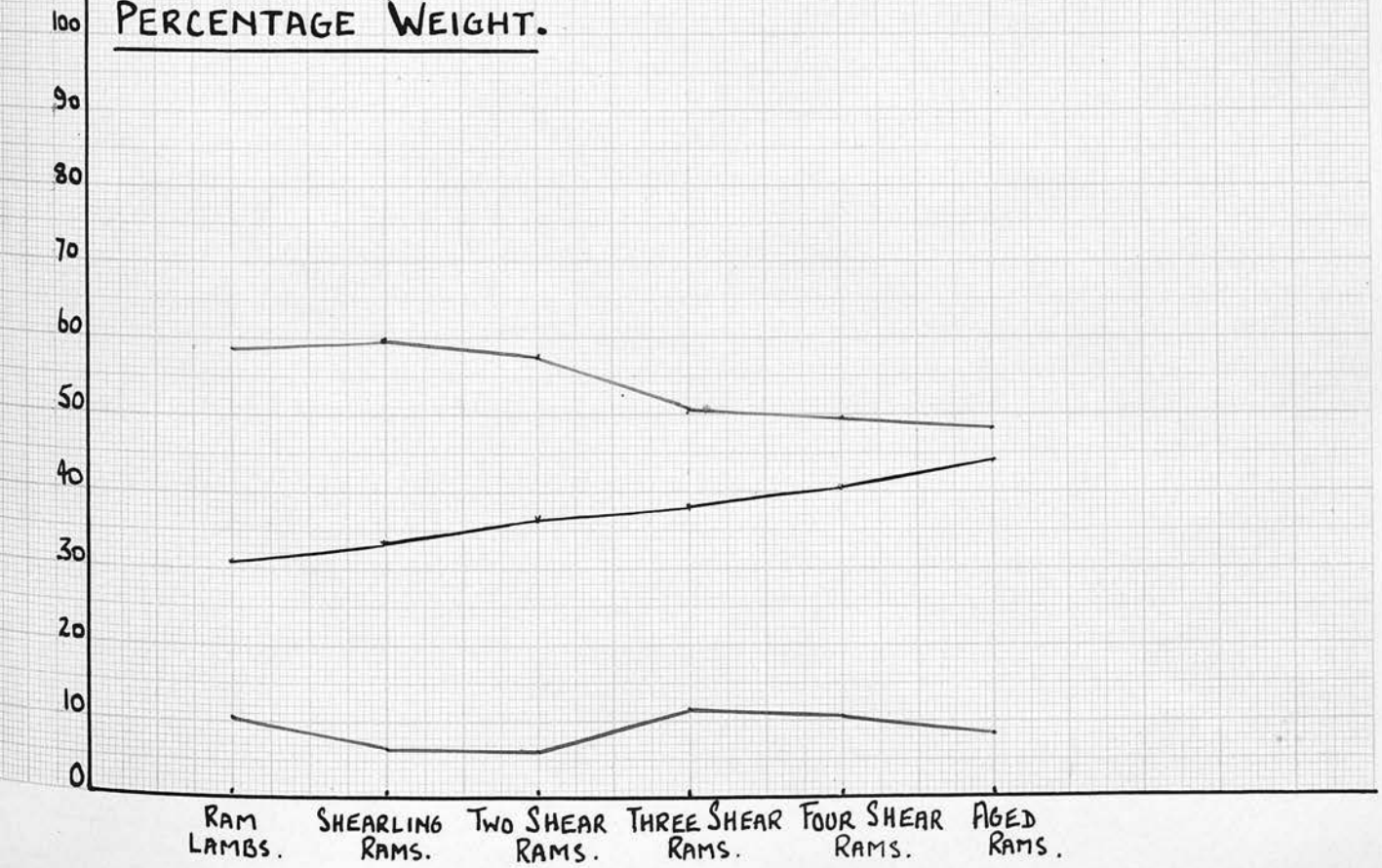
Graph IX.

Percentage Count.



Graph X

Percentage Weight.



NATURAL SIZE.

SHOULDER STAPLE FROM A NINETEEN YEAR OLD BLACKFACE EWE.

INDICATING ABSENCE OF LONG HAIR IN OLD AGE.

PLATE VI.

2. <u>There is a difference in the average wool--long hair--kemp relationship of the fleece fibres in rams of different ages.</u> This fact is most intimately concerned with the ratio between the wool and long hair. In the young animal, carrying its first fleece, as exemplified by the individuals of the ram lamb class, it may be said that the fleece carries its full complement of fibres in the proportions implied by the genetic constitution of the animal. It is reasonable to postulate that the ratios of wool to long hair observable at later ages are the expression of a gene governing the length of life and development of long hair, and to a much lesser extent, to environmental factors affecting the long hairs selectively.

From a perusal of the graphs showing the weight and count means of the different fibre classes in rams of different ages, pp.34-36, it is evident that with the advance of age the proportion of wool fibres tends to increase and the long hair fraction decreases. From a shoulder average of 75.4 ($\pm$ 0.34)% in ram lambs the wool fraction rises to 80.8 ($\pm$ 0.88)% in aged rams. A similar occurrence is found to take place in the haunch. Apparent as this is in the count analyses, it is still more so if the weight means are considered. The wool weight mean in the shoulder rises from 42.6 ($\pm$ 1.15)% in ram lambs to 53.2 ($\pm$ 1.50)% in aged rams, and the long hair weight

mean falls from 50.1 (± 2.02)% in ram lambs to 44.6 (± 1.89)% in aged rams. The haunch shows the same phenomenon even more markedly. A twofold process is taking place. Firstly, with the passage of years, long hairs tend to drop out of the fleece, their parent follicles not producing this type of fibre subsequently. Secondly, as the sheep grows older the great length of hair is not produced as in early years, neither is it quite so coarse. However, the long hair weight mean of the shearling class is worthy of particular attention. At this age no appreciable lessening of numbers of long hairs has taken place and they reach a maximum development of length and coarseness. In later years the long hair weight means fall markedly. Shedding of the long hairs appears to take place in the withers and shoulders first and more noticeably than in the haunch.

It must be emphasized that these facts concerning the wool hair ratio at different ages have emerged against very severe odds. The older rams whose fleeces have been analysed have all been kept for stud purposes because of their continued utility and excellence. A necessity to a stud ram, as to any other sheep, is a sound fleece of wool. Each year the lasting quality of his fleece is noticed with great care and if the fleece becomes thin and not weather resistant he is removed from the breeding flock, for it is realised that the lasting quality of

the fleece is a hereditary factor and one eagerly to be sought after. The older rams examined, then, have continued to be used because in addition to other points of excellence they have retained a sound fleece. Had a number of Blackface lambs been kept until they reached old age, it is probable that a very marked annual decrease in the numbers and weight of long hairs in relation to the wool would have been apparent. Plate VI shows a sample of wool taken from the shoulder of a nineteen year old Blackface ewe that had carried a very good fleece in her prime. Long hairs and kemp are quite absent from this sample, the fleece consisting of very soft wool only. One ram aged about twelve years which came under our notice had a similar fleece, but the wool was so cotted that it was impossible to take a sample. The production of long hair in the Blackface is analogous to milk production by a dairy cow, the shape of the production mean-age class curve being relatively similar. An interesting study is indicated in comparative physiology.

It is suggested that the high kemp percentage by count 9.7 ($\pm$ 0.79) % and by weight 8.9 ($\pm$ 1.04) % in the whole fleece averages of the ram lamb class lacks significance when it is considered that the kemplike fibres of the birth coat of many lambs, which fibres begin to be shed at two or three months of age, may

have remained, in part, in the distal ends of the staples.

3. There is a striking difference in the amount of variability to be found in the proportions of wool, long hair and kemp present in the total fleece; and to a lesser extent in the haunch than in the shoulder area.

a. Wool. The wool fraction is the most stable constituent of the fleece. In the count figures -- which are more true biological indicators than the weight figures, the latter being much more easily affected by environment -- the wool shows coefficients of variability which are consistently low throughout the age classes treated. The coefficient never rises above 8.25 ± 0.74 and in the ram lamb class it is as low as 4.3 ± 0.43 , in the whole fleece count figures (see Graph XVIII p. 56). The Graphs XI - XVII and XX - XXIII pp. 49-55 and 58-61 show that the shoulder wool is less variable than the haunch. The wool is, as it were, the static and least alterable component of the fleece. With advancing age the coefficient of variability for wool tends to rise. This is because the age at which long hair leaves the fleece is different in individual animals, some having the constitutional capacity to grow long hair far into old age.

b. Long hair. The long hair is much more variable than the wool fraction by count and is moderately

consistent in its variability (20.3 ± 1.25 to 30.3 ± 3.50 in whole fleece count figures - see Graph XVIII p. 56). That it is not a factor incapable of modification is shown by the fact that there are many "all wool" breeds of sheep having fleeces devoid of hair. Neither is it immutable or unmodifiable in the Blackface breed. Reference to the analyses of the shearling ram B.49 (wool 78.5%, long hair 0.0%, kemp 21.5%) shows a pure bred Blackface ram having a hairless fleece. This fleece contained a very high proportion of kemp (which was not obvious on casual examination of the sheep) but this is no reason to consider the lack of hair a directly relative coincidence. This particular fleece was similar to that of a Welsh Mountain ram of the kempy-fleeced type. Another example of the lack of hair in the fleece is the ewe-hogg G.33 (100% wool in shoulder count) where only in the haunch do a few fine hair-like fibres occur. Wallace (20) mentions the occasional occurrence of "all-wool" Blackfaces, and Low (6) says, "Sometimes individuals "of this breed are born with wool which is fine and "short." The writer has under observation also, a ram born in 1929, in which the long hairs are definitely much shorter and finer than in the normal Blackface tup-hogg, yet the fleece is heavy, close, and an excellent rain-shedder. It is obvious, then, that a variety of mutations or modifications occur

in the expression of the long hair fraction of the fleece which might be used by the breeder in any ultimate alteration of the character of the Blackface fleece, should such be considered desirable eventually.

In the majority of fleece analyses there is a larger proportion of long hair by count and weight in the haunch than in the shoulder. Usually by weight the long hair remains more variable than the wool, except in the haunch, where the proportion of wool by weight is consistently more variable than that of the long hair in all the age classes examined. This is not an unexpected finding. In the haunch the kemp fibres grow in greater abundance than on the fore quarters of the sheep, and though steady numbers of wool fibres are present in the haunch as biological entities, their expression as a weight percentage varies because of the luxuriance of growth of the other two fibre classes, which hold a more dominant position than in the shoulder. As mentioned previously, the weight proportions of the fibre classes are more readily affected by environmental conditions than the proportions by count, which quite reasonably may be considered as less changeable expressions of genetic constitution.

c. Kemp. The kemp fraction shows an extraordinarily high and inconsistent coefficient of variability in the age classes examined. The variability is much higher than that of either of the other two fractions

and it bears no relation to them (49.3 ± 7.09 to 85.5 ± 7.62 in whole fleece count figures - see Graph XVIII p. 56). It is very noticeable that the shoulder kemp shows the highest degree of variability (52.1 ± 7.3 to 146.7 ± 9.0 in count figures - see Graph XX p. 58). This is readily understandable when it is remembered that kemp is in the great majority of Blackfaces present in the haunch, whilst in the shoulder absence of kemp is not unusual.

The extraordinary variability of the kemp fraction is a point of very great importance in sheep -breeding practice. There can be no doubt whatever that presence of kemp is the expression of one or more genetic factors. Lasting modification by selective breeding is essentially dependent upon the occurrence of variation and upon the complementary tendency of like to beget like. The high degree of variability of the kemp fraction, therefore, indicates that it is the constituent of the fleece which could be removed most easily by careful selection. The figures presented indicate also that the kemp would disappear first from the shoulder (in fact, in some few individuals it seems already to have disappeared) and from the haunch at a later time. Had analyses been made throughout from the saddle area, it is probable that the lowest coefficient of variability for kemp would have been found in this region, and it is reasonable to believe that this area together

with small places on the tail and near the hocks would be the last areas of the body to retain a kempy growth if breeding practice aimed definitely at eliminating the kemp fraction from the fleece. The practical necessity for the elimination of kemp from the fleece of the Blackface is dealt with further at the conclusion of this Discussion.

4. There is no correlation, except in extreme instances, between the proportion by count of the wool fibres and the proportion by weight. This fact can be illustrated by one or two interesting points. During the analyses of the samples it was noticeable that a well developed long hair fraction often hid a wool portion, the fibres of which were of exceptional fineness. The shearling ram B.60 is a good example, in that a high wool count of 80% in the shoulder appears as a low weight of 33%. Again, the shearling ram B.15, showing a shoulder count of 75% of wool, gives a weight figure for wool of 51.25%. It is not to be inferred, however, that a negative correlation is the rule. There are alternative reasons for a differing wool weight percentage, irrespective of a high or low count, namely, the fineness and the length of the wool fibres.

The development of the long hair fraction appears to be independent of the manner in which the wool is expressed. Broadly speaking, a staple of great length will contain wool relatively long, but

this is not always so. It seems to indicate that if modification of the long hair appeared desirable it would be possible to effect such without great alteration of the character of the wool fraction of the fleece.

. . . . . .

Britain may have the monopoly of the Scottish Mountain Blackface sheep, but she has not the monopoly of the fleece. At the present time practically the whole of the Blackface clip is used for carpet and mattress manufacture and the wool has been eagerly sought after in the past because of its suitability for these purposes together with the ready accessibility of Britain as a producer of the commodity.

However, among the Continental carpet and mattress manufacturers there is a feeling that other countries may be able to supply the type of wool required, and the kemp of Blackface wool is a cause of much complaint. That enormous reservoir of sheep, Central Asia, has many types producing good carpet wool. India and Spain have such sheep, and Plate VII shows three staples of wool, two from these countries and one Scottish Blackface staple.[x] Small numbers of Blackface sheep have been exported

[x] Several persons having much acquaintance with Blackface wool have been unable to pick out the Blackface staple from these three.

to Italy with a view to populating suitable mountain pastures with the breed for the production of carpet wool near to the factories. With the improvements in methods of communication and transport it is possible that many parts of the Old World may provide carpet wool which will compete very seriously with the fleece of the Blackface.

Wallace (20) mentions that a Blackface carrying a woolly fleece yields a heavy clip for a longer period of years than one carrying the hard type of coat. The data presented tend to bear out this view, in that long hairs disappear from the fleece as the sheep grows older and the resulting falling proportion by weight affects the total fleece weight. The woolly fleece, not shedding long hairs, might be expected to yield a steady average over a longer number of years.

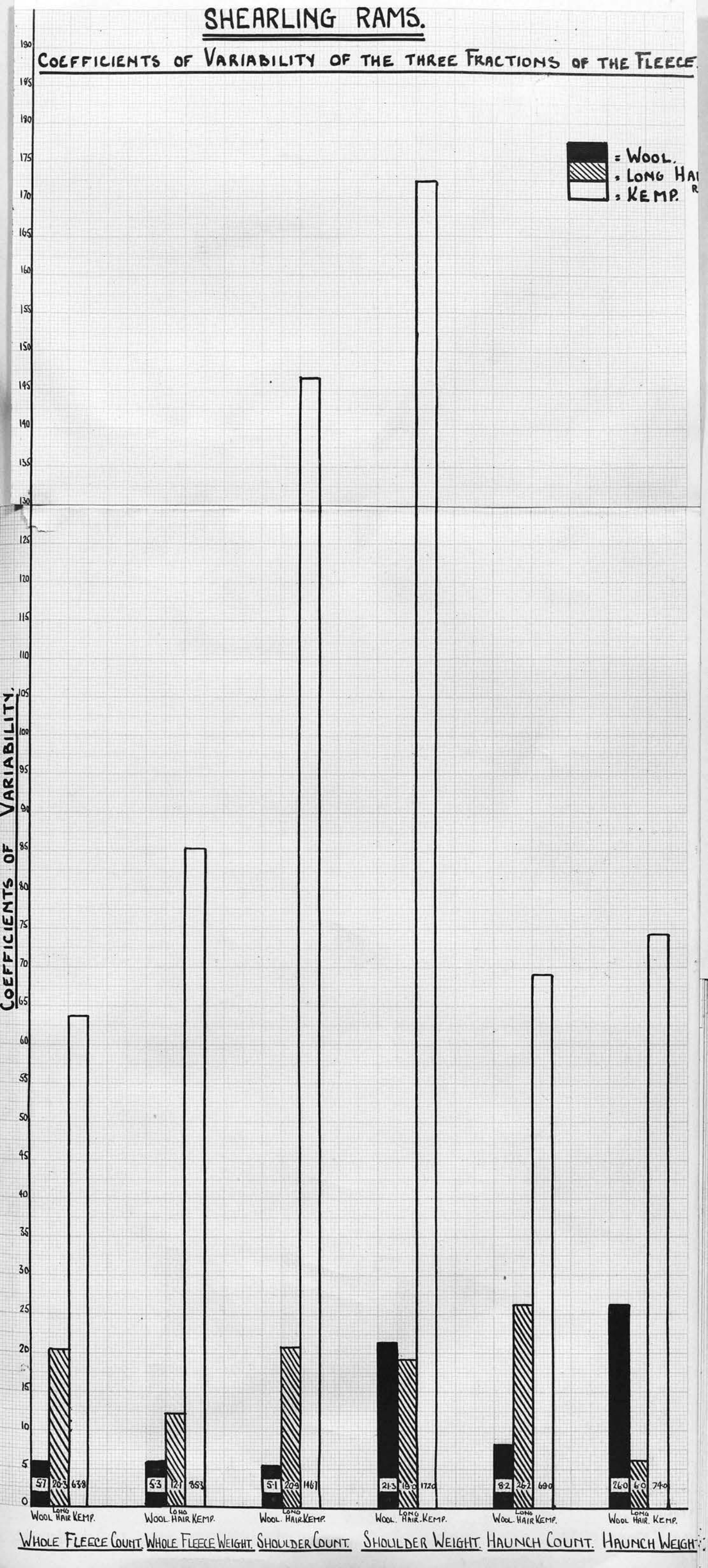
Were the "all-wool" and the "hairy" type of Blackface fleece clearly differentiated into two distinct classes, and were sheep owners whose stock and land are adapted to the production of the woolly type made aware of the inadvisability of attempting to produce the strong hairy variety by the importation of rams from strong wool areas, it is likely that the home manufacturing market might be developed for a definitely woolly Blackface fleece. A policy of this sort would do much to eliminate from the trade those intermediate and often nondescript clips which

are greatly responsible for the selling of Blackface wool in bulk at a fixed price irrespective of quality.

Certain defects in the Blackface fleece need immediate attention if the present market is to be maintained. Kemp must be eliminated and black spots in the fleece reduced to a minimum. As far as can be ascertained, neither of these characters is associated with mutton qualities or hardiness, yet both are amenable to modification by selection. The present practice, which is followed by the more enlightened breeders, of rigidly culling from the breeding stock all sheep with coloured patches, should be encouraged and extended. In addition, the attention of breeders should be more emphatically directed towards the elimination of kemp than it is at present. Until further data can be collected, the exact mode of inheritance cannot be defined, but the indications at present point to the likelihood of its being a controllable genetic character.

SHEARLING RAMS.

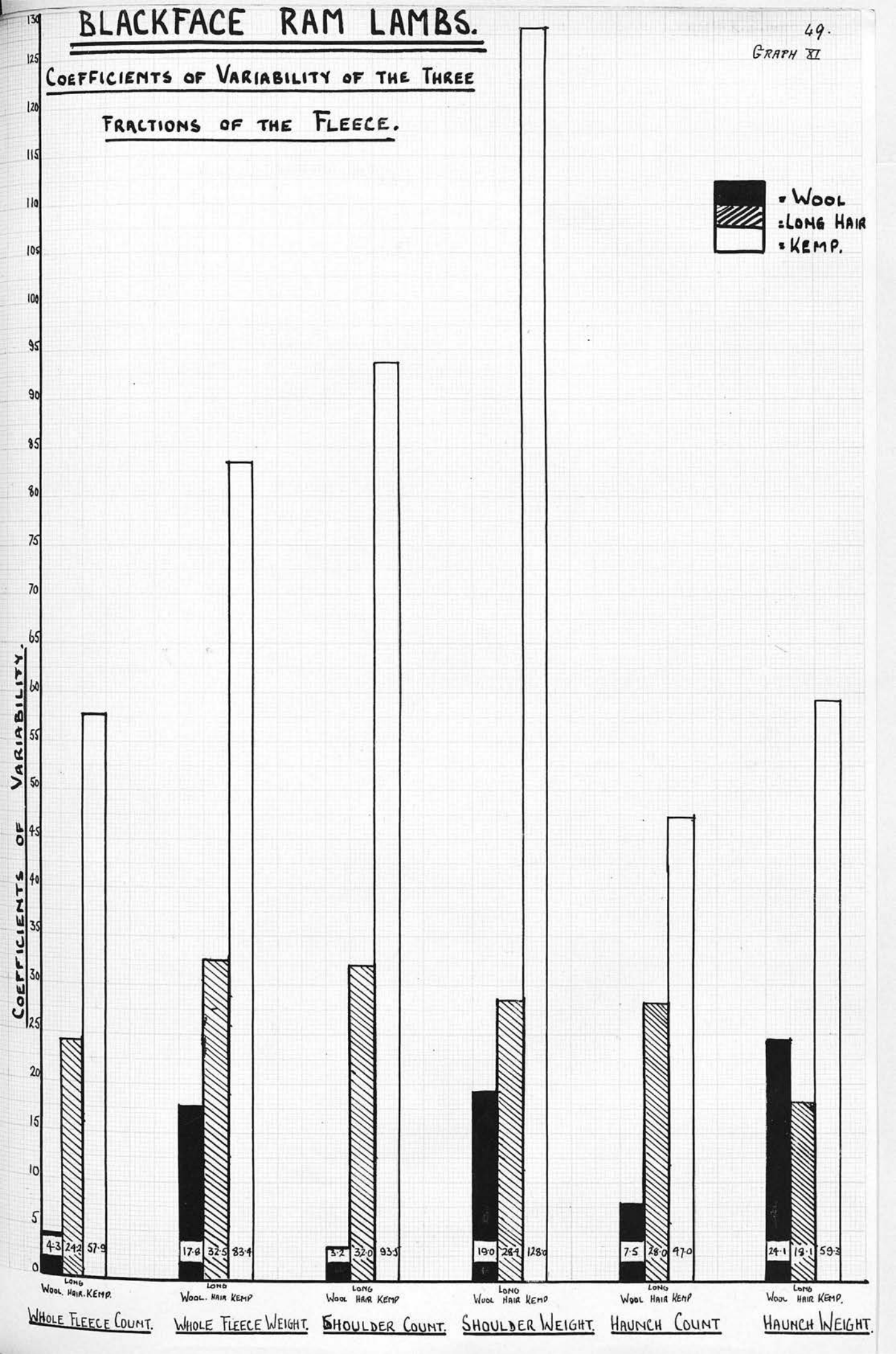
COEFFICIENTS OF VARIABILITY OF THE THREE FRACTIONS OF THE FLEECE.



GRAPH XI

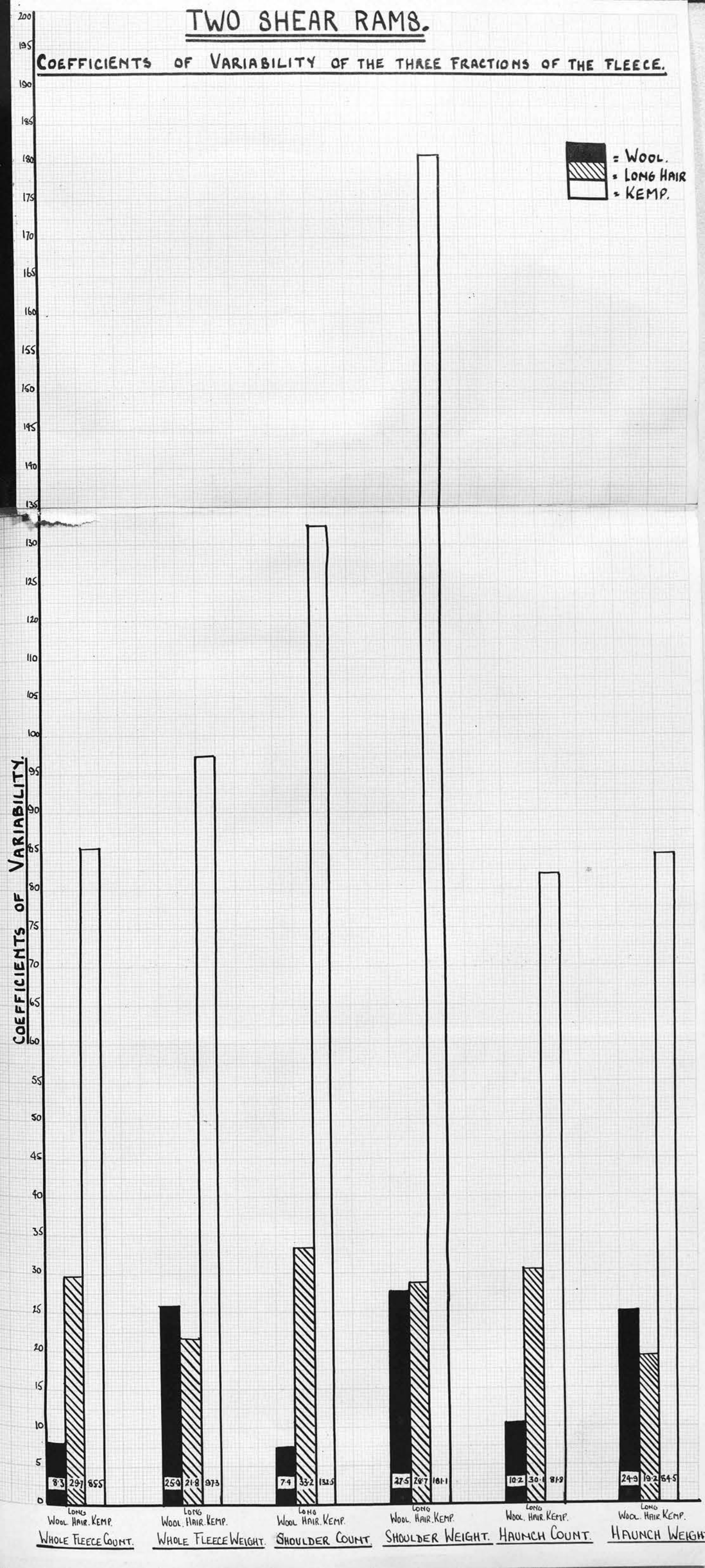
BLACKFACE RAM LAMBS.

COEFFICIENTS OF VARIABILITY OF THE THREE FRACTIONS OF THE FLEECE.



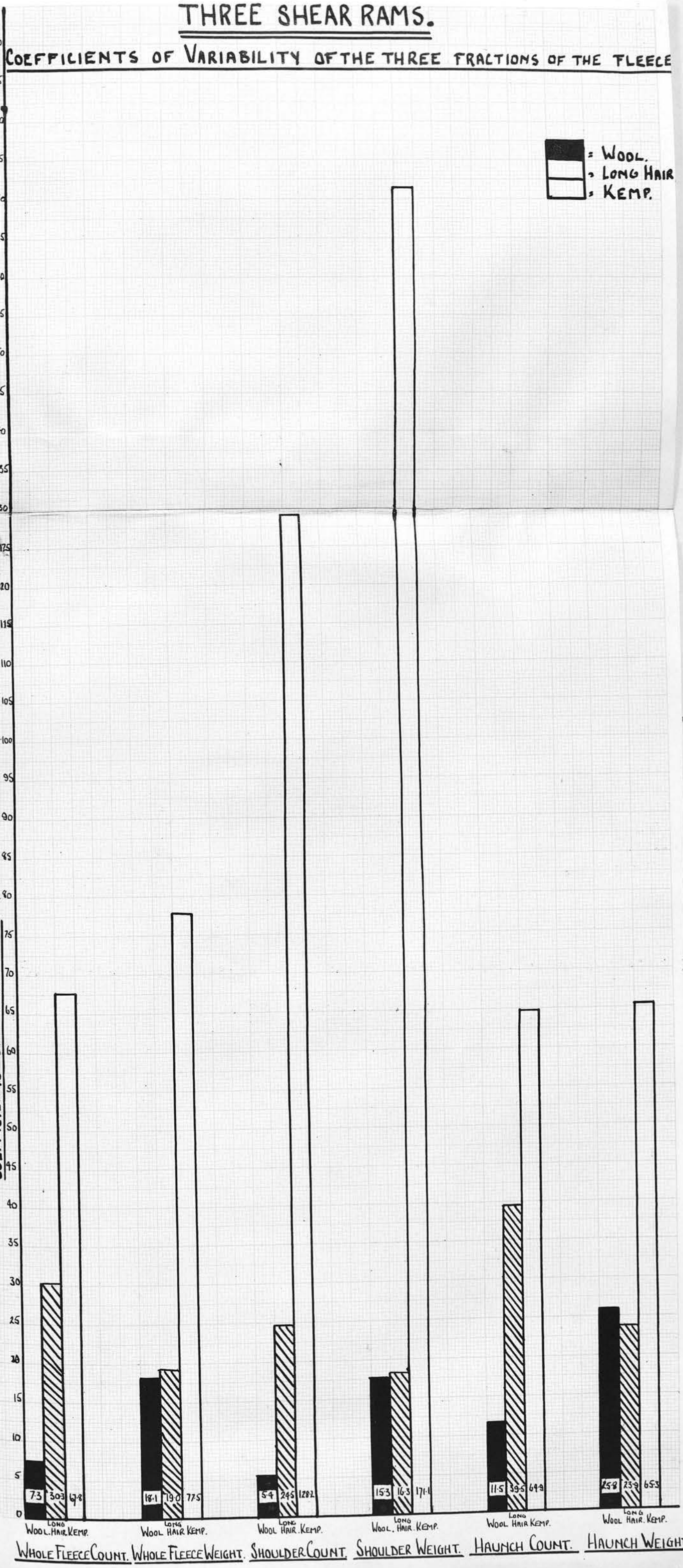
TWO SHEAR RAMS.

COEFFICIENTS OF VARIABILITY OF THE THREE FRACTIONS OF THE FLEECE.



THREE SHEAR RAMS.

COEFFICIENTS OF VARIABILITY OF THE THREE FRACTIONS OF THE FLEECE



FOUR SHEAR RAMS.

COEFFICIENTS OF VARIABILITY OF THE THREE FRACTIONS OF THE FLEECE.

= WOOL.
= LONG HAIR
= KEMP.

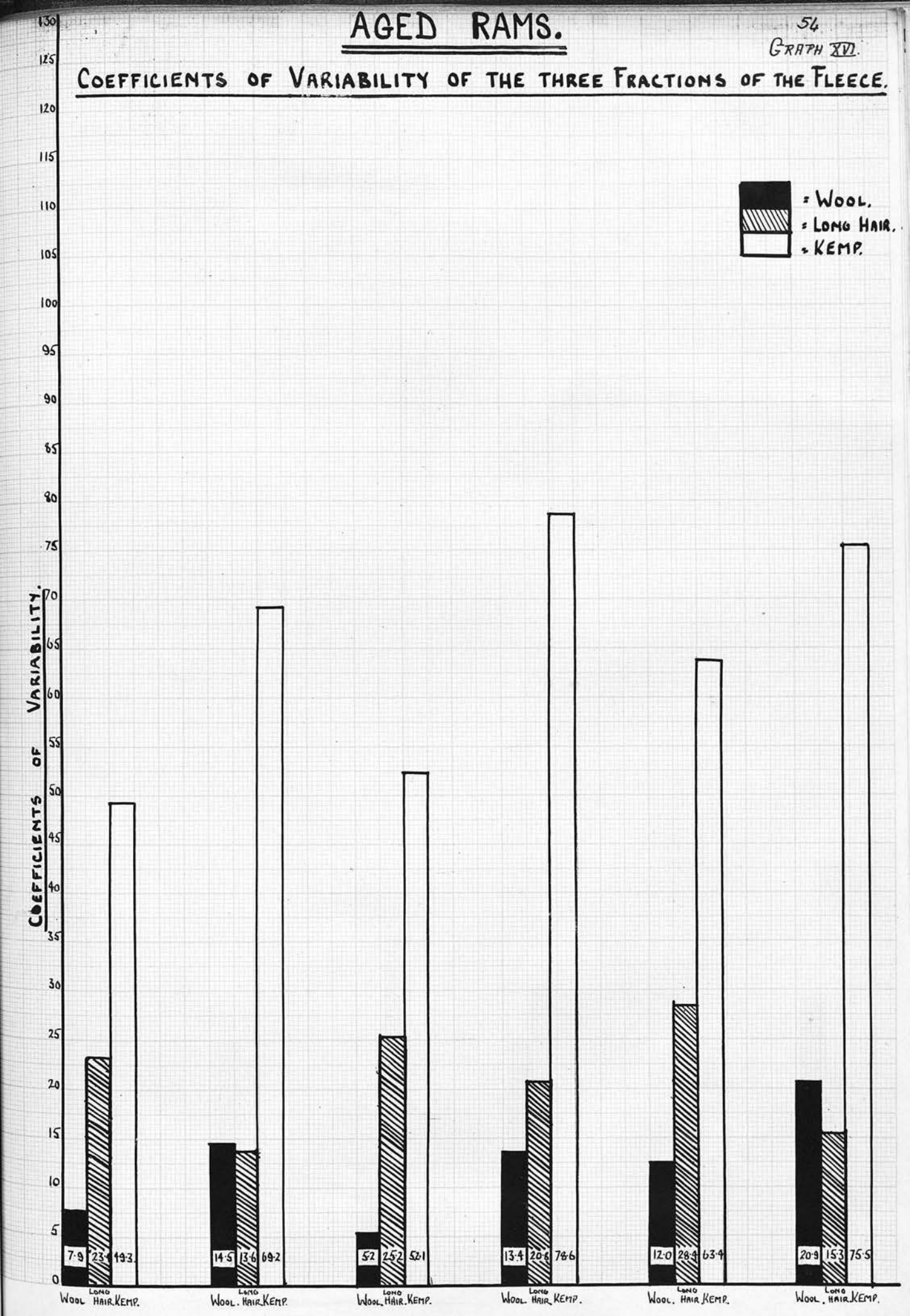
COEFFICIENTS OF VARIABILITY.

	Wool	Long Hair	Kemp
Whole Fleece Count.	5·9	20·7	59·4
Whole Fleece Weight.	16·1	13·8	97·0
Shoulder Count.	3·8	13·1	88·8
Shoulder Weight.	12·7	11·3	186·6
Haunch Count	8·1	31·6	57·0
Haunch Weight	26·9	21·7	87·9

AGED RAMS.

GRAPH XVI.

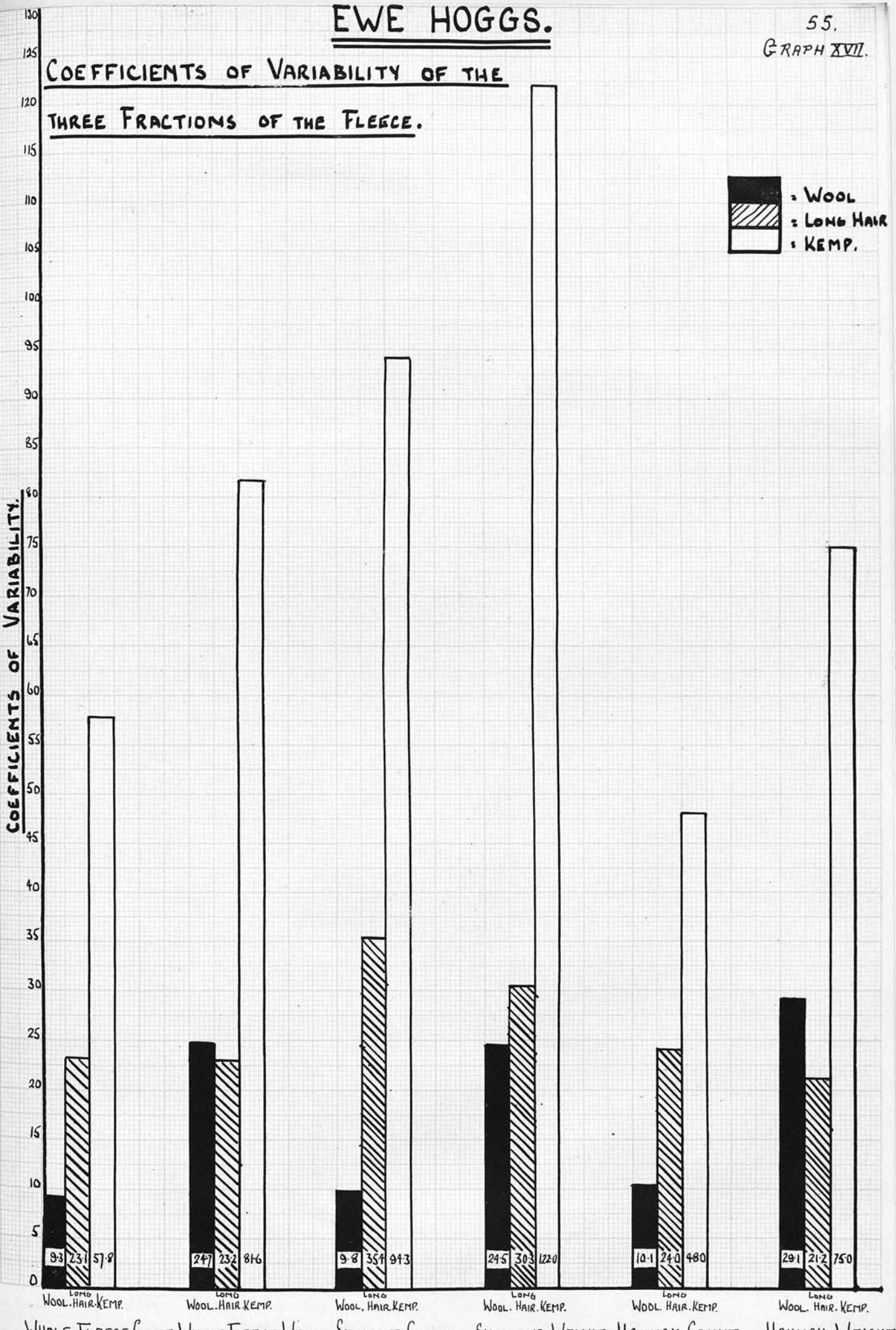
COEFFICIENTS OF VARIABILITY OF THE THREE FRACTIONS OF THE FLEECE.



GRAPH XVII.

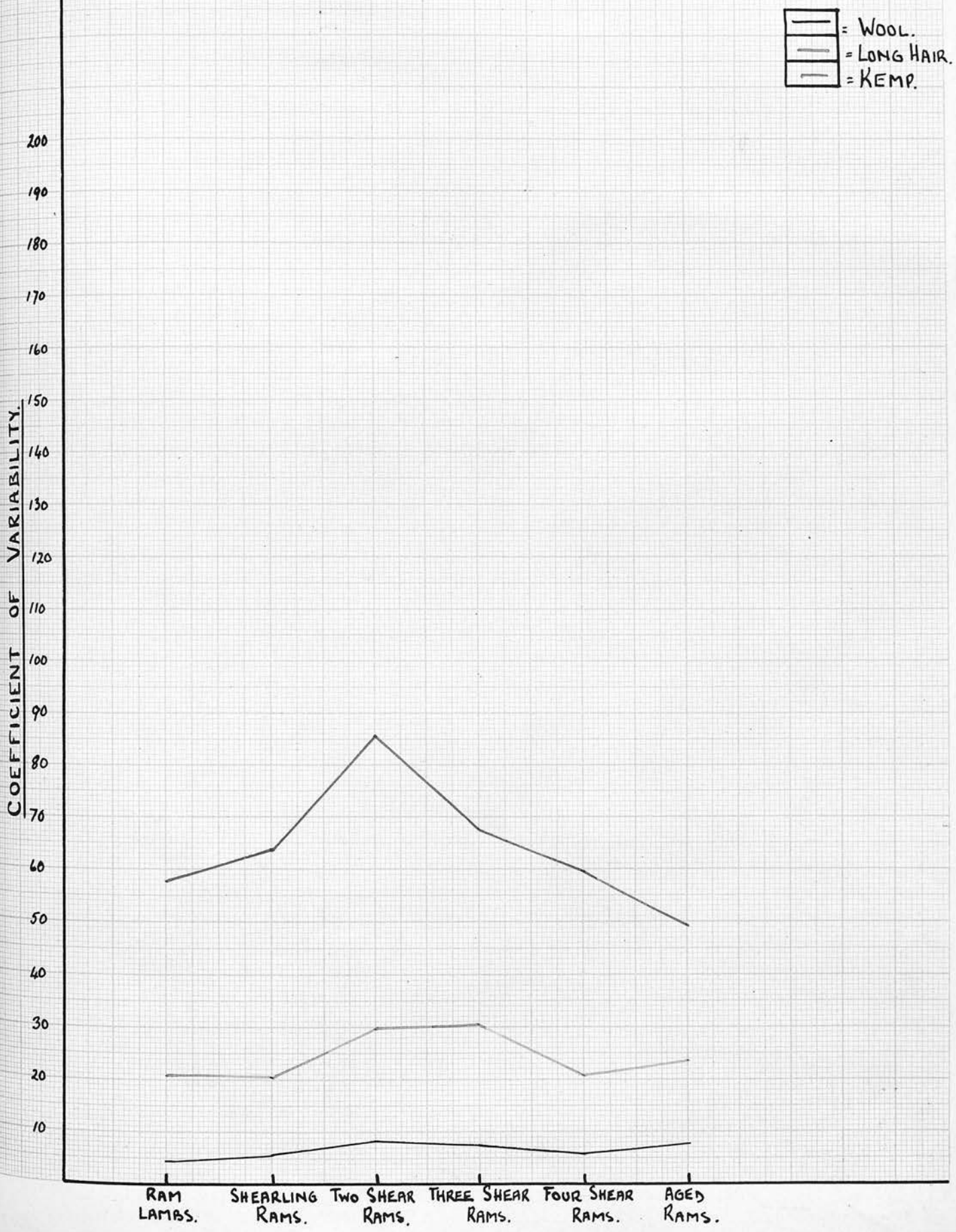
EWE HOGGS.

COEFFICIENTS OF VARIABILITY OF THE THREE FRACTIONS OF THE FLEECE.



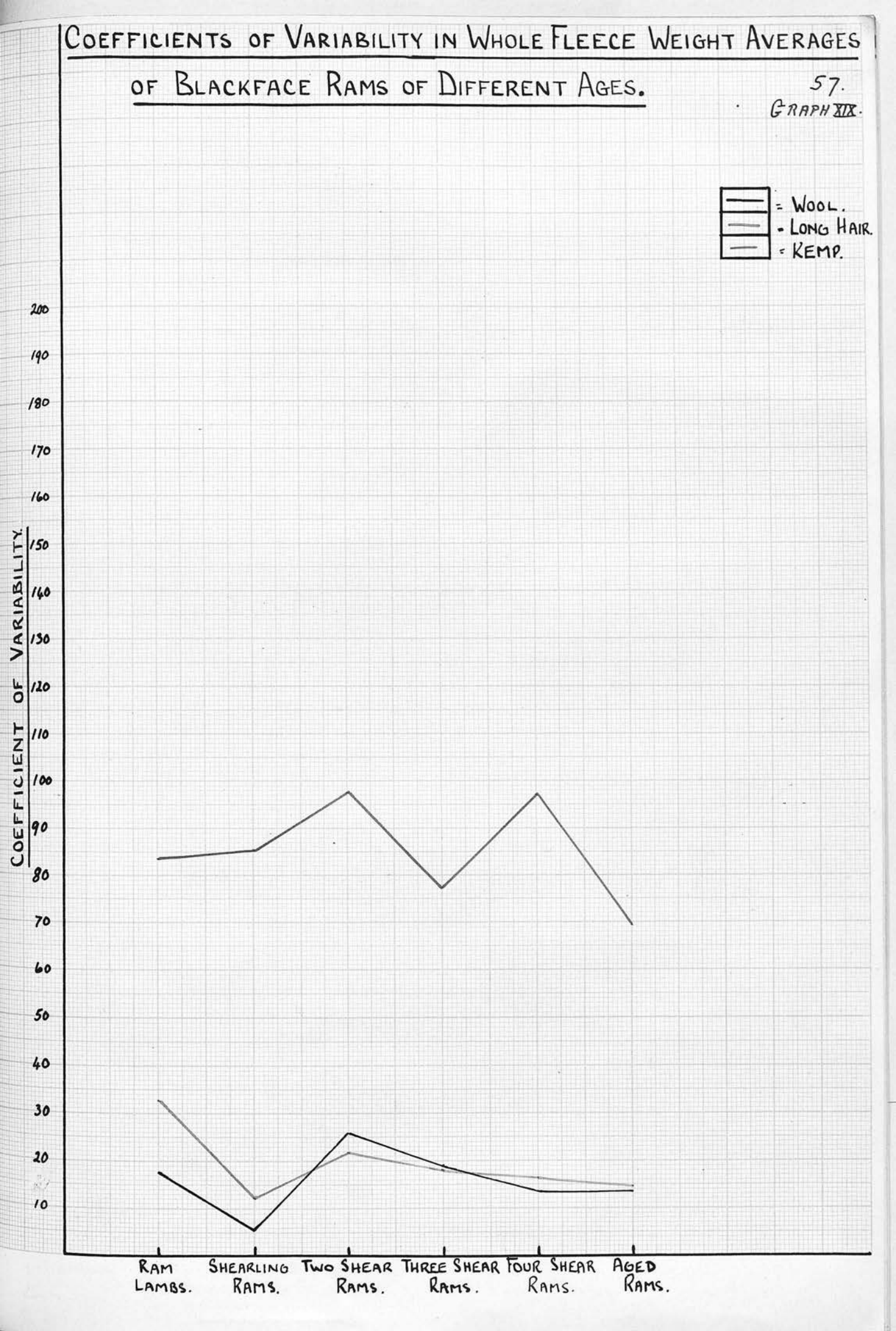
Coefficients of Variability in Whole Fleece Count Averages of Blackface Rams of Different Ages.

Graph XVIII.



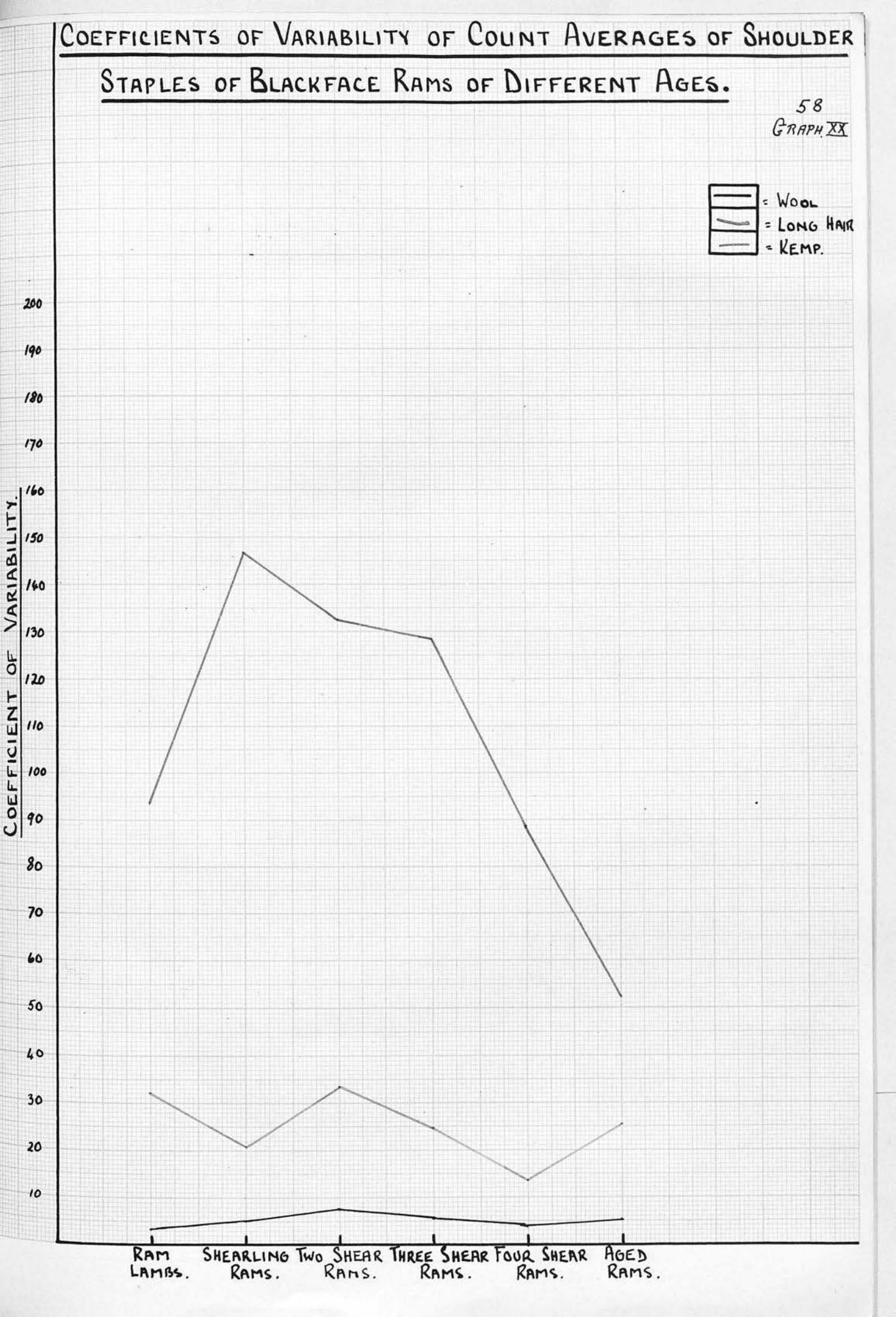
Coefficients of Variability in Whole Fleece Weight Averages of Blackface Rams of Different Ages.

Graph XIX.



Coefficients of Variability of Count Averages of Shoulder Staples of Blackface Rams of Different Ages.

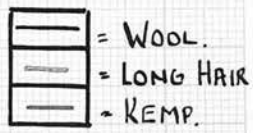
Graph XX

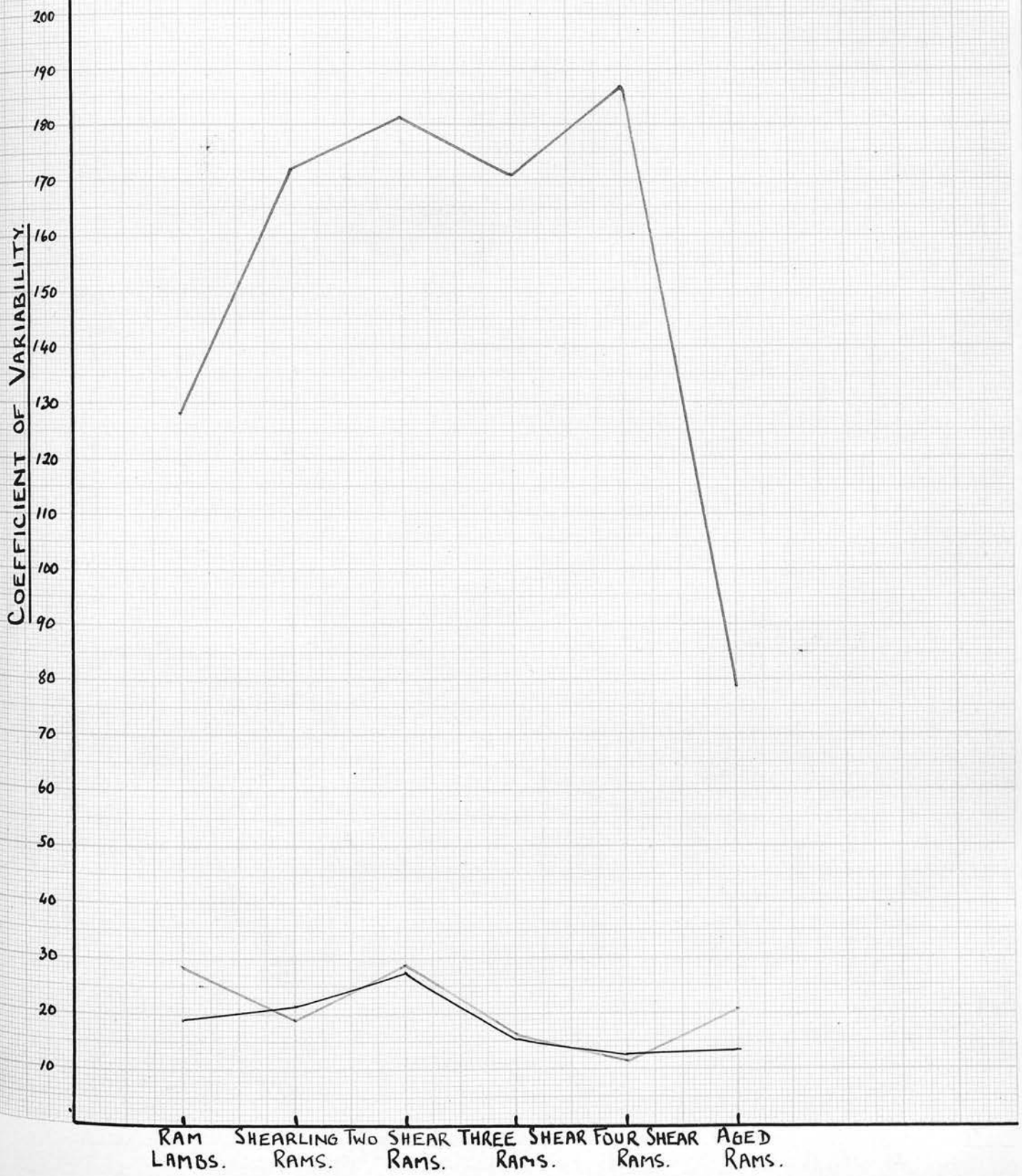


Coefficients of Variability of Weight Averages of Shoulder Staple of Blackface Rams of Different Ages.

59

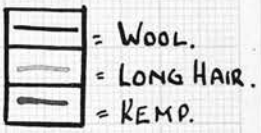
Graph XXI

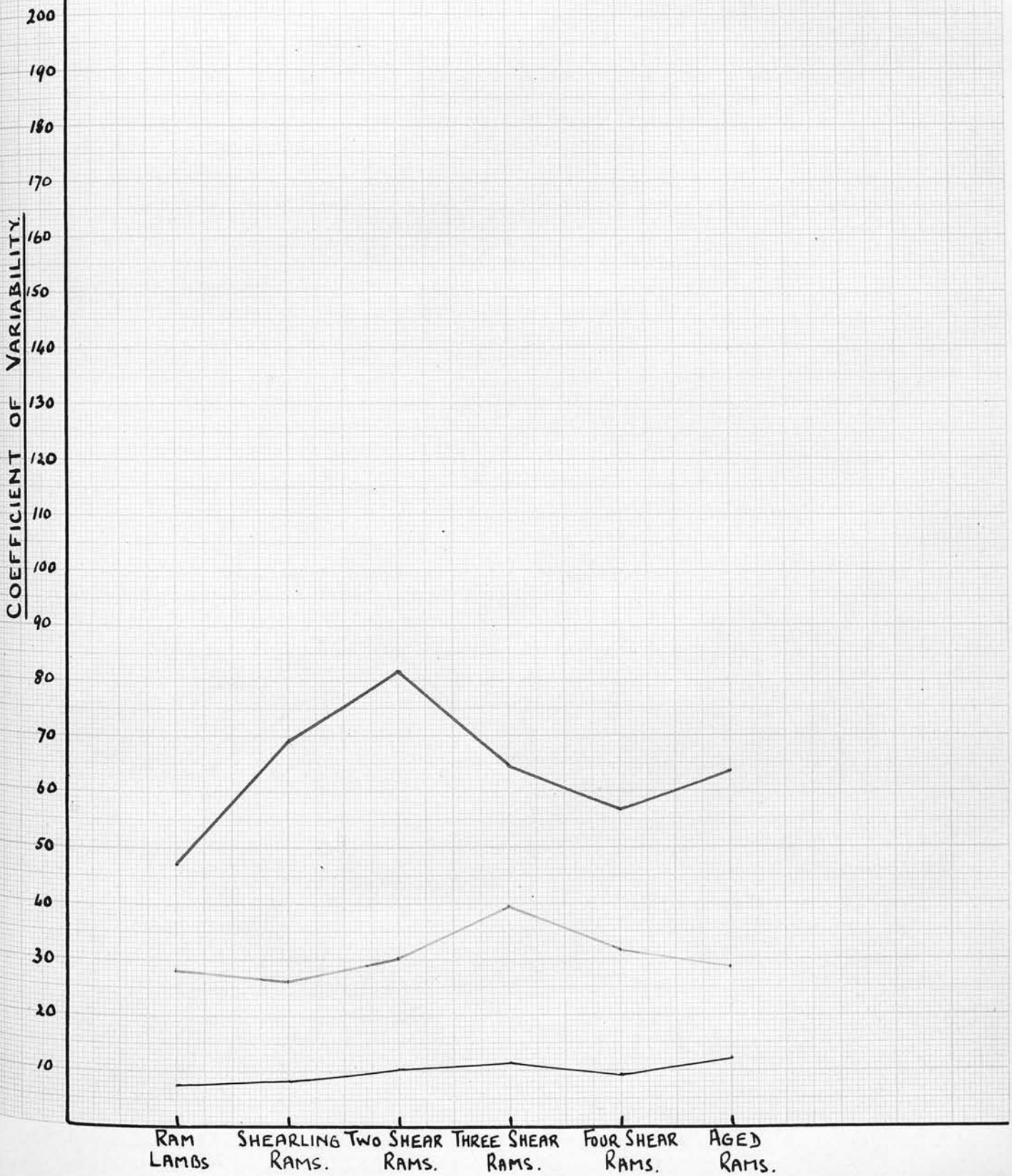




Coefficient of Variability of Count Averages of Haunch Staples of Blackface Rams of Different Ages.

Graph XXII.

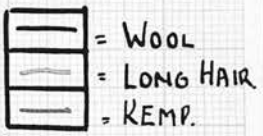


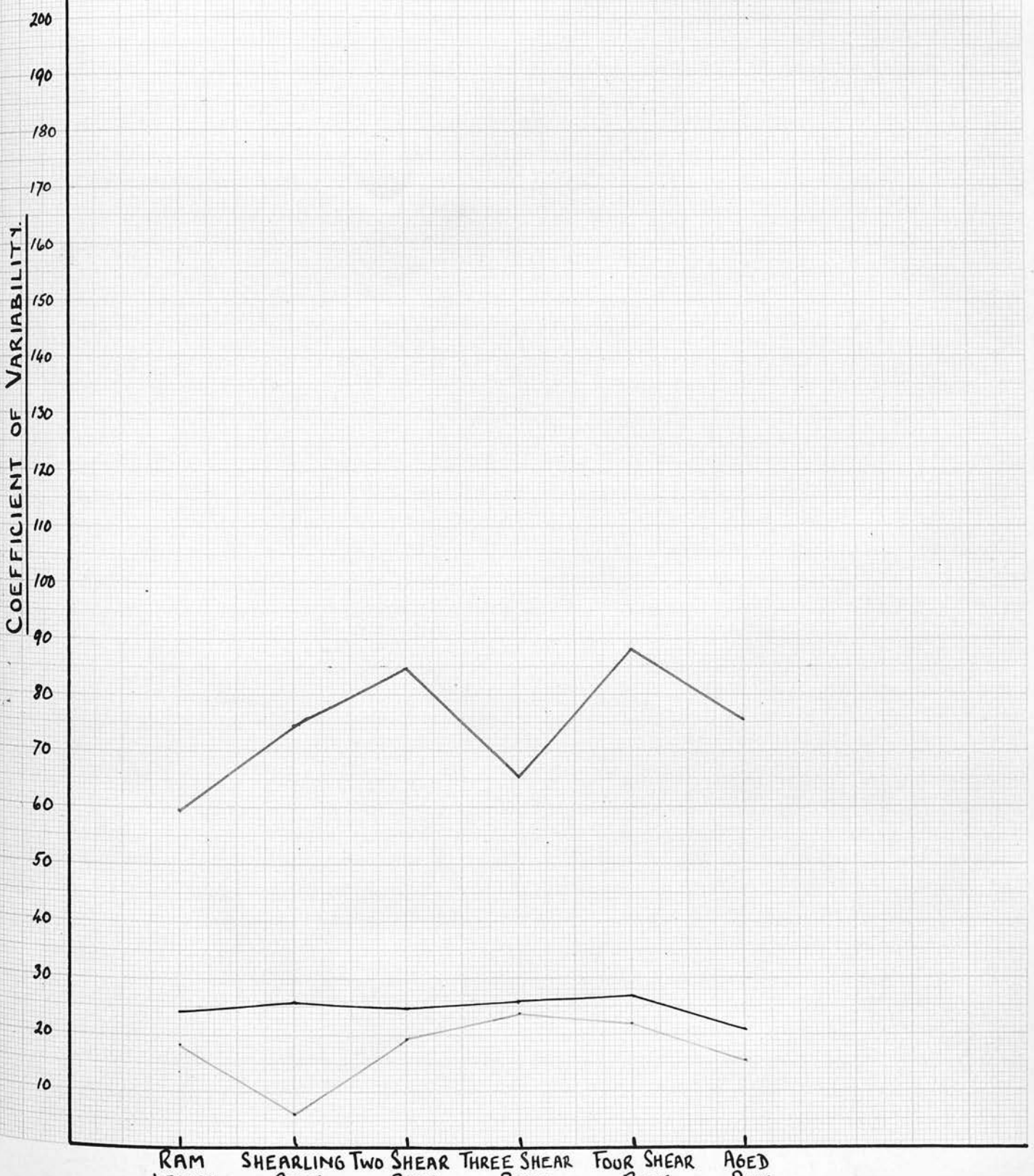


Coefficients of Variability of Weight Averages of Haunch Staples of Blackface Rams of Different Ages.

61.

Graph XXIII.





Summary of Ram Lambs' Fleece Analyses.

	Wool.	Long hair.	Kemp.
Whole Fleece.			
Count.			
Means. %	69·4 ± 0·42	20·9 ± 0·71	9·7 ± 0·79
Standard Deviations.	2·97 ± 0·29	5·06 ± 0·50	5·62 ± 0·56
Co-efficicients of Variability.	4·29 ± 0·43	24·20 ± 2·40	57·90 ± 5·76
Weight.			
Means. %	36·8 ± 0·86	54·3 ± 2·34	8·9 ± 1·04
Standard Deviations.	6·53 ± 0·65	17·65 ± 1·75	7·43 ± 0·74
Co-efficients of Variability.	17·80 ± 1·76	32·50 ± 3·23	83·42 ± 8·30
Shoulder.			
Count.			
Means. %	75·4 ± 0·34	18·2 ± 0·81	6·4 ± 0·83
Standard Deviations.	2·48 ± 0·25	5·82 ± 0·58	5·91 ± 0·59
Co-efficients of Variability.	3·17 ± 0·31	32·0 ± 3·18	93·45 ± 9·30
Weight.			
Means. %	42·6 ± 1·15	50·1 ± 2·02	7·3 ± 1·32
Standard Deviations.	8·10 ± 0·80	14·40 ± 1·40	9·34 ± 0·93
Co-efficients of Variability.	19·0 ± 1·85	28·4 ± 2·80	128·0 ± 12·60
Haunch.			
Count.			
Means. %	63·4 ± 0·98	23·5 ± 0·92	13·10 ± 0·86
Standard Deviations.	4·73 ± 0·47	6·59 ± 0·65	6·15 ± 0·60
Co-efficients of Variability.	7·46 ± 0·74	28·0 ± 2·75	47·0 ± 4·60
Weight.			
Means. %	31·0 ± 1·01	58·5 ± 1·49	10·5 ± 0·88
Standard Deviations.	7·15 ± 0·70	10·60 ± 1·0	6·22 ± 0·615
Co-efficients of Variability.	24·10 ± 2·40	18·10 ± 1·80	59·33 ± 5·90

Summary of Shearling Rams' Fleece Analyses.

	Wool.	Long Hair.	Kemp.
Whole Fleece.			
Count.			
Means. %	73·5 ± 0·37	20·7 ± 0·36	5·8 ± 0·32
Standard Deviations.	4·20 ± 0·26	4·20 ± 0·26	3·70 ± 0·23
Co-efficients of Variability.	5·70 ± 0·35	20·30 ± 1·25	63·80 ± 3·82
Weight.			
Means %	36·9 ± 0·17	58·6 ± 0·62	4·5 ± 0·34
Standard Deviations.	1·97 ± 0·12	7·10 ± 0·44	3·84 ± 0·24
Co-efficients of Variability.	5·3 ± 0·33	12·1 ± 0·74	85·3 ± 5·20
Shoulder.			
Count.			
Means. %	77·4 ± 0·35	19·6 ± 0·36	3·0 ± 0·38
Standard Deviations.	4·0 ± 0·25	4·1 ± 0·25	4·4 ± 0·27
Co-efficients of Variability.	5·1 ± 0·31	20·9 ± 1·30	146·7 ± 9·0
Weight.			
Means. %	40·0 ± 0·74	57·5 ± 0·94	2·5 ± 0·37
Standard Deviations.	8·51 ± 0·52	10·9 ± 0·67	4·3 ± 0·26
Co-efficients of Variability.	21·3 ± 1·30	19·0 ± 1·15	172·0 ± 10·50
Haunch.			
Count.			
Means. %	69·6 ± ·49	21·8 ± 0·49	8·6 ± 0·53
Standard Deviations.	5·7 ± 0·35	5·7 ± 0·35	5·9 ± 0·37
Co-efficients of Variability.	8·2 ± 0·50	26·2 ± 1·60	69·0 ± 4·23
Weight.			
Means. %	33·8 ± 0·47	59·7 ± 0·31	6·5 ± 0·42
Standard Deviations	8·8 ± 0·54	3·55 ± 0·22	4·82 ± 0·29
Co-efficients of Variability.	26·0 ± 1·60	6·0 ± 0·37	74·0 ± 4·53

Summary of Two-Shear Rams' Fleece Analyses.

	Wool.	Long Hair.	Kemp.
Whole Fleece.			
Count.			
Means. %	73·3 ± 0·75	21·2 ± 0·80	5·5 ± 0·59
Standard Deviations.	6·0 ± 0·53	6·3 ± 0·56	4·7 ± 0·42
Co-efficients of Variability.	8·25 ± 0·74	29·7 ± 2·63	85·5 ± 7·57
Weight.			
Means. %	42·2 ± 1·36	53·8 ± 1·34	4·0 ± 0·47
Standard Deviations.	10·92 ± 0·94	11·72 ± 0·98	3·89 ± 0·35
Co-efficients of Variability.	25·9 ± 2·29	21·8 ± 1·92	97·25 ± 8·6
Shoulder.			
Count.			
Means. %	78·6 ± 0·72	19·0 ± 0·80	2·4 ± 0·40
Standard Deviations.	5·8 ± 0·51	6·3 ± 0·56	3·2 ± 0·27
Co-efficients of Variability.	7·38 ± 0·65	33·16 ± 2·94	132·5 ± 11·73
Weight.			
Means. %	47·9 ± 1·65	50·3 ± 1·80	1·8 ± 0·40
Standard Deviations.	13·15 ± 1·17	14·45 ± 1·30	3·26 ± 0·29
Co-efficients of Variability.	27·5 ± 2·43	28·7 ± 2·54	181·1 ± 16·03
Haunch.			
Count.			
Means. %	68·0 ± 0·88	23·4 ± 0·90	8·6 ± 0·90
Standard Deviations.	6·96 ± 0·62	7·04 ± 0·63	7·03 ± 0·63
Co-efficients of Variability.	10·24 ± 0·91	30·10 ± 2·66	81·75 ± 7·30
Weight.			
Means. %	36·5 ± 1·12	57·3 ± 1·37	6·2 ± 0·65
Standard Deviations.	9·0 ± 0·79	11·0 ± 0·98	5·24 ± 0·47
Co-efficients of Variability.	24·9 ± 2·21	19·2 ± 1·70	84·5 ± 7·50

Summary of Three-Shear Rams' Fleece Analyses.

	Wool.	Long Hair.	Kemp.
Whole Fleece.			
Count.			
Means. %	74·1 ± 0·88	18·6 ± 0·94	7·3 ± 0·71
Standard Deviations.	5·43 ± 0·63	5·63 ± 0·65	4·95 ± 0·57
Co-efficients of Variability.	7·3 ± 0·84	30·3 ± 3·50	67·8 ± 7·84
Weight.			
Means. %	43·3 ± 1·28	49·5 ± 1·54	7·2 ± 0·91
Standard Deviations	7·84 ± 0·91	9·42 ± 1·09	5·58 ± 0·65
Co-efficients of Variability.	18·1 ± 2·10	19·0 ± 2·19	77·5 ± 8·97
Shoulder.			
Count.			
Means. %	79·8 ± 0·68	17·5 ± 0·68	2·7 ± 0·57
Standard Deviations.	4·27 ± 0·49	4·29 ± 0·49	3·46 ± 0·40
Co-efficients of Variability.	5·35 ± 0·62	24·5 ± 2·83	128·15 ± 14·80
Weight.			
Means. %	48·5 ± 1·21	48·7 ± 1·30	2·8 ± 0·78
Standard Deviations.	7·4 ± 0·86	7·94 ± 0·92	4·79 ± 0·55
Co-efficients of Variability.	15·26 ± 1·76	16·3 ± 1·89	171·1 ± 19·79
Haunch.			
Count.			
Means. %	68·4 ± 1·28	19·7 ± 1·27	11·9 ± 1·26
Standard Deviations.	7·83 ± 0·90	7·79 ± 0·90	7·72 ± 0·89
Co-efficients of Variability.	11·45 ± 1·32	39·5 ± 4·57	64·9 ± 7·51
Weight.			
Means. %	38·1 ± 1·37	50·3 ± 1·97	11·6 ± 1·24
Standard Deviations.	9·84 ± 1·14	12·02 ± 1·39	7·58 ± 0·88
Co-efficients of Variability.	25·83 ± 2·99	23·9 ± 2·76	65·34 ± 7·56

Summary of Four-Shear Rams' Fleece Analyses.

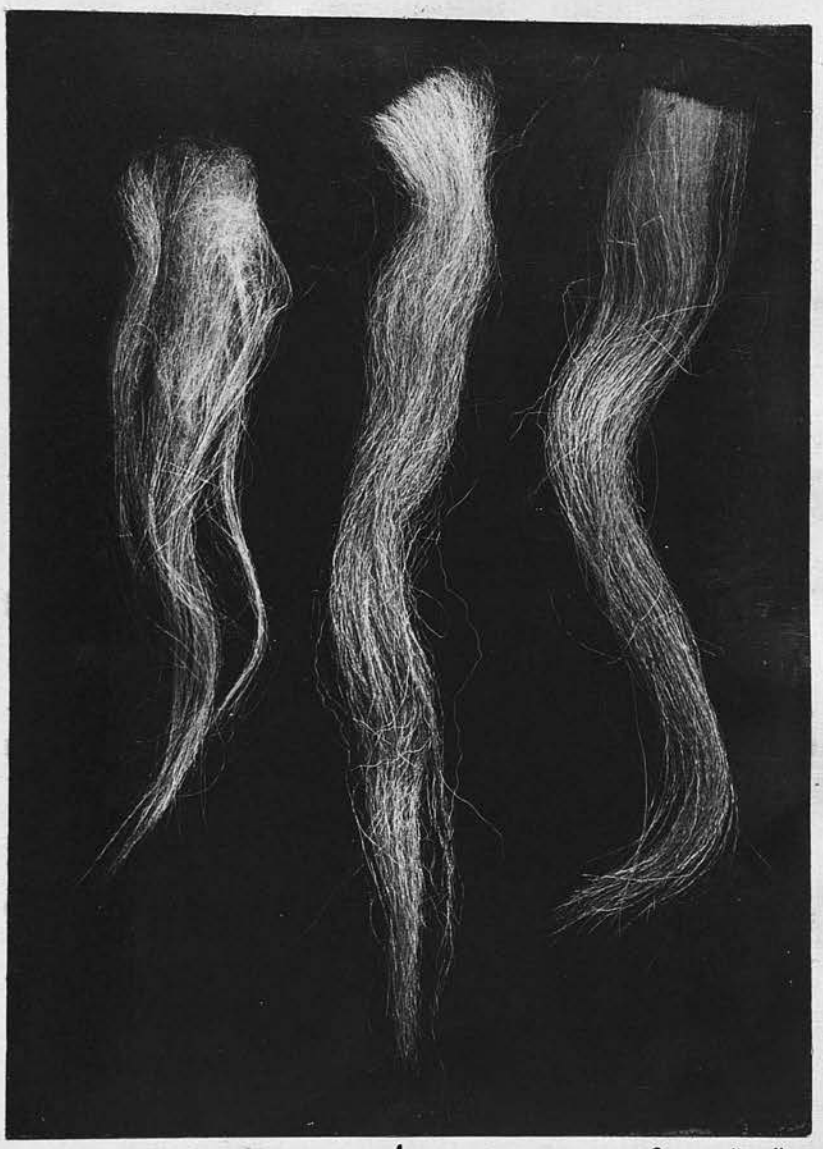
	Wool.	Long Hair.	Kemp.
Whole Fleece.			
Count.			
Means. %	75·7 ± 0·94	19·0 ± 0·84	5·3 ± 0·67
Standard Deviations.	4·44 ± 0·67	3·93 ± 0·59	3·16 ± 0·47
Co-efficients of Variability.	5·85 ± 0·88	20·70 ± 3·10	59·60 ± 9·0
Weight.			
Means. %	44·6 ± 1·50	49·3 ± 1·40	6·1 ± 1·20
Standard Deviations.	7·16 ± 1·07	6·82 ± 1·02	5·92 ± 0·88
Coefficients of Variability.	16·05 ± 2·40	13·8 ± 2·07	97·0 ± 14·63
Shoulder.			
Count.			
Means. %	79·9 ± 0·63	18·5 ± 0·52	1·6 ± 0·3
Standard Deviations.	3·01 ± 0·45	2·42 ± 0·36	1·42 ± 0·21
Co-efficients of Variability.	3·75 ± 0·56	13·1 ± 1·96	88·75 ± 13·31
Weight.			
Means. %	48·8 ± 1·30	49·4 ± 1·01	1·8 ± 0·68
Standard Deviations.	6·19 ± 0·92	5·59 ± 0·84	3·36 ± 0·50
Co-efficients of Variability.	12·7 ± 1·90	11·3 ± 1·70	186·6 ± 28·14
Haunch.			
Count.			
Means. %	71·5 ± 1·30	19·5 ± 1·30	9·0 ± 1·08
Standard Deviations.	6·53 ± 0·98	6·16 ± 0·92	5·13 ± 0·77
Co-efficients of Variability.	9·1 ± 1·40	31·6 ± 4·70	57·0 ± 8·60
Weight.			
Means. %	40·4 ± 2·29	49·2 ± 2·27	10·4 ± 2·00
Standard Deviations.	10·87 ± 1·64	10·8 ± 1·60	9·18 ± 1·38
Co-efficients of Variability.	26·9 ± 4·06	21·8 ± 3·27	87·9 ± 13·26

Summary of Five-Shear & over Rams' Fleece Analyses.

	Wool.	Long Hair.	Kemp.
Whole Fleece.			
Count.			
Means. %	75·5 ± 1·20	19·0 ± 0·90	5·5 ± 0·55
Standard Deviations.	5·98 ± 0·85	4·45 ± 0·63	2·71 ± 0·38
Co-efficients of Variability.	7·92 ± 1·13	23·4 ± 3·36	49·3 ± 7·09
Weight.			
Means. %	48·5 ± 1·40	46·3 ± 1·28	5·2 ± 0·74
Standard Deviations.	7·03 ± 1·01	6·29 ± 0·91	3·60 ± 0·52
Co-efficients of Variability.	14·5 ± 2·09	13·6 ± 1·96	69·2 ± 9·96
Shoulder.			
Count.			
Means. %	80·8 ± 0·88	16·8 ± 0·88	2·4 ± 0·26
Standard Deviations.	4·22 ± 0·61	4·26 ± 0·61	1·25 ± 0·18
Co-efficients of Variability.	5·22 ± 0·75	25·23 ± 3·63	52·10 ± 7·3
Weight.			
Means. %	53·2 ± 1·50	44·6 ± 1·89	2·2 ± 0·35
Standard Deviations.	7·15 ± 1·0	9·3 ± 1·34	1·73 ± 0·25
Co-efficients of Variability.	13·4 ± 1·92	20·8 ± 2·99	78·6 ± 11·3
Haunch.			
Count.			
Means. %	70·2 ± 1·7	21·2 ± 1·25	8·6 ± 1·11
Standard Deviations.	8·45 ± 1·22	6·03 ± 0·86	5·45 ± 0·83
Co-efficients of Variability.	12·04 ± 1·73	28·44 ± 4·09	63·4 ± 9·10
Weight.			
Means. %	43·8 ± 1·70	48·0 ± 1·60	8·2 ± 1·25
Standard Deviations.	9·15 ± 1·32	7·35 ± 1·06	6·19 ± 0·89
Co-efficients of Variability.	20·9 ± 3·00	15·3 ± 2·20	75·5 ± 10·86

Summary of Ewe Hoggs' Fleece Analyses.

	Wool.	Long Hair.	Kemp.
Whole Fleece.			
Count.			
Means. %	70·0 ± 1·28	20·5 ± 0·94	9·5 ± 1·08
Standard Deviations.	6·48 ± 0·49	4·74 ± 0·36	5·49 ± 0·41
Co-efficients of Variability.	9·26 ± 0·68	23·12 ± 1·70	57·8 ± 4·39
Weight.			
Means. %	43·50 ± 2·10	50·4 ± 2·3	6·1 ± 1·0
Standard Deviations.	10·75 ± 0·82	11·70 ± 0·88	4·98 ± 0·37
Co-efficients of Variability.	24·70 ± 1·90	23·2 ± 1·70	81·6 ± 6·15
Shoulder.			
Count.			
Means. %	74·5 ± 1·42	17·2 ± 1·21	8·3 ± 1·50
Standard Deviations.	7·28 ± 0·54	6·08 ± 0·45	7·83 ± 0·59
Co-efficients of Variability.	9·8 ± 0·74	35·4 ± 2·60	94·3 ± 7·10
Weight.			
Means. %	49·5 ± 2·40	44·8 ± 2·60	5·7 ± 1·30
Standard Deviations.	12·12 ± 0·90	13·60 ± 1·02	6·95 ± 0·51
Co-efficients of Variability.	24·50 ± 1·90	30·3 ± 2·22	122·0 ± 9·0
Haunch.			
Count.			
Means %	65·5 ± 1·28	23·8 ± 1·15	10·7 ± 1·01
Standard Deviations.	6·62 ± 0·50	5·71 ± 0·43	5·13 ± 0·38
Co-efficients of Variability.	10·1 ± 0·76	24·0 ± 1·82	48·0 ± 3·64
Weight.			
Means. %	37·5 ± 2·10	56·0 ± 2·35	6·5 ± 0·95
Standard Deviations.	10·93 ± 0·80	11·90 ± 0·90	4·87 ± 0·36
Co-efficients of Variability.	29·1 ± 2·10	21·2 ± 1·6	75·0 ± 5·66



a. b. c. HALF NATURAL SIZE.

SIMILAR TYPES OF "CARPET" WOOL

a. FROM A PYRENEAN SHEEP.

b. FROM A MYSORE RAM.

c. FROM A BLACKFACE RAM.

PLATE VII

CONCLUSIONS.

1. There is considerable differentiation in the disposition of the three types of fibre in different parts of the Blackface fleece. There is more kemp and long hair in the haunch than in the shoulder and there is a kempy area on the saddle of the sheep.
2. The wool portion of the fleece occupies approximately 73·5 % of the total number of fibres, the long hair about 20·0 %, and the kemp about 6·5 %. By weight, the wool takes up approximately 42·0 %, the long hair 52·0 %, and the kemp 6·0 %.
3. There is no correlation except in extreme instances between the proportion by count of the wool fibres and the proportion by weight. From the figures produced there appears to be a correlation between the percentage of kemp by count and by weight, but this is not considered to be of significance.
4. There is a striking difference in the range of variability found in the proportions of wool, long hair and kemp present, and to a lesser extent in the haunch than in the shoulder. The wool fraction is most stable, the long hair fraction less so, and the kemp fraction is extraordinarily variable, from which it is

deduced that kemp could be bred out of the fleece most easily and that the long hair could be modified.

5. There is a difference in the average wool-hair-kemp relationship of the fleece fibres in rams of different ages. As old age advances the wool percentage increases and the long hair percentage decreases.

6. The wool is an annual growth, being shed in the spring months. The long hair is apparently a continuous growth. The kemp grows into the fleece in January and February, and is cast in October, November and December.

7. The long hairs grow at a faster rate than the wool fibres.

8. The character of the long hair determines the market type of the Blackface fleece.

S U M M A R Y

1. A short history of the Scottish Mountain Blackface breed is given with particular reference to the development of the fleece.

2. Data are presented of the analyses of the fleeces of 150 Scottish Blackface rams of different ages and of 40 ewe-hoggs aged one year.

3. The analyses were obtained from the examination of four staples from the fleece, one from the point of each shoulder and one from the point of each haunch.

4. The three classes of fibres to be found in the Blackface fleece are described -- wool, long hair-like fibres, and kemp. Mention is made of the varying character of the fleeces in different parts of Scotland.

5. A description is given of the technique of analysis for arriving at the count and weight proportions of the fleece, on which the discussion and conclusions are based.

6. Data are presented of the differential growth rate of the fibre types and the shedding periods of the classes of fibres are discussed.

S U M M A R Y (continued)

7. The conclusions which are deduced from the statistical treatment of the results of the fleece analyses are discussed, and a short speculative survey is made of the position which Blackface wool holds or may hold in the market.

8. Graphs, histograms, and photographs explain points of importance wherever possible and summaries of statistical results are given.

9. Tables of analyses of the fleeces are appended.

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RAM LAMB CLASS

COMPRISING

TWENTY-THREE INDIVIDUALS.

SERIAL LETTER - A

A1	RS	72·50	26·50	1·00	73·75	25·75	0·50	66·25	32·5	1·25	48·00	52·00	—	47·76	52·25	—	41·00	56·25	2·75
	LS	75·00	25·00	—							47·50	52·50	—						
	RH	56·50	42·00	1·50	58·75	39·25	2·00				36·00	59·00	5·00	34·25	60·25	5·50			
	LH	61·00	36·50	2·50							32·50	61·50	6·00						
A2	RS	73·50	26·50	—	75·75	24·25	—	71·75	21·125	7·125	37·50	62·50	—	43·75	56·25	—	38·25	57·00	4·75
	LS	78·00	22·00	—							50·00	60·00	—						
	RH	70·50	17·00	12·50	67·75	18·00	14·25				35·00	57·50	7·50	32·75	57·75	9·50			
	LH	65·00	19·00	16·00							30·50	58·00	11·50						
A3	RS	75·00	21·50	3·50	73·75	23·25	3·00	68·50	23·375	8·125	33·50	64·50	2·00	34·00	64·00	2·00	29·75	65·125	5·125
	LS	72·50	25·00	2·50							34·50	63·50	2·00						
	RH	61·00	24·00	15·00	63·25	23·50	13·25				25·00	66·00	9·00	25·5	66·25	8·25			
	LH	65·50	23·00	11·50							26·00	66·50	7·50						
A4	RS	75·50	24·50	—	74·50	25·50	—	70·25	29·75	—	33·50	66·50	—	33·00	67·00	—	27·25	72·75	—
	LS	73·50	26·50	—							32·50	67·50	—						
	RH	63·50	36·50	—	66·00	34·00	—				21·00	79·00	—	21·50	78·50	—			
	LH	68·50	31·50	—							22·00	78·00	—						
A5	RS	70·50	24·50	5·00	70·75	23·75	5·50	68·125	23·125	8·75	28·00	66·50	5·50	27·00	66·75	6·25	24·375	66·375	9·25
	LS	71·00	23·00	6·00							26·00	67·00	7·00						
	RH	64·50	22·50	13·00	65·50	22·50	12·00				18·00	68·00	14·00	21·75	66·00	12·25			
	LH	66·50	22·50	11·00							25·50	64·00	10·50						
A6	RS	78·00	17·50	4·50	79·25	17·75	3·00	73·875	19·00	7·125	38·50	60·00	1·50	37·50	61·25	1·25	32·875	64·00	3·125
	LS	80·50	18·00	1·50							36·50	62·50	1·00						
	RH	67·00	22·00	11·00	68·50	20·25	11·25				27·50	67·50	5·00	28·25	66·75	5·00			
	LH	70·00	18·50	11·50							29·00	66·00	5·00						
A7	RS	76·75	21·00	2·25	76·625	20·75	2·625	71·50	22·375	6·125	33·50	65·00	1·50	34·50	63·75	1·75	27·625	67·50	4·875
	LS	76·50	20·50	3·00							35·50	62·50	2·00						
	RH	60·50	29·500	10·00	66·25	24·00	9·75				20·00	72·50	7·50	20·75	71·25	8·00			
	LH	72·00	18·50	9·50							21·50	70·00	8·50						
A8	RS	74·50	16·00	9·50	72·25	14·00	13·75	66·00	18·00	16·00	44·00	51·00	5·00	46·25	45·50	8·25	35·00	55·50	9·50
	LS	70·00	12·00	18·00							48·50	4000	11·50						
	RH	60·00	20·00	20·00	59·625	22·00	18·375				26·50	60·50	13·00	23·875	65·25	10·875			
	LH	59·25	24·00	16·75							21·25	70·00	8·75						
A9	RS	76·00	15·00	9·00	77·50	14·50	8·00	67·00	20·50	12·50	61·50	35·00	3·50	60·25	36·75	3·00	47·25	46·00	6·75
	LS	79·00	14·00	7·00							59·00	38·50	2·50						
	RH	58·00	26·5	15·50	56·625	26·50	16·875				37·50	52·00	10·50	34·25	55·00	10·75			
	LH	55·25	26·5	18·25							31·00	58·00	11·00						
A10	RS	79·50	18·00	2·500	76·00	20·25	3·75	67·875	23·625	8·50	38·50	60·00	1·50	36·00	61·50	2·50	29·25	66·625	4·125
	LS	72·50	22·50	5·00							33·50	63·00	3·50						
	RH	55·50	30·00	14·50	59·75	27·00	13·25				23·25	71·00	5·75	22·50	71·75	5·75			
	LH	64·00	24·00	12·00							21·75	72·50	5·75						
A11	RS	76·50	17·75	5·75	7875	16·00	5·25	68·50	20·375	11·125	37·50	56·25	6·25	41·25	52·625	6·125	36·625	54·00	9·375
	LS	81·00	74·25	4·75							45·00	49·00	6·00						
	RH	56·50	25·50	18·00	58·25	24·75	17·00				33·50	55·50	11·00	32·00	55·25	12·75			
	LH	60·00	24·00	16·00							30·50	55·00	14·5						
A12	RS	77·50	22·50	—	74·25	25·75	—	69·625	28·00	2·375	42·00	58·00	—	42·25	57·75	64—	38·00	61·00	1·00
	LS	71·00	29·00	—							42·50	57·50	—						
	RH	69·00	27·00	4·00	65·00	30·25	4·75				41·50	57·00	1·5	33·75	64·25	2·00			
	LH	61·00	33·50	5·50							26·00	71·50	2·5						
A13	RS	76·00	18·00	6·00	78·00	15·25	6·75	73·00	14·375	12·625	47·50	47·50	5·00	50·75	41·75	7·50	46·125	43·125	10·75
	LS	80·00	12·50	7·50							54·00	36·00	10·00						
	RH	72·50	13·00	14·50	68·00	13·5	18·50				44·00	44·00	12·00	41·50	44·50	14·00			
	LH	63·50	14·00	22·50							39·00	4500	1600						
A14	RS	80·50	19·50	—	80·25	19·75	—	74·625	18·875	6·50	42·00	58·00	—	42·25	57·75	—	40·25	54·75	5·0
	LS	80·00	20·00	—							42·50	57·50	—						
	RH	65·50	20·00	14·5	69·00	18·00	13·00				38·75	51·25	10·00	38·375	51·625	10·00			
	LH	72·50	16·00	11·5							38·00	52·00	10·00						
A15	RS	70·00	17·50	12·50	70·00	15·25	14·75	66·00	17·25	16·75	43·50	51·50	5·00	50·25	43·50	6·25	44·25	48·875	6·875
	LS	70·00	13·00	17·00							57·00	35·50	7·500						
	RH	59·50	19·50	21·00	62·00	19·25	18·75				38·00	53·50	8·50	38·375	54·25	7·375			
	LH	64·50	19·00	16·50							38·75	55·00	6·25						
A16	RS	COTTED STAPLE			78·00	18·00	4·00	73·375	18·375	8·25	COTTED STAPLE			40·75	50·75	8·50	38·625	54·875	6·5
	LS	78·00	18·0	4·0							40·75	50·75	8·50						
	RH	68·75	18·75	12·50	68·75	18·75	12·50				41·00	54·50	4·50	36·50	59·00	4·50			
	LH	68·75	18·75	12·50							32·00	63·50	4·50						
A17	RS	75·00	24·00	1·00	74·75	23·75	1·50	70·25	23·375	6·375	34·75	64·50	0·75	36·625	62·25	1·125	34·75	59·875	5·375
	LS	74·50	23·50	2·00							38·50	60·00	1·50						
	RH	66·50	24·00	9·50	65·75	23·0	11·25				35·50	55·00	9·50	32·75	57·50	9·75			
	LH	65·00	22·00	13·00							30·00	60·00	10·00						
A18	RS	75·00	12·00	13·00	75·50	12·00	12·50	70·0	12·00	18·00	44·00	25·50	30·50	44·25	26·25	29·50	43·875	27·50	28·625
	LS	76·00	12·00	12·00							44·50	27·00	28·50						
	RH	65·00	13·00	22·00	64·50	12·00	23·50				43·50	29·50	27·00	43·50	28·875	27·625			
	LH	64·00	11·00	26·00							43·50	28·25	28·25						
A19	RS	78·00	15·00	7·0	75·50	16·50	8·00	7			36·50	47·50	16·00	35·25	49·75	15·00	35·375	51·875	12·75
	LS	73·00	18·00	9·0				72·50	19·25	8·25	34·00	52·00	14·00						
	RH	69·50	22·00	8·5	69·50	22·00	8·50				35·50	54·00	10·50	35·50	54·00	10·50			
	LH																		
A20	RS	72·50	26·25	1·25	74·50	23·125	2·375	67·125	29·75	3·125	41·50	57·00	1·50	43·75	54·25	2·00	35·625	62·00	2·375
	LS	76·50	20·00	3·50							46·00	51·50	2·50						
	RH	53·50	40·50	6·00	59·75	36·375	3·875				25·50	71·50	3·00	27·50	69·75	2·75			
	LH	66·00	32·25	1·75							29·50	68·00	2·50						

A21	RS	75·25	6·750	18·00	75·50	5·125	19·375	70·00	11·00	19·00	53·50	24·50	22·00	59·00	17·25	23·75	49·625	29·625	20·75
	LS	75·75	3·50	20·75							64·50	10·00	25·50						
	RH	67·25	10·00	22·75	64·375	16·75	18·875				44·50	32·00	23·50	4025	42·00	17·75			
	LH	61·50	23·50	15·00							36·00	52·00	12·00						
A22	RS	74·00	6·00	20·00	74·00	6·00	20·00	62·0	16·25	21·75	53·00	14·50	32·5	53·00	14·50	32·5	36·50	36·125	27·375
	LS																		
	RH	50·00	26·5	23·50	50·00	26·50	23·50				20·00	57·75	22·25	20·00	57·75	22·25			
	LH																		
A23	RS	77·00	13·00	10·00	75·00	12·5	12·5	68·00	17·625	14·375	36·00	54·50	9·50	40·75	47·75	11·50	33·00	54·875	12·125
	LS	73·00	12·00	15·00							45·50	41·00	13·50						
	RH	58·50	23·50	18·00	61·00	22·75	16·25				25·00	61·50	13·50	25·25	62·00	12·75			
	LH	63·50	22·00	14·50							25·50	62·50	12·00						

SHEARLING RAM CLASS

COMPRISING

SIXTY INDIVIDUALS

SERIAL LETTER - B.

B1	RS	75·00	23·50	1·50	75·00	22·00	3·00	70·375	23·50	6·125	31·00	68·00	1·00	31·75	66·50	1·75	29·875	64·875	5·25
	LS	75·00	20·50	4·50							32·50	65·00	2·50						
	RH	66·50	25·00	8·50	65·75	25·00	9·25				30·50	63·50	6·00	28·00	63·25	8·75			
	LH	65·00	25·00	10·00							25·50	63·00	11·50						
B2	RS	72·50	22·50	5·00	74·00	22·00	4·00	71·125	21·75	7·125	30·00	68·00	2·00	27·50	70·50	2·00	26·375	69·25	4·375
	LS	75·50	21·50	3·00							25·00	73·00	2·00						
	RH	65·50	21·50	13·00	68·25	21·50	10·25				26·00	66·00	8·00	25·25	68·00	6·75			
	LH	71·00	21·50	7·50							24·50	70·00	5·50						
B3	RS	71·00	24·50	4·50	72·25	24·75	3·00	68·375	26·875	4·75	31·00	65·00	4·00	28·00	69·75	2·25	25·75	71·25	3·00
	LS	73·50	25·00	1·50							25·00	74·50	0·50						
	RH	64·50	27·00	8·50	64·50	29·00	6·50				26·00	70·00	5·00	23·50	72·75	3·75			
	LH	64·50	31·00	4·50							22·00	75·50	2·50						
B4	RS	78·00	19·00	3·00	78·25	19·25	2·50	71·25	22·625	6·125	36·50	59·50	4·00	36·25	59·75	4·00	32·75	60·25	7·00
	LS	78·50	19·50	2·00							36·00	60·00	4·00						
	RH	64·50	26·50	9·00	64·25	26·00	9·75				31·50	57·00	11·50	29·25	60·75	10·00			
	LH	64·00	25·50	10·50							27·00	64·50	8·50						
B5	RS	81·50	17·50	1·00	80·50	18·50	1·00	71·625	19·75	8·625	43·50	56·00	0·50	41·25	58·00	0·75	36·50	57·50	6·00
	LS	79·50	19·50	1·00							39·00	60·00	1·00						
	RH	63·00	22·00	15·00	62·75	21·00	16·25				27·50	64·00	8·50	31·75	57·00	11·25			
	LH	62·50	20·00	17·50							36·00	50·00	14·00						
B6	RS	79·00	19·50	1·50	78·75	19·00	2·25	73·00	23·00	4·00	45·50	53·50	1·00	49·00	49·25	1·75	41·75	54·875	3·375
	LS	78·50	18·50	3·00							52·50	45·00	2·50						
	RH	64·00	28·00	8·00	67·25	27·00	5·75				37·00	55·50	7·50	34·50	60·50	5·00			
	LH	70·50	26·00	3·50							32·00	65·50	2·50						
B7	RS	75·00	11·50	13·50	75·25	14·50	10·25	71·375	14·875	13·75	39·00	51·00	10·00	38·50	53·75	7·75	37·50	51·125	11·375
	LS	75·50	17·50	7·00							38·00	56·50	5·50						
	RH	67·00	16·50	16·50	67·50	15·25	17·25				35·00	54·00	11·00	36·50	48·50	15·00			
	LH	68·00	14·00	18·00							38·00	43·00	19·00						
B8	RS	74·00	26·00	—	73·50	26·50	—	73·50	22·625	3·875	34·00	66·00	—	28·75	71·25	—	32·75	62·875	4·375
	LS	73·00	27·00	—							23·50	76·50	—						
	RH	73·00	18·00	9·00	73·50	18·75	7·75				38·00	52·00	10·00	36·75	54·50	8·75			
	LH	74·00	19·50	6·50							35·50	57·00	7·50						
B9	RS	78·50	21·50	—	78·25	21·75	—	73·875	24·125	2·00	37·50	62·50	—	37·50	62·50	—	35·625	63·50	0·875
	LS	78·00	22·00	—							37·50	62·50	—						
	RH	65·00	29·00	6·00	69·5	26·50	4·00				36·50	61·00	2·50	33·75	64·50	1·75			
	LH	74·00	24·00	2·00							31·00	68·00	1·00						
B10	RS	72·00	23·50	4·50	72·25	20·00	7·75	73·125	19·25	7·625	30·00	63·50	6·50	30·75	57·25	12·00	32·00	57·00	11·00
	LS	72·50	16·50	11·00							31·50	51·00	17·50						
	RH	76·00	20·50	3·50	74·00	18·5	7·50				34·00	63·50	2·50	33·25	56·75	10·00			
	LH	72·00	16·50	11·50							32·50	50·00	17·50						
B11	RS	73·50	19·50	7·00	77·5	17·75	4·75	73·375	16·50	10·125	41·00	57·00	2·00	45·75	53·00	1·25	43·375	52·125	4·50
	LS	81·50	16·00	2·50							50·50	49·00	0·50						
	RH	68·50	16·50	15·00	69·25	15·25	15·50				43·00	51·00	6·00	41·00	51·25	7·75			
	LH	70·00	14·00	16·00							39·00	51·50	9·50						
B12	RS	78·00	20·00	2·00	79·00	19·50	1·50	75·75	19·375	4·875	35·00	63·00	2·00	36·50	61·75	1·75	35·50	60·125	4·375
	LS	80·00	19·00	1·00							38·00	60·50	1·50						
	RH	71·50	20·00	8·50	72·50	19·25	8·25				35·50	58·50	6·00	34·50	58·50	7·00			
	LH	73·50	18·50	8·00							33·50	58·50	8·00						
B13	RS	76·00	24·00	—	76·50	23·50	—	75·25	23·625	1·125	24·00	76·00	—	26·25	73·75	—	25·125	74·625	0·25
	LS	77·00	23·00	—							28·50	71·50	—						
	RH	74·00	21·50	4·50	74·00	23·75	2·25				26·50	72·50	1·00	24·00	75·50	0·5			
	LH	74·00	26·00	—							21·50	78·50	—						
B14	RS	81·00	12·50	6·50	80·50	13·25	6·25	76·125	18·125	5·75	45·00	48·00	7·00	47·5	45·875	6·625	33·50	55·75	5·75
	LS	80·00	14·00	6·00							50·00	43·75	6·25						
	RH	69·00	26·50	5·50	71·75	23·00	5·25				28·50	66·50	5·00	29·5	65·75	4·750			
	LH	74·50	20·50	5·00							30·50	65·00	4·50						
B15	RS	75·00	21·50	3·50	75·00	20·75	4·25	70·75	21·75	7·50	47·50	50·50	2·00	51·25	46·25	2·50	45·75	48·75	5·50
	LS	75·00	20·00	5·00							55·00	42·00	3·00						
	RH	69·00	20·50	10·50	66·50	22·75	10·75				44·50	47·50	8·00	40·25	51·25	8·50			
	LH	64·00	25·00	11·00							36·00	55·00	9·00						
B16	RS	78·50	18·50	3·00	76·25	21·25	2·50	73·875	19·875	6·25	32·50	64·50	3·00	29·00	68·00	3·00	25·875	68·00	6·125
	LS	74·00	24·00	2·00							25·50	71·50	3·00						
	RH	69·50	19·50	11·00	71·50	18·50	10·00				24·50	66·00	9·50	22·75	68·00	9·25			
	LH	73·50	17·50	9·00							21·00	70·00	9·00						
B17	RS	80·50	17·00	2·50	80·0	16·50	3·50	76·125	20·25	3·625	44·00	53·50	2·50	47·00	50·00	3·00	40·875	56·875	2·25
	LS	79·50	16·00	4·50							50·00	46·50	3·50						
	RH	73·50	20·50	6·00	72·25	24·00	3·75				35·00	62·50	2·50	34·75	63·75	1·50			
	LH	71·00	27·50	1·50							34·50	65·00	0·50						
B18	RS	80·50	17·50	2·00	80·75	17·50	1·75	76·125	22·375	1·50	40·50	56·00	4·00	37·75	60·00	2·25	30·25	68·25	1·50
	LS	81·00	17·50	1·50							35·50	64·00	0·50						
	RH	73·00	24·50	2·50	71·50	27·25	1·25				27·00	71·50	1·50	22·75	76·50	0·75			
	LH	70·00	30·00	—							18·50	81·50	—						
B19	RS	82·00	16·50	1·50	82·00	17·25	0·75	79·125	18·25	2·625	40·00	59·00	1·00	40·25	59·25	0·50	38·375	58·625	3·0
	LS	82·00	18·00	—							40·50	59·50	—						
	RH	77·00	19·25	3·75	76·25	19·125	4·625				36·00	59·50	4·50	36·50	58·00	5·50			
	LH	75·50	19·00	5·50							37·00	56·50	6·50						
B20	RS	77·50	22·50	—	78·00	22·00	—	76·25	22·375	1·375	33·00	67·00	—	34·25	65·75	—	31·375	68·375	0·25
	LS	78·50	21·50	—							35·50	64·50	—						
	RH	71·50	24·00	4·50	74·50	22·75	2·75				26·50	72·50	1·00	28·50	71·00	0·50			
	LH	77·50	21·50	1·00							30·50	69·50	—						

B21	RS	77·50	22·50	—	79·00	21·00	—	76·375	23·625	—	48·00	52·00	—	46·25	53·75	—	41·50	58·50	—
	LS	80·50	19·50	—							44·50	55·50	—						
	RH	74·50	25·50	—	73·75	26·25	—				38·00	62·00	—	36·75	63·25	—			
	LH	73·00	27·00	—							35·50	64·50	—						
B22	RS	76·50	21·50	2·00	79·00	20·00	1·00	75·875	21·375	2·75	45·00	53·50	1·50	50·75	48·50	0·75	44·75	53·25	2·00
	LS	81·50	18·50	—							56·50	43·50	—						
	RH	68·00	23·00	9·00	72·75	22·75	4·5				37·00	56·50	6·50	38·75	58·00	3·25			
	LH	77·50	22·50	—							40·50	59·50	—						
B23	RS	81·50	18·50	—	81·75	18·25	—	76·875	23·125	—	36·50	63·50	—	37·00	63·00	—	33·125	66·875	—
	LS	82·00	18·00	—							37·50	62·50	—						
	RH	77·00	23·00	—	72·00	28·00	—				31·00	69·00	—	29·25	70·75	—			
	LH	67·00	33·00	—							27·50	72·50	—						
B24	RS	76·00	22·00	2·00	70·00	28·00	2·00	71·875	24·625	3·50	35·50	63·50	1·00	30·25	68·75	1·00	33·875	64·00	2·125
	LS	64·00	34·00	2·00							25·00	74·00	1·00						
	RH	70·00	25·00	5·00	73·75	21·25	5·00				33·50	63·50	3·00	37·50	59·25	3·25			
	LH	77·50	17·50	5·00							41·50	55·00	3·50						
B25	RS	74·50	23·50	2·00	75·25	22·50	2·25	70·375	18·126	11·50	36·50	62·50	1·00	36·25	62·5	1·25	36·125	55·75	8·125
	LS	76·00	21·50	2·50							36·00	62·50	1·50						
	RH	65·50	13·00	21·50	65·50	13·75	20·75				40·00	43·50	16·50	36·00	49·0	16·00			
	LH	65·50	14·50	20·00							32·00	54·50	13·50						
B26	RS	85·00	14·00	1·00	82·75	16·75	0·50	77·00	15·875	7·125	54·00	45·00	1·00	49·0	50·50	0·50	45·375	49·375	5·25
	LS	80·50	19·50	—							44·00	56·00	—						
	RH	73·50	14·50	12·00	71·25	15·00	13·75				43·00	51·00	6·00	41·75	48·25	10·00			
	LH	69·00	15·50	15·50							40·50	45·50	14·00						
B27	RS	79·50	16·00	4·50	79·25	17·75	3·00	76·50	21·625	1·875	42·50	55·00	2·50	41·50	56·75	1·75	37·50	61·50	1·00
	LS	79·00	19·50	1·50							40·50	58·50	1·00						
	RH	74·00	26·00	—	73·75	25·50	0·75				33·50	66·50	—	33·50	66·25	0·25			
	LH	73·50	25·00	1·50							33·50	66·00	0·50						
B28	RS	74·00	23·50	2·50	73·50	24·25	2·25	68·625	22·875	8·50	23·50	76·00	0·50	26·75	72·50	0·75	27·75	67·25	5·00
	LS	73·00	25·00	2·00							30·00	69·00	1·00						
	RH	63·00	22·00	15·00	63·75	21·50	14·75				27·50	63·50	9·00	28·75	62·00	9·25			
	LH	64·50	21·00	14·50							30·00	60·50	9·50						
B29	RS	80·50	16·50	3·00	81·00	16·75	2·25	74·25	15·375	10·375	36·00	63·50	0·50	36·75	62·75	0·50	35·75	59·625	4·625
	LS	81·50	17·00	1·50							37·50	62·00	0·50						
	RH	69·00	9600	21·50	67·50	14·00	18·50				43·50	44·00	12·50	34·75	56·50	8·75			
	LH	66·00	18·50	15·50							26·00	69·00	5·00						
B30	RS	75·00	22·00	3·00	74·25	22·25	3·50	72·125	22·625	5·25	34·00	66·00	1·00	34·50	64·50	1·00	38·25	59·875	1·875
	LS	73·50	22·50	4·00							35·00	64·00	1·00						
	RH	67·50	26·00	6·50	70·00	23·00	7·00				38·50	59·50	2·00	42·00	55·25	2·75			
	LH	72·50	20·00	7·50							45·50	51·00	3·50						
B31	RS	76·00	24·00	—	74·75	25·25	—	71·875	26·625	1·50	26·00	74·00	—	29·75	70·25	—	26·375	73·125	0·50
	LS	73·50	26·50	—							33·50	66·50	—						
	RH	70·00	26·50	3·50	69·00	28·00	3·00				25·00	74·00	1·00	23·00	76·00	1·00			
	LH	68·00	29·50	2·50							21·00	78·00	1·00						
B32	RS	72·00	27·00	1·00	75·50	24·00	0·50	73·125	23·50	3·375	39·00	60·50	0·50	38·00	61·75	0·25	34·50	62·00	3·50
	LS	79·00	21·00	—							37·00	63·00	—						
	RH	70·50	24·50	5·00	70·75	23·00	6·25				31·00	62·50	6·50	31·00	62·25	6·75			
	LH	71·00	21·50	7·50							31·00	62·00	7·00						
B33	RS	74·50	21·50	4·00	74·75	19·00	6·25	68·875	25·625	5·50	38·50	56·50	5·00	40·25	49·75	10·00	31·125	61·25	7·625
	LS	75·00	16·50	8·50							42·00	43·00	15·00						
	RH	64·50	31·00	4·50	63·00	32·25	4·75				21·00	74·00	5·00	22·00	72·75	6·25			
	LH	61·50	33·50	5·00							23·00	71·50	5·50						
B34	RS	78·50	11·50	10·00	77·50	13·25	9·25	71·00	17·75	11·25	59·00	38·00	3·00	54·00	41·00	5·00	43·00	51·75	5·25
	LS	76·50	15·00	8·50							49·00	44·00	7·00						
	RH	64·00	23·50	12·50	64·50	22·25	13·25				34·00	61·50	4·50	32·00	62·50	5·50			
	LH	65·00	21·00	14·00							30·00	63·50	6·50						
B35	RS	79·00	21·00	—	79·75	20·25	—	74·00	20·00	6·00	31·25	68·75	—	32·375	67·625	—	32·875	60·375	6·75
	LS	80·50	19·50	—							33·50	66·50	—						
	RH	66·50	19·50	14·00	68·25	19·75	12·00				34·50	50·00	15·50	33·25	53·25	13·50			
	LH	70·00	20·00	10·00							32·00	56·50	11·50						
B36	RS	78·00	22·00	—	79·00	28·00	—	75·25	22·875	1·875	33·00	67·00	—	33·5	66·50	—	29·125	70·25	0·625
	LS	80·00	20·00	—							34·00	6600	—						
	RH	74·00	18·50	7·50	71·50	24·75	3·75				27·75	69·50	2·75	24·625	74·00	1·375			
	LH	69·00	31·00	—							21·50	78·50	—						
B37	RS	80·50	18·00	1·50	80·25	17·00	2·75	78·75	19·125	2·125	46·25	51·50	2·25	45·375	51·50	3·125	41·00	56·00	3·00
	LS	80·00	16·00	4·00							44·50	51·50	4·00						
	RH	75·00	22·50	2·50	77·25	21·25	1·50				34·00	63·00	3·00	36·75	60·50	2·50			
	LH	79·50	20·00	0·50							39·50	58·50	2·00						
B38	RS	80·00	18·50	1·50	80·00	19·25	0·75	69·625	22·875	7·50	40·00	59·00	1·00	39·00	60·50	0·50	31·875	62·875	5·25
	LS	80·00	20·00	—							38·00	62·00	—						
	RH	61·00	28·00	11·00	59·25	26·50	14·25				26·00	67·00	7·00	24·75	65·25	10·00			
	LH	57·50	25·00	17·50							23·50	63·50	13·00						
B39	RS	81·00	17·50	1·50	82·00	16·50	1·50	76·625	19·75	3·625	40·00	59·75	0·25	45·00	54·125	0·875	38·625	59·00	2·375
	LS	83·00	15·50	1·50							50·00	48·50	1·50						
	RH	72·50	22·00	5·50	71·25	23·00	5·75				34·00	62·00	4·00	32·25	64·00	3·75			
	LH	70·00	24·00	6·00							30·50	66·00	3·50						
B40	RS	72·50	16·50	11·00	74·25	19·25	6·50	71·00	16·50	12·50	37·00	49·50	13·50	36·50	56·00	7·50	34·00	52·625	13·375
	LS	76·00	22·00	2·00							36·00	62·50	1·50						
	RH	64·00	16·00	20·00	67·75	13·75	18·50				30·00	50·00	20·00	31·50	49·25	19·25			
	LH	71·50	11·50	17·00							33·00	48·50	18·50						

B1U	RS	80.00	16.50	3.50	80.0	17.00	3.00	73.625	15.75	10.625	42.00	55.50	2.50	45.00	52.75	2.25	42.50	49.125	8.375
	LS	80.00	17.50	2.50							48.00	50.00	2.00						
	RH	69.00	15.50	15.50	67.25	14.5	18.25				40.00	48.50	11.50	40	45.5	14.50			
	LH	65.50	18.50	21.00							40.00	42.50	17.50						
B42	RS	78.50	21.50	—	78.75	21.25	—	71.375	19.625	9.00	36.00	64.00	—	38.50	61.50	—	39.375	54.125	6.50
	LS	79.00	21.00	—							41.00	59.00	—						
	RH	66.00	17.00	17.00	64.00	18.00	18.00				42.00	46.00	12.00	40.25	46.75	13.00			
	LH	62.00	19.00	19.00							38.50	47.50	14.00						
B43	RS	83.50	16.50	—	81.50	18.50	—	74.125	17.875	8.00	41.50	58.50	—	42.625	57.375	—	39.25	57.50	3.25
	LS	79.50	20.50	—							43.75	56.25	—						
	RH	64.50	20.50	15.00	66.75	17.25	16.00				38.75	56.25	5.00	35.875	47.625	6.50			
	LH	69.00	14.00	17.00							53.00	39.00	8.00						
B44	RS	78.00	20.00	2.00	78.75	19.25	2.00	73.875	20.625	5.50	46.50	52.50	1.00	47.50	51.50	1.00	41.25	53.375	5.375
	LS	79.50	18.50	2.00							48.50	50.50	1.00						
	RH	71.50	19.00	9.50	69.00	22.00	9.00				39.00	52.00	9.00	35.00	55.25	9.75			
	LH	66.50	25.00	8.50							31.00	58.50	10.50						
B45	RS	76.00	21.50	2.50	76.00	20.75	3.25	71.25	24.25	4.50	32.00	67.00	1.00	36.50	62.00	1.50	29.625	68.50	1.875
	LS	76.00	20.00	4.00							41.00	57.00	2.00						
	RH	66.50	27.00	6.50	66.50	27.75	5.75				20.75	76.50	2.75	22.625	75.00	2.375			
	LH	66.50	28.50	5.00							24.50	73.50	2.00						
B46	RS	73.50	26.50	—	73.50	26.50	—	72.50	24.625	2.875	25.00	75.00	—	31.75	68.25	—	32.75	65.125	2.125
	LS	73.50	26.50	—							38.50	61.50	—						
	RH	71.50	24.00	4.50	71.50	22.75	5.75				33.75	63.25	3.00	33.625	62.125	4.25			
	LH	71.50	21.50	7.00							33.50	61.00	5.50						
B47	RS	76.00	24.00	—	80.00	20.00	—	76.25	21.75	2.00	45.00	55.00	—	44.75	55.25	—	40.50	58.625	0.875
	LS	84.00	16.00	—							44.50	55.50	—						
	RH	75.00	18.75	6.25	72.50	23.625	3.875				39.50	58.00	2.50	36.25	62.00	1.75			
	LH	70.00	28.50	1.50							33.00	66.00	1.00						
B48	RS	76.00	18.00	6.00	76.00	21.00	3.00	68.25	23.00	8.75	48.50	48.50	3.00	46.50	52.00	1.50	40.25	56.625	3.125
	LS	76.00	24.00	—							44.50	55.50	—						
	RH	59.00	23.50	17.50	60.50	25.00	14.50				34.00	60.00	6.00	34.00	61.25	4.75			
	LH	62.00	26.50	11.50							34.00	62.50	3.50						
B49	RS	75.00	—	25.00	75.75	—	24.25	78.50	—	21.5	73.00	—	27.00	73.0	—	27.00	76.875	—	23.125
	LS	76.50	—	23.500							73.00	—	27.00						
	RH	82.50	—	17.50	81.25	—	18.75				81.50	—	18.50	80.75	—	19.25			
	LH	80.00	—	20.00							80.00	—	20.00						
B50	RS	81.00	15.50	3.50	83.50	13.00	3.50	82.75	14.125	3.125	42.00	54.50	3.50	42.75	53.50	3.75	40.50	55.875	3.625
	LS	86.00	10.50	3.50							43.50	52.50	4.00						
	RH	84.00	14.50	1.50	82.00	15.25	2.75				36.50	62.00	1.50	38.25	58.25	3.50			
	LH	80.00	16.00	4.00							40.00	54.50	5.50						
B51	RS	84.00	16.00	—	83.75	16.25	—	79.625	20.00	0.375	55.00	45.00	—	53.75	46.25	—	46.75	53.00	0.25
	LS	83.50	16.50	—							52.50	47.50	—						
	RH	73.50	26.50	—	75.50	23.75	0.75				39.50	60.50	—	39.75	59.75	0.50			
	LH	77.50	21.00	1.50							40.00	59.00	1.00						
B52	RS	75.50	19.00	5.50	76.25	20.50	3.25	73.125	16.50	10.375	48.50	48.50	3.00	45.75	52.50	1.75	45.50	49.50	5.00
	LS	77.00	22.00	1.00							43.00	56.50	0.50						
	RH	70.00	10.00	20.00	70.00	12.50	17.50				47.00	44.50	8.50	45.25	46.50	8.25			
	LH	70.00	15.00	15.00							43.50	48.50	8.00						
B53	RS	80.00	20.00	—	80.00	19.00	1.00	72.00	24.375	3.625	43.50	56.50	—	42.75	57.00	0.25	40.0	58.125	1.875
	LS	80.00	18.00	2.00							42.00	57.50	0.50						
	RH	63.00	31.50	5.50	64.00	29.75	6.25				37.00	59.50	3.50	37.375	59.25	3.375			
	LH	65.00	28.00	7.00							37.75	59.00	3.25						
B54	RS	77.00	21.50	1.50	74.75	24.50	0.75	68.50	26.75	4.75	32.00	67.50	0.50	28.50	71.25	0.25	28.25	69.50	2.25
	LS	72.50	27.50	—							25.00	75.00	—						
	RH	60.50	30.25	9.25	62.25	29.125	8.625				29.00	68.00	3.00	28.00	67.75	4.25			
	LH	64.00	28.00	8.00							27.00	67.50	5.50						
B55	RS	COTTED STAPLE			64.00	21.00	15.00	57.875	24.25	17.875	COTTED STAPLE			39.50	51.75	8.75	30.50	58.50	11.00
	LS	64.00	21.00	15.00							39.50	51.75	8.75						
	RH	50.00	2500	25.00	57.75	27.50	20.75				19.25	63.50	17.25	21.375	65.375	13.25			
	LH	53.50	30.00	16.50							23.50	67.25	9.25						
B56	RS	82.50	15.25	2.25	78.50	20.375	1.125	78.00	20.25	1.75	39.25	58.25	2.50	39.375	59.375	1.25	36.25	61.625	2.125
	LS	74.50	25.50	—							39.50	60.50	—						
	RH	75.00	20.00	5.0	77.50	20.00	2.50				33.00	61.00	6.00	33.00	64.00	3.00			
	LH	80.00	20.00	—							33.00	67.00	—						
B57	RS	84.00	16.00	—	84.50	15.5	—	79.875	15.625	4.50	52.75	47.25	—	48.625	51.375	—	45.0	50.375	4.625
	LS	85.00	15.00	—							44.50	55.50	—						
	RH	76.50	15.50	8.00	75.25	15.75	9.00				42.50	49.00	8.50	41.500	49.375	9.125			
	LH	74.00	16.00	10.00							40.50	49.75	9.75						
B58	RS	68.00	16.00	16.00	64.00	18.00	18.00	70.625	20.00	9.375	39.00	51.50	9.50	37.50	51.25	11.25	43.25	50.875	5.875
	LS	60.00	20.00	20.00							36.00	51.00	13.00						
	RH	79.00	21.00	—	77.25	22.00	0.75				51.00	49.00	—	49.00	50.50	0.50			
	LH	75.50	23.00	1.50							47.00	52.00	1.00						
B59	RS	77.50	22.50	—	77.75	21.50	0.75	75.50	23.25	1.25	53.50	46.50	—	53.25	46.50	0.25	48.625	50.75	0.625
	LS	78.00	20.50	1.50							53.00	46.50	0.50						
	RH	73.00	25.00	2.00	73.25	25.00	1.75				46.00	53.00	1.00	44.00	55.125	0.875			
	LH	73.50	25.00	1.50							42.00	57.25	0.75						
B60	RS	80.00	19.50	0.50	80.00	19.50	0.50	68.25	27.75	4.00	33.50	66.25	0.25	33.50	6625	0.25	31.75	65.25	3.00
	LS																		
	RH																		
	LH	56.50	36.00	7.50	56.5	36.00	7.50				30.00	64.25	5.75	30.0	64.25	5.75			

TWO-SHEAR RAM CLASS

COMPRISING

TWENTY-NINE INDIVIDUALS

SERIAL LETTER - C.

C1	RS	74·00	25·00	1·00	73·25	26·25	0·50	70·125	29·00	0·875	30·00	70·00	—	29·75	70·25	—	27·375	72·50	0·125
	LS	72·50	27·50	—							29·50	70·50	—						
	RH	66·50	32·00	1·50	67·00	31·75	1·25				26·50	73·00	0·50	25·00	74·75	0·25			
	LH	67·50	31·50	1·00							23·50	76·50	—						
C2	RS	73·50	26·50	—	74·25	25·75	—	67·00	30·25	2·75	48·00	52·00	—	47·75	52·25	—	41·00	56·25	2·75
	LS	75·00	25·00	—							47·50	52·50	—						
	RH	67·50	29·00	3·50	59·75	34·75	5·50				36·00	59·00	5·00	34·25	60·25	5·50			
	LH	62·00	40·50	7·50							32·50	61·50	6·00						
C3	RS	72·00	28·00	—	72·25	27·00	0·75	68·50	30·375	1·125	41·00	59·00	—	42·00	57·50	0·50	36·375	53·125	0·50
	LS	72·50	26·00	1·50							43·00	56·00	1·00						
	RH	63·00	35·50	1·50	64·75	33·75	1·50				29·00	70·50	0·50	30·75	68·75	0·50			
	LH	66·50	32·00	1·50							32·50	67·00	0·50						
C4	RS	76·00	24·00	—	75·25	24·50	0·25	71·75	28·125	0·125	59·00	41·00	—	49·75	50·00	0·25	44·25	55·625	0·125
	LS	74·50	25·00	0·50							40·50	59·00	0·50						
	RH	68·00	32·00	—	68·25	31·75	—				38·50	61·50	—	38·75	61·25	—			
	LH	68·50	31·50	—							39·00	61·00	—						
C5	RS	70·00	30·00	—	70·75	29·25	—	62·875	30·625	6·50	34·50	65·50	—	41·00	59·00	—	34·50	62·75	2·75
	LS	71·50	28·50	—							47·50	52·50	—						
	RH	56·50	30·50	13·00	55·00	32·00	13·00				28·00	66·50	5·50	28·00	66·50	5·50			
	LH	53·50	33·50	13·00							28·00	66·50	5·50						
C6	RS	79·00	19·50	1·50	79·75	18·25	2·00	75·125	18·25	6·625	45·50	54·00	0·50	46·75	52·50	0·75	45·125	49·25	5·625
	LS	80·50	17·00	2·50							48·00	51·00	1·00						
	RH	69·50	17·50	13·00	70·50	18·25	11·25				46·50	43·00	11·50	43·50	46·00	10·50			
	LH	71·50	19·00	9·50							41·50	49·00	9·50						
C7	RS	84·00	16·00	—	81·75	17·25	1·00	81·125	17·625	1·25	41·50	58·50	—	41·75	58·00	0·25	38·625	60·25	1·125
	LS	79·50	18·50	2·00							42·00	57·50	0·50						
	RH	80·50	18·00	1·50	80·50	18·00	1·50				37·00	61·50	1·50	35·50	62·50	2·00			
	LH	80·50	18·00	1·50							34·00	63·50	2·50						
C8	RS	78·00	20·00	2·00	77·50	20·25	2·25	73·625	24·375	2·00	33·00	66·00	1·00	31·50	68·00	0·50	31·125	67·875	1·00
	LS	77·00	20·50	2·50							30·00	70·00	—						
	RH	66·50	33·50	—	69·75	28·50	1·75				26·50	73·50	—	30·75	67·75	1·50			
	LH	73·00	23·50	3·50							35·00	62·00	3·00						
C9	RS	79·00	21·00	—	78·50	21·50	—	74·00	23·75	2·25	54·00	46·00	—	48·00	52·00	—	42·625	57·00	0·375
	LS	78·00	22·00	—							42·00	58·00	—						
	RH	69·00	24·00	7·00	69·50	26·00	4·50				33·50	66·00	0·50	37·25	62·00	0·75			
	LH	70·00	28·00	2·00							41·00	58·00	1·00						
C10	RS	80·50	16·00	3·50	80·75	17·00	2·25	76·00	18·625	5·375	47·00	52·00	1·00	48·00	51·25	0·75	42·375	54·125	3·50
	LS	81·00	18·00	1·00							49·00	50·50	0·50						
	RH	72·00	20·00	8·00	71·25	20·25	8·50				40·00	54·00	6·00	36·75	57·00	6·25			
	LH	70·50	20·50	9·00							33·50	60·00	6·50						
C11	RS	80·00	17·50	2·50	78·75	19·25	2·00	72·875	19·375	7·75	43·50	55·00	1·50	42·75	56·00	1·25	36·375	56·875	6·75
	LS	77·50	21·00	1·50							42·00	57·00	1·00						
	RH	68·50	14·50	17·00	67·00	19·50	13·50				33·50	50·00	16·50	30·00	57·75	12·25			
	LH	65·50	24·50	10·00							26·50	65·50	8·00						
C12	RS	73·00	27·00	—	72·25	27·75	—	70·125	26·875	3·00	32·00	68·00	—	31·25	68·75	—	28·50	69·50	2·00
	LS	71·50	28·50	—							30·50	69·50	—						
	RH	69·50	28·00	2·50	68·00	26·00	6·00				27·50	71·00	1·50	25·75	70·25	4·00			
	LH	66·50	24·00	9·50							24·00	69·50	6·50						
C13	RS	70·00	30·00	—	73·00	27·00	—	65·50	33·00	1·50	18·00	82·00	—	23·00	77·00	—	18·25	80·125	1·625
	LS	76·00	24·00	—							28·00	72·00	—						
	RH	58·00	40·00	2·00	58·00	39·00	3·00				12·00	85·00	3·00	13·50	83·25	3·25			
	LH	58·00	38·00	4·00							15·00	81·50	3·50						
C14	RS	81·00	13·50	5·50	78·50	17·75	3·75	74·875	20·375	4·75	59·00	35·50	5·50	53·25	43·00	3·75	57·00	49·25	3·75
	LS	76·00	22·00	2·00							47·50	50·50	2·00						
	RH	76·00	16·00	8·00	71·25	23·00	5·75				43·00	51·50	5·50	40·75	55·50	3·75			
	LH	66·50	30·00	3·50							38·50	59·50	2·00						
C15	RS	99·00	1·00	—	98·75	1·25	—	90·00	9·125	0·875	95·00	5·00	—	92·50	7·50	—	76·125	23·625	0·25
	LS	98·50	2·00	—							90·00	10·00	—						
	RH	81·00	19·00	—	81·25	17·00	1·75				66·50	33·50	—	59·75	39·75	0·50			
	LH	81·50	15·00	3·5							53·00	46·00	1·00						
C16	RS	73·50	26·50	—	74·25	19·50	6·25	66·75	16·625	16·625	41·00	59·00	—	43·50	49·25	7·25	41·25	45·625	13·125
	LS	75·00	12·50	12·50							46·00	39·50	14·50						
	RH	63·00	11·50	25·50	59·25	13·75	27·00				42·00	42·00	16·00	39·00	42·00	19·00			
	LH	55·50	16·50	28·50							36·00	42·00	22·00						
C17	RS	78·00	20·00	2·00	78·00	19·75	2·25	72·00	19·375	8·625	38·50	61·00	0·50	36·75	62·25	1·00	36·375	56·875	6·75
	LS	78·00	19·50	2·50							35·00	63·50	1·50						
	RH	69·00	20·50	10·50	66·00	19·00	15·00				35·00	55·50	9·50	36·00	51·50	12·50			
	LH	63·00	17·50	19·50							37·00	47·50	15·50						
C18	RS	90·00	8·00	2·00	87·00	8·00	5·00	83·875	10·50	5·625	68·50	30·50	1·00	65·50	25·50	9·00	56·625	35·25	8·125
	LS	84·00	8·00	8·00							62·50	20·50	17·00						
	RH	79·00	13·00	8·00	80·75	13·00	6·25				52·50	41·00	6·50	47·75	45·00	7·25			
	LH	82·50	13·00	4·50							43·00	49·00	8·00						
C19	RS	87·00	13·00	—	84·50	14·75	0·75	78·875	16·625	4·50	51·50	48·50	—	52·25	47·50	0·25	47·00	50·25	2·75
	LS	82·00	16·50	1·50							53·00	46·50	0·50						
	RH	76·50	13·50	10·00	73·25	18·50	8·25				50·00	44·00	6·00	41·75	53·00	5·25			
	LH	70·00	23·50	6·50							33·50	62·00	4·50						
C20	RS	81·50	17·50	1·00	80·75	18·75	0·50	77·375	18·50	4·125	50·50	49·00	0·50	50·00	49·75	0·25	43·875	53·125	3·00
	LS	80·00	20·00	—							49·50	50·50	—						
	RH	76·00	14·50	9·50	74·00	18·25	7·75				40·00	61·50	8·50	37·75	56·50	5·75			
	LH	72·00	22·00	6·00							35·50	61·50	3·00						

C21	RS	78·00	22·00	—	78·00	22·00	—	69·50	22·25	8·25	47·50	52·50	—	47·50	52·50	—	44·25	51·625	4·125
	LS	78·00	22·00	—							47·50	52·50	—						
	RH	63·00	22·00	15·00	61·00	22·50	16·50				43·50	48·50	8·00	41·00	50·75	8·25			
	LH	59·00	23·00	18·00							38·50	63·00	8·50						
C22	RS	72·25	9·75	18·00	75·625	8·00	16·375	70·375	11·25	18·375	52·50	33·50	14·00	59·50	26·50	14·00	50·375	35·375	14·25
	LS	79·00	6·25	14·75							66·50	19·50	14·00						
	RH	63·50	17·00	19·50	65·00	14·50	20·50				43·00	43·00	14·00	41·25	44·25	14·50			
	LH	66·50	12·00	21·50							39·50	45·50	15·00						
C23	RS	81·50	14·00	4·50	81·25	13·75	5·00	76·125	15·875	8·00	65·00	32·25	2·75	65·00	32·25	2·75	52·50	42·625	4·875
	LS	81·00	13·50	5·50							65·00	32·25	2·75						
	RH	70·60	18·00	11·50	71·00	18·00	11·00				34·00	60·00	6·00	40·00	53·00	7·00			
	LH	71·50	18·00	10·50							46·00	46·00	8·00						
C24	RS	75·00	15·00	10·00	75·25	16·00	8·75	68·50	16·625	14·875	48·00	44·00	8·00	46·00	47·50	6·50	42·50	44·25	13·25
	LS	75·50	17·00	7·50							44·00	51·00	6·00						
	RH	60·50	18·00	21·50	61·75	17·25	21·00				39·00	41·00	20·00	39·00	41·00	20·00			
	LH	63·00	16·50	20·50							39·00	41·00	20·00						
C25	RS	81·50	16·00	2·50	79·75	19·00	1·25	76·375	21·125	2·50	50·00	49·50	0·50	46·75	53·00	0·25	40·375	58·375	1·25
	LS	78·00	22·00	—							43·50	56·50	0·00						
	RH	68·00	27·00	5·00	73·00	23·25	3·75				32·00	64·50	3·50	34·00	63·75	2·25			
	LH	78·00	19·50	2·50							36·00	63·00	1·00						
C26	RS	80·00	20·00	—	80·00	20·00	—	71·25	24·50	4·25	53·50	46·50	—	51·75	48·25	—	37·25	59·375	3·375
	LS	80·00	20·00	—							50·00	50·00	—						
	RH	59·50	30·00	10·5	62·50	29·00	8·50				23·50	68·50	8·00	22·75	70·50	6·75			
	LH	65·50	28·00	6·5							22·00	72·50	5·50						
C27	RS	74·50	23·00	2·50	74·25	22·00	3·75	69·75	27·00	3·25	37·50	61·00	1·50	39·25	58·50	2·25	31·00	67·00	2·00
	LS	74·00	21·00	5·00							41·00	56·00	3·00						
	RH	64·50	32·50	3·00	65·25	32·00	2·75				23·00	75·00	2·00	22·75	75·50	1·75			
	LH	66·00	31·50	2·50							22·50	76·00	1·50						
C28	RS	77·00	17·25	5·75	77·00	20·00	2·875	68·25	19·875	11·875	53·50	42·50	4·00	49·75	48·25	2·00	43·75	49·875	6·375
	LS	77·00	23·00	—							46·00	54·00	—						
	RH	61·50	15·50	23·00	59·50	19·50	21·00				45·50	43·00	11·50	37·75	51·50	10·75			
	LH	57·50	23·50	19·00							30·00	60·00	10·00						
C29	RS	87·50	12·50	—	88·25	10·75	1·00	84·125	13·625	2·25	65·00	35·00	—	66·50	33·50	—	57·625	41·75	0·625
	LS	89·00	9·00	2·00							68·00	32·00	—						
	RH	74·50	23·00	2·50	80·00	16·50	3·50				39·50	59·50	1·00	48·75	50·00	1·25			
	LH	85·50	10·00	4·50							58·00	40·50	1·50						

THREE-SHEAR RAM CLASS

COMPRISING

SEVENTEEN INDIVIDUALS

SERIAL LETTER D.

D1	RS	82·00	17·00	1·00	79·75	17·25	3·00	78·125	14·875	7·00	58·50	41·00	0·50	56·25	39·75	4·00	52·75	36·25	11·00
	LS	77·50	17·50	5·00							54·00	38·50	7·50						
	RH	76·50	12·00	11·50	76·50	12·50	11·00				50·00	29·50	20·50	49·25	32·75	18·00			
	LH	76·50	13·00	10·50							48·50	36·00	15·50						
D2	RS	86·00	11·00	3·00	85·00	11·50	3·50	79·625	13·50	6·875	68·00	30·50	1·50	63·50	34·75	1·75	56·125	34·00	10·875
	LS	84·00	12·00	4·00							59·00	39·00	2·00						
	RH	73·50	18·50	8·00	74·25	15·50	10·25				40·00	40·00	20·00	46·75	33·25	20·00			
	LH	75·00	12·50	12·50							53·50	26·50	20·00						
D3	RS	69·50	28·00	2·50	72·25	25·00	2·75	64·50	34·125	1·375	37·50	59·50	3·00	40·75	57·00	2·25	32·25	66·625	1·125
	LS	75·00	22·00	3·00							46·00	54·50	1·50						
	RH	55·50	44·50	—	56·75	43·25	—				20·50	79·50	—	23·75	76·25	—			
	LH	58·00	42·00	—							27·00	73·00	—						
D4	RS	77·00	19·00	4·00	75·25	20·00	4·75	72·00	17·875	10·125	53·00	42·00	5·00	45·75	48·25	6·00	48·00	38·75	13·25
	LS	73·50	21·00	5·50							38·50	54·50	7·00						
	RH	66·50	21·00	12·50	68·75	15·75	15·50				47·00	30·00	23·00	50·25	29·25	20·50			
	LH	71·00	10·50	18·50							53·50	28·50	18·00						
D5	RS	84·00	14·00	2·00	84·50	14·00	1·50	82·00	15·00	3·00	55·00	43·00	2·00	54·25	43·75	2·00	48·75	47·00	4·25
	LS	85·00	14·00	1·00							53·50	44·50	2·00						
	RH	81·00	15·00	4·00	79·50	16·00	4·50				48·00	46·00	6·00	43·25	50·25	6·50			
	LH	78·00	17·00	5·00							38·50	54·50	7·00						
D6	RS	84·00	16·00	—	84·00	16·00	—	75·50	17·25	7·25	52·00	48·00	—	51·75	48·25	—	43·75	53·00	3·25
	LS	84·00	16·00	—							51·50	48·50	—						
	RH	67·00	17·00	16·00	67·00	18·50	14·50				37·50	55·00	7·50	35·75	57·75	6·50			
	LH	67·00	20·00	13·00							34·00	60·50	5·50						
D7	RS	80·50	13·00	6·50	80·25	16·25	4·5	72·375	16·125	11·50	56·50	39·00	4·50	49·50	47·50	3·00	45·875	46·25	7·875
	LS	80·00	17·50	2·50							42·50	56·00	1·50						
	RH	60·50	18·50	21·00	64·50	17·00	18·50				42·50	42·50	15·00	42·25	45·00	12·75			
	LH	68·50	15·50	16·00							42·00	47·50	10·50						
D8	RS	82·00	18·00	—	82·50	17·50	—	79·125	16·625	4·25	51·50	48·50	—	46·25	53·75	—	46·00	51·75	2·25
	LS	83·00	17·00	—							41·00	59·00	—						
	RH	76·50	16·00	8·50	76·75	16·75	8·50				44·00	52·00	4·0	45·75	49·75	4·50			
	LH	75·00	16·50	8·50							47·50	47·50	5·0						
D9	RS	83·50	16·50	—	85·25	14·75	—	84·625	14·25	1·125	54·00	46·00	—	61·00	39·00	—	59·75	39·375	0·875
	LS	87·00	13·00	—							68·00	32·00	—						
	RH	83·50	14·00	2·50	84·00	13·75	2·25				62·50	35·50	2·00	58·50	39·75	1·75			
	LH	84·50	13·50	2·00							54·50	44·00	1·50						
D10	RS	79·50	19·00	1·50	79·25	20·00	0·75	69·75	21·00	9·25	37·00	62·50	0·50	38·50	61·25	0·25	35·75	58·375	5·875
	LS	79·00	21·00	—							40·00	60·00	—						
	RH	57·00	21·50	21·50	60·25	22·00	17·75				31·50	56·00	12·50	33·00	55·50	11·50			
	LH	63·50	22·50	14·00							34·50	55·00	10·50						
D11	RS	75·00	25·00	—	73·75	26·25	—	71·00	27·125	1·875	37·00	63·00	—	36·00	64·00	—	33·25	64·125	2·625
	LS	72·50	27·50	—							35·00	65·00	—						
	RH	67·50	30·00	2·50	68·25	28·00	3·75				29·50	67·50	3·00	30·50	64·25	5·25			
	LH	69·00	26·00	5·00							31·50	61·00	7·50						
D12	RS	88·00	12·00	—	84·00	16·00	—	75·25	14·125	10·625	52·00	48·00	—	50·50	49·50	—	46·875	45·25	7·875
	LS	80·00	20·00	—							49·00	51·00	—						
	RH	60·00	15·50	24·5	66·50	12·25	21·25				39·50	42·00	18·50	43·25	41·00	15·75			
	LH	73·00	9·00	18·0							47·00	40·00	13·00						
D13	RS	73·00	13·50	13·50	74·50	11·50	14·00	70·00	12·75	17·25	38·50	46·00	15·50	40·75	38·75	20·50	34·375	43·25	22·375
	LS	76·00	9·50	14·50							43·00	31·50	25·50						
	RH	70·00	13·00	17·00	65·50	14·00	20·50				28·00	51·00	21·00	28·00	47·75	24·25			
	LH	61·00	15·00	24·00							28·00	44·50	27·50						
D14	RS	76·50	21·50	2·00	75·75	23·25	1·00	70·875	27·375	1·75	53·00	46·00	1·00	48·75	50·75	0·50	37·375	61·50	1·125
	LS	75·00	25·00	—							44·50	55·50	—						
	RH	63·00	33·50	3·50	66·00	31·50	2·50				23·00	75·00	2·00	26·00	72·25	1·75			
	LH	69·00	29·50	1·50							29·00	69·50	1·50						
D15	RS	81·00	19·00	—	80·25	19·75	—	75·875	19·875	4·25	47·00	53·00	—	42·50	57·50	—	37·875	56·875	5·25
	LS	79·50	20·50	—							38·00	62·00	—						
	RH	70·50	24·00	5·50	71·50	20·00	8·50				31·00	60·50	8·50	33·25	56·25	10·50			
	LH	72·50	16·00	11·50							35·50	52·00	12·50						
D16	RS	83·50	12·50	4·00	84·00	12·25	3·75	74·375	16·875	8·75	50·50	46·50	3·00	51·00	46·50	2·50	41·125	50·25	8·625
	LS	84·50	12·00	3·50							51·50	46·50	2·00						
	RH	60·50	24·00	15·50	64·75	21·50	13·75				32·00	52·50	15·50	31·25	64·00	14·75			
	LH	69·00	19·00	12·00							30·50	55·50	14·00						
D17	RS	79·00	10·50	10·50	76·50	17·00	6·50	64·375	18·125	17·50	57·50	33·50	9·00	48·25	46·75	5·00	37·25	49·00	13·75
	LS	74·00	23·50	2·50							39·00	60·00	1·00						
	RH	50·00	22·00	28·00	52·25	19·25	28·50				23·50	56·00	21·50	26·25	61·25	22·50			
	LH	54·50	16·50	29·00							29·00	47·50	23·50						

FOUR-SHEAR RAM CLASS

COMPRISING

TEN INDIVIDUALS

SERIAL LETTER.-E.

E1	RS	80·00	19·00	1·00	80·25	18·50	1·25	75·625	16·625	7·75	56·00	43·50	0·50	54·50	45·00	0·50	46·75	42·875	10·375
	LS	80·50	18·00	1·50							53·00	46·50	0·50						
	RH	69·00	17·00	14·00	71·00	14·75	14·25				34·00	49·50	16·50	39·00	40·75	20·25			
	LH	73·00	12·50	14·50							44·00	32·00	24·00						
E2	RS	76·00	22·50	1·50	75·5	23·25	1·25	70·75	26·375	2·875	49·50	49·50	1·00	50·75	48·25	1·00	46·00	52·625	1·375
	LS	75·00	24·00	1·00							52·00	47·00	1·00						
	RH	69·00	29·00	2·00	66·00	29·50	4·50				44·50	54·50	1·00	41·25	57·00	1·75			
	LH	63·00	30·00	7·00							38·00	59·50	2·50						
E3	RS	72·00	21·00	7·00	75·00	20·50	4·50	70·25	21·00	8·75	40·50	40·50	19·00	41·25	47·00	11·75	35·875	43·875	20·25
	LS	78·00	20·00	2·00							42·00	53·50	4·50						
	RH	63·50	20·00	16·50	65·50	21·50	13·00				31·50	41·50	27·00	30·50	40·75	28·75			
	LH	67·50	23·00	9·50							29·50	40·00	30·50						
E4	RS	82·00	18·00	—	79·50	20·00	0·50	73·375	24·75	1·875	42·00	58·00	—	44·00	55·00	1·00	37·75	60·50	1·76
	LS	77·00	22·00	1·00							46·00	52·00	2·00						
	RH	70·00	26·50	3·50	67·25	29·50	3·25				35·50	61·00	3·50	31·50	66·00	2·50			
	LH	64·50	32·50	3·00							27·50	71·00	1·50						
E5	RS	85·00	13·50	1·50	82·50	16·75	0·75	81·00	17·125	1·875	44·00	55·00	1·00	44·00	55·50	0·50	45·875	53·00	1·125
	LS	80·00	20·00	—							44·00	56·00	—						
	RH	83·00	14·50	2·50	79·50	17·50	3·00				55·00	43·50	1·50	47·75	50·50	1·75			
	LH	76·00	20·50	3·50							40·50	57·50	2·00						
E6	RS	86·00	14·00	—	86·00	14·00	—	81·50	14·75	3·75	61·50	38·50	—	64·00	36·00	0·00	56·75	40·875	2·375
	LS	86·00	14·00	—							66·50	33·50	7·00						
	RH	75·00	15·00	10·00	77·00	15·50	7·50				50·00	43·00	2·50	49·50	45·75	4·75			
	LH	79·00	16·00	5·00							49·00	48·50							
E7	RS	80·00	20·00	—	80·25	19·00	0·75	78·375	17·00	4·625	46·00	54·00	—	49·25	50·50	0·25	54·625	42·375	3·00
	LS	80·50	18·00	1·50							52·50	47·00	0·50						
	RH	75·00	12·50	12·50	76·50	15·00	8·50				60·00	30·00	10·00	60·00	34·25	5·75			
	LH	78·00	17·50	4·50							60·00	38·50	1·50						
E8	RS	82·50	17·50	—	80·25	18·75	1·00	76·625	20·125	3·25	45·00	55·00	—	46·75	53·00	0·25	36·75	60·125	3·125
	LS	78·00	20·00	2·00							48·50	51·00	0·50						
	RH	71·00	22·00	7·00	73·00	21·50	5·50				25·50	67·50	7·00	26·75	67·25	6·00			
	LH	75·00	21·00	4·00							28·00	61·00	5·00						
E9	RS	78·50	17·50	4·00	78·75	16·75	4·50	68·875	19·125	12·00	49·00	49·00	2·00	47·50	50·25	2·25	37·00	51·125	11·875
	LS	79·00	16·00	5·00							46·00	51·50	2·50						
	RH	52·00	25·00	23·00	59·00	21·50	19·50				21·50	57·00	21·50	26·50	52·00	21·50			
	LH	66·00	18·00	16·00							31·50	47·00	21·50						
E10	RS	80·50	19·50	—	81·00	17·75	1·5	80·25	13·50	6·25	45·00	55·00	—	46·25	53·00	0·75	48·375	46·00	5·625
	LS	81·50	16·00	2·50							47·50	51·00	1·50						
	RH	84·00	9·50	6·50	79·50	9·25	11·25				52·00	44·00	4·00	50·50	39·00	10·5			
	LH	75·00	9·00	16·00							49·00	34·00	17·00						

FIVE-SHEAR & OVER RAM CLASS

COMPRISING

ELEVEN INDIVIDUALS

SERIAL LETTER - F.

F1	RS	84·00	11·50	4·50	85·75	10·50	3·75	82·875	13·00	4·125	52·00	43·50	4·50	55·75	41·00	3·25	48·875	47·75	3·375
	LS	87·50	9·50	3·00							59·50	38·50	2·00						
	RH	77·50	20·00	2·50	80·00	15·50	4·50				32·00	65·50	2·50	42·00	54·50	3·50			
	LH	82·50	11·00	6·50							52·00	43·50	4·50						
F2	RS	79·00	18·00	3·00	82·75	15·00	2·25	78·75	17·50	3·75	48·00	47·50	4·50	55·50	41·00	3·50	52·375	42·875	4·75
	LS	86·50	12·00	1·50							63·00	34·50	2·50						
	RH	73·00	23·50	3·50	74·75	20·00	5·25				43·50	54·00	2·50	49·25	44·75	6·00			
	LH	76·50	16·50	7·00							55·00	35·50	9·50						
F3	RS	76·50	20·60	3·00	77·00	18·50	4·50	70·00	21·625	8·375	57·00	41·50	1·50	49·25	45·50	5·25	41·875	47·875	10·25
	LS	77·50	16·60	6·00							41·50	49·50	9·00						
	RH	62·50	25·00	12·50	63·00	24·75	12·25				35·50	49·00	15·50	34·50	60·25	15·25			
	LH	63·50	24·50	12·00							33·50	51·50	15·00						
F4	RS	87·50	9·00	3·50	89·50	7·00	3·50	81·76	13·875	4·375	68·00	31·00	1·00	75·00	23·75	1·25	58·625	37·375	4·00
	LS	91·50	5·00	3·50							82·00	16·50	1·50						
	RH	76·00	18·00	6·00	74·00	20·75	5·25				40·50	54·00	5·50	42·25	51·00	6·75			
	LH	72·00	23·50	4·50							44·00	48·00	8·00						
F6	RS	80·00	17·00	3·00	81·00	17·50	1·50	73·5	17·875	8·625	44·00	55·00	1·00	42·25	57·25	0·50	36·625	59·50	3·875
	LS	82·00	18·00	—							40·50	59·50	—						
	RH	67·50	15·00	17·50	66·00	18·25	15·75				34·00	57·00	9·00	31·00	61·75	7·25			
	LH	64·50	21·50	14·00							28·00	56·50	5·50						
F7	RS	84·00	16·00	—	75·00	24·00	1·00	66·75	22·375	10·875	48·50	51·50	—	44·25	54·75	1·00	39·375	50·00	10·625
	LS	66·00	32·00	2·00							40·00	58·00	2·00						
	RH	60·00	20·00	20·00	58·50	20·75	20·75				35·50	43·00	21·50	34·50	45·25	20·25			
	LH	57·00	21·50	21·50							33·50	47·50	19·00						
F8	RS	80·00	20·00	—	80·25	19·00	0·75	78·50	17·00	4·50	46·00	56·00	0·00	49·25	50·50	0·25	54·75	42·25	3·00
	LS	80·50	18·00	1·50							52·50	47·00	0·50						
	RH	75·00	12·50	12·50	76·75	15·00	8·25				60·00	30·00	10·00	60·25	34·00	5·75			
	LH	78·50	17·60	4·00							60·50	38·00	1·50						
F8	RS	87·00	11·50	1·50	84·00	13·75	2·25	82·50	13·875	3·625	61·50	38·00	0·50	55·75	43·75	0·50	55·00	42·625	2·375
	LS	81·00	16·00	3·00							50·00	49·50	0·50						
	RH	78·50	15·50	6·00	81·00	14·00	5·00				52·50	43·00	4·50	54·25	41·50	4·25			
	LH	83·50	12·50	4·00							56·00	40·00	4·00						
F9	RS	78·50	20·50	1·00	80·00	19·25	0·75	79·25	19·25	1·50	52·50	47·00	0·50	54·00	45·50	0·50	54·25	45·00	0·75
	LS	81·50	18·00	0·50							55·50	44·00	0·50						
	RH	75·00	22·00	3·00	78·50	19·25	2·25				47·50	51·00	1·50	54·50	44·50	1·00			
	LH	82·00	16·50	1·50							61·50	38·00	0·50						
F10	RS	78·00	19·00	3·00	76·50	20·00	3·50	67·25	25·25	7·50	62·00	35·00	3·00	61·75	34·00	4·25	49·375	39·625	11·00
	LS	75·00	21·00	4·00							61·50	33·00	5·50						
	RH	58·00	30·00	12·00	58·00	30·50	11·50				34·50	45·00	20·50	37·00	45·25	17·75			
	LH	58·00	31·00	11·00							39·50	45·50	15·00						
F11	RS	78·00	18·00	4·00	77·00	20·00	3·00	69·25	27·00	3·75	44·00	52·00	4·00	43·00	53·50	3·5	42·00	55·00	3·00
	LS	76·00	22·00	2·00							42·00	55·00	3·00						
	RH	61·00	34·00	5·00	61·50	34·00	4·50				43·00	54·00	3·00	41·00	56·50	2·5			
	LH	62·00	34·00	4·00							39·00	59·00	2·00						

EWE-HOGG CLASS

COMPRISING

FORTY INDIVIDUALS

SERIAL LETTER - G.

G1	RS				70·5	25·5	4·0	64·5	29·0	6·5				43·0	53·5	3·5	39·25	55·5	5·25
	LS				58·5	32·5	9·0							35·5	57·5	7·0			
	RH																		
	LH																		
G2	RS				73·0	15·0	12·0	71·0	16·75	12·25				55·0	38·5	6·5	49·25	46·0	4·75
	LS				69·0	18·5	12·5							43·5	53·5	3·0			
	RH																		
	LH																		
G3	RS				71·0	29·0	—	64·0	27·5	8·5				43·5	56·5	—	40·25	53·75	6·0
	LS				57·0	26·0	17·0							37·0	51·0	12·0			
	RH																		
	LH																		
G4	RS				66·0	25·5	8·5	65·5	24·25	10·25				44·0	48·0	8·0	38·25	53·5	8·25
	LS				65·0	23·0	12·0							32·5	59·0	8·5			
	RH																		
	LH																		
G5	RS				70·0	27·0	3·0	69·0	27·5	3·5				30·0	68·5	1·5	27·5	70·5	2·0
	LS				68·0	28·0	4·0							25·0	72·5	2·5			
	RH																		
	LH																		
G6	RS				67·0	21·0	12·0	64·0	23·75	12·25				40·0	53·0	7·0	36·5	57·5	6·0
	LS				61·0	26·5	12·5							33·0	62·0	5·0			
	RH																		
	LH																		
G7	RS				65·0	25·5	9·5	60·0	27·25	12·75				31·0	65·5	3·5	27·0	67·5	5·5
	LS				55·0	29·0	16·0							23·0	69·5	7·5			
	RH																		
	LH																		
G8	RS				64·0	24·5	11·5	60·25	24·5	15·25				41·0	52·5	6·5	37·0	54·5	8·5
	LS				56·5	24·5	19·0							33·0	56·5	10·5			
	RH																		
	LH																		
G9	RS				45·5	5·0	49·5	48·75	18·0	33·25				43·0	13·5	43·5	34·75	36·75	28·5
	LS				52·0	31·0	17·0							26·5	60·0	13·5			
	RH																		
	LH																		
G10	RS				73·5	20·0	6·5	69·0	23·25	7·75				37·0	59·0	4·0	32·0	62·25	5·75
	LS				64·5	26·5	9·0							27·0	65·5	7·5			
	RH																		
	LH																		
G11	RS				78·5	8·5	13·0	72·75	15·25	12·0				72·5	21·5	6·0	53·0	40·75	6·25
	LS				67·0	22·0	11·0							33·5	60·0	6·5			
	RH																		
	LH																		
G12	RS				75·0	14·0	11·0	63·0	25·5	11·5				50·5	41·5	8·0	39·0	52·5	8·5
	LS				51·0	37·0	12·0							27·5	63·5	9·0			
	RH																		
	LH																		
G13	RS				70·0	13·5	16·5	66·25	19·25	14·5				50·0	37·5	12·5	43·75	41·5	14·75
	LS				62·5	25·0	12·5							37·5	45·5	17·0			
	RH																		
	LH																		
G14	RS				72·0	14·0	14·0	65·5	19·5	15·0				57·5	35·5	7·0	47·75	42·75	9·5
	LS				59·0	25·0	16·0							38·0	50·0	12·0			
	RH																		
	LH																		
G15	RS				75·0	15·0	10·0	68·5	20·25	11·25				48·5	45·5	6·0	40·75	55·0	4·25
	LS				62·0	25·5	12·5							33·0	64·5	2·5			
	RH																		
	LH																		
G16	RS				73·5	16·5	10·0	70·0	19·0	11·0				46·5	45·5	8·0	39·25	51·75	9·0
	LS				66·5	21·5	12·0							32·0	58·0	10·0			
	RH																		
	LH																		
G17	RS				77·5	11·0	11·5	70·5	18·75	10·75				48·0	44·5	7·5	38·5	55·75	5·75
	LS				63·5	26·5	10·0							29·0	67·0	4·0			
	RH																		
	LH																		
G18	RS				73·0	19·0	8·0	70·5	19·0	10·5				42·5	54	3·5	40·0	55·0	5·0
	LS				68·0	19·0	13·0							37·5	56·0	6·5			
	RH																		
	LH																		
G19	RS				77·0	15·5	7·5	70·0	21·0	9·0				43·5	51·5	5·0	36·5	58·5	5·0
	LS				63·0	26·5	10·5							29·5	65·5	5·0			
	RH																		
	LH																		
G20	RS				73·0	22·5	4·5	64·25	25·25	10·5				40·5	58·0	1·5	38·5	57·75	3·75
	LS				55·5	28·0	16·5							36·5	57·5	6·0			
	RH																		
	LH																		

COUNT

Reference Number	Location of Sample	Numbers Analyses Per Cent. Wool	Long Hair	Kemp	Shoulder & Haunch Averages. Wool	Long Hair	Kemp	Whole Fleece Averages. Wool	Long Hair	Kemp
G21	RS	72·5	19·0	8·5	71·50	18·5	10·0	68·75	18·75	12·5
	LS	70·5	18·0	11·5						
	RH	65·5	18·0	16·5	66·25	19·0	14·75			
	LH	67·0	20·0	13·0						
G22	RS	74·0	16·0	10·0	74·5	17·75	7·75	68·25	16·50	15·25
	LS	75·0	19·5	5·5						
	RH	64·0	11·0	25·0	62·0	15·0	23·0			
	LH	60·0	19·0	21·0						
G23	RS	77·0	11·5	11·5	76·5	13·0	10·5	73·5	13·25	13·25
	LS	76·0	14·5	9·5						
	RH	74·0	10·0	16·0	70·5	13·5	16·0			
	LH	67·0	17·0	16·0						
G24	RS	70·5	28·0	1·5	72·0	26·5	1·5	72·0	23·25	4·75
	LS	73·5	25·0	1·5						
	RH	72·0	20·0	8·0	72·0	20·0	8·0			
	LH									
G25	RS				73·5	15·0	#11·5	70·0	20·25	9·75
	LS									
	RH				66·5	25·5	8·0			
	LH									
G26	RS				83·0	13·0	4·0	77·0	11·75	11·25
	LS									
	RH				71·0	10·5	18·5			
	LH									
G27	RS				76·0	12·0	12·0	74·75	11·25	14·0
	LS									
	RH				73·5	10·5	16·0			
	LH									
G28	RS				79·0	19·5	1·5	74·25	22·75	3·0
	LS									
	RH				69·5	26·0	4·5			
	LH									
G29	RS				81·0	14·0	5·0	74·0	18·25	7·75
	LS									
	RH				67·0	22·5	10·5			
	LH									
G30	RS				80·0	14·5	5·5	77·0	17·5	5·5
	LS									
	RH				74·0	20·5	5·5			
	LH									
G31	RS				78·5	21·0	0·5	75·0	21·5	3·5
	LS									
	RH				71·5	22·0	6·5			
	LH									
G32	RS				78·0	20·5	1·5	73·75	24·0	2·25
	LS									
	RH				69·5	27·5	3·0			
	LH									
G33	RS				100·0	—	—	90·0	9·0	1·0
	LS									
	RH				80·0	18·0	2·0			
	LH									
G34	RS				76·0	20·0	4·0	73·0	22·5	4·5
	LS									
	RH				70·0	25·0	5·0			
	LH									
G35	RS				76·5	21·5	2·0	75·25	22·5	2·25
	LS									
	RH				74·0	23·5	2·5			
	LH									
G36	RS				79·0	16·0	5·0	73·5	18·5	8·0
	LS									
	RH				68·0	21·0	11·0			
	LH									
G37	RS				80·0	10·0	10·0	77·0	16·25	6·75
	LS									
	RH				74·0	22·5	3·5			
	LH									
G38	RS				76·0	20·0	4·0	70·0	26·25	3·75
	LS									
	RH				64·0	32·5	3·5			
	LH									
G39	RS				80·0	11·5	8·5	78·25	13·5	8·25
	LS									
	RH				76·5	15·5	8·0			
	LH									
G40	RS				78·0	16·5	5·5	70·75	23·25	6·0
	LS									
	RH				63·5	30·0	6·5			
	LH									

WEIGHT

Reference Number	Location of Sample	Weight Analyses Per Cent. Wool	Long Hair	Kemp	Shoulder & Haunch Averages. Wool	Long Hair	Kemp	Whole Fleece Averages. Wool	Long Hair	Kemp
G21	RS	47·5	38·0	14·5	45·5	42·25	12·25	47·25	41·0	11·75
	LS	43·5	46·5	10·0						
	RH	47·5	38·0	14·5	49·0	40·0	11·0			
	LH	50·5	42·0	7·5						
G22	RS	54·0	35·5	10·5	56·5	35·5	8·0	50·25	34·25	15·5
	LS	59·0	35·5	5·5						
	RH	47·0	27·0	26·0	44·0	33·0	23·0			
	LH	41·0	39·0	20·0						
G23	RS	67·0	24·0	9·0	60·0	31·0	9·0	58·5	29·75	11·75
	LS	53·0	38·0	9·0						
	RH	61·0	23·0	16·0	57·0	28·5	14·5			
	LH	53·0	34·0	13·0						
G24	RS	44·0	55·5	0·5	47·25	52·0	0·75	36·0	60·0	4·0
	LS	50·5	48·5	1·0						
	RH	25·0	68·0	7	25·0	68·0	7·0			
	LH									
G25	RS				44·0	51·0	5·0	39	57·5	3·5
	LS									
	RH				34·0	64·0	2·0			
	LH									
G26	RS				47·0	52·0	1·0	46·0	48·5	5·5
	LS									
	RH				45·0	45·0	10·0			
	LH									
G27	RS				52·0	43·5	4·5	40·0	53·75	6·25
	LS									
	RH				28·0	64·0	8·0			
	LH									
G28	RS				45·5	54·25	0·25	40·5	58·5	1·0
	LS									
	RH				35·5	63·00	1·5			
	LH									
G29	RS				60·5	38·5	1·0	44·75	51·0	2·25
	LS									
	RH				33·0	63·5	3·5			
	LH									
G30	RS				60·0	37·0	3·0	54·5	43·0	2·5
	LS									
	RH				49·0	49·0	2·0			
	LH									
G31	RS				35·0	64·75	0·25	36·0	62·25	1·75
	LS									
	RH				37·0	59·75	3·25			
	LH									
G32	RS				39·0	60·5	0·5	34·5	63·75	1·75
	LS									
	RH				30·0	67·0	3·0			
	LH									
G33	RS				100	—	—	92·0	7·25	0·75
	LS									
	RH				84·0	14·5	1·5			
	LH									
G34	RS				41·0	52·5	6·5	34·25	60·0	5·75
	LS									
	RH				27·5	67·5	5·0			
	LH									
G35	RS				54·5	44·0	1·5	55·0	43·75	1·25
	LS									
	RH				55·5	43·5	1·0			
	LH									
G36	RS				59·0	36·5	4·5	50·0	42·0	8·0
	LS									
	RH				41·0	47·5	11·5			
	LH									
G37	RS				63·0	32·0	5·0	51·75	45·25	3·0
	LS									
	RH				40·5	58·5	1·0			
	LH									
G38	RS				44·5	54·0	1·5	38·0	60·5	1·5
	LS									
	RH				31·5	67·0	1·5			
	LH									
G39	RS				53·5	34·0	12·5	47·25	41·0	6·75
	LS									
	RH				41·0	48·0	1·0			
	LH									
G40	RS				61·5	35·0	3·5	51·75	44·25	4·0
	LS									
	RH				42·0	53·5	4·5			
	LH									