THE INFLUENCE OF PLANE OF NUTRITION

ON THE BREEDING BEHAVIOUR OF

TWO-TOOTH ROMNEY EWES

A THESIS SUBMITTED FOR THE DEGREE OF M.AGR.SC.

BY J.F. TILL.

DECEMBER 1950.

TABLE OF CONTENTS.

Page

INTRODUCTION.

The few flock records available present evidence for the dissatisfaction voiced by sheep farmers concerning the comparatively low lambing percentage in two-tooth Romney ewes. Although the death rate of lambs is higher for two-tooths than for older ewes, this low lambing percentage is due to two main factors. First, a high proportion of empty ewes and secondly a lower incidence of multiple births.

Of the fundamental considerations that must be made in any study of the productivity of ewes, the two most important are ability to reproduce, or fertility, and the rate at which they reproduce, or fecundity. For two-tooth ewes, with the greater part of their productive life ahead, the increase in production resulting from a higher lambing percentage is greater than that of any older age group. Further, ewes failing to bear lambs as two-tooths often reproduce irregularly or fail to breed in subsequent years. This problem of low fertility and low fecundity is therefore of considerable importance to the sheep industry in New Zealand.

Without further knowledge of the breeding behaviour of two-tooths, it is unlikely that this problem of low fertility and fecundity will be solved. Nutrition has been shown to be one of the major variables conditioning breeding behaviour and this preliminary investigation undertakes to study the influence of plane of nutrition on the breeding behaviour of two-tooth Romney ewes, particularly those aspects of time of onset of the breeding season, duration of oestrus and dioestrous cycles, conception and ovulation rates.

Chapter I. REVIEW OF LITERATURE.

Flock masters, graziers or sheep farmers generally for many decades have observed that the amount of feed available to sheep, which is influenced by many factors including climate, affects their fertility, fecundity and general breeding behaviour. Clark (1) states that Aristotle observed the increased fertility of sheep when they were subjected to a favourable climate and Darwin is quoted "that domestic animals breed at more frequent periods and produce larger numbers of offspring than wild animals of the same specie."

Whether plane of nutrition does influence the time of onset of the sexual season has been the subject of considerable interest especially where early lambing is favoured.

Marshall (2) states there is abundant evidence that "flushing" hastens forward the tupping time and suggests that artificial feeding has a stimulating influence over the secretory activities of the ovary. Nichols (3) and Marshall and Hammond (4) agree that "flushing" will bring the ewes into oestrus earlier.

Grant (5) however, while believing that "flushing" hastens the onset of the breeding season by converting spurious ovulation periods into true heat or oestrus, cannot agree that it stimulates the earlier production of ripe follicles. He contends that for "flushing" to be effective it must be commenced five to six weeks before the first heat period is due to occur.

Marshall and Potts (6) for Southdown ewes and Clark (1) for grade Western and purebred Shropshires, found flushing did not bring the ewes into season earlier. For Border Leicester-Merino ewes, Underwood and Shier (7) found "flushing" did not hasten the onset of the breeding season. McKenzie and Phillips (8) state that there was no evidence that an increasing food supply induced earlier heat periods. During an eight-year study of the influence of flushing, Briggs et al (9) did not

note any difference between the flushed and unflushed lots as to the time of the first oestrous period in the season.

Quinlan and Mare (10) observed that continued drought may cause an entire inhibition of ovarian activity in many ewes.

Where ewes are bordering on emaciation Asdell (11) suggests that nutritional stimulation may cause earlier than otherwise sexual receptivity.

There has been little investigation of the influence of nutrition on duration of oestrus. McKenzie and Terrill (12) observed that the duration of oestrus was similar in flushed and unflushed ewes and Marshall and Potts (6) have made similar observations.

Kelley (13) and Roux (14) consider that the incidence or failure of appearance of oestrus has no association with plane of nutrition.

Few feeding experiments have recorded the duration of dioestrous cycles or the rhythm of the sexual season characteristic of domesticated breeds. Briggs et al (9) noted that differences in duration of dioestrous cycles between flushed and unflushed lots indicated that nutrition did affect the productive organs in some way, the flushed lots tending to have shorter cycles. Ewes that were starved to the point of emaciation failed to come on heat regularly. McKenzie and Terrill (12) ran vasectomised rams with two groups of ewes and though they had no observations on the start of the breeding season they found the average cycle length was generally less in well fed ewes.

That barrenness and conception rate may be influenced by nutrition, has been investigated by many workers.

Marshall (15) states there is direct evidence that barrenness is less for ewes that have been specially treated or flushed. White and Roberts (16) and Okulicev (17) agree that improving nutritional conditions does decrease percentage barrenness.

Terrill and Stoehr (18) however did not observe any

influence of flushing on barrenness. For the flushed and unflushed groups, Underwood and Shier (7) found there was no significant difference in the number of ewes which conceived. There was a slight but definite lag in the lambing period of the flushed ewes explainable by more ewes returning to service. This however may have been due to rams on flushing feed becoming too fat for active work.

Darlow and Hawkins (19) record that there was little difference in the number of ewes returning to the ram within the five ration groups but that group receiving a maintenance ration and fresh cow peas ad lib. was poorest in this respect. In the experiment of Marshall and Potts (6) more flushed ewes returned to second and third services than in the unflushed group.

The effects of nutrition on lambing percentage and ovulation rate have been the subject of many experiments and this is especially true of the practice of "flushing".

Heape (20) from data on 275 flocks of different English breeds concluded that environment plays an important role in determining the fertility of a breed; certain seasons were more conducive to high fertility, and plane of nutrition did influence the ability of sheep to breed. Statistics presented show that an abnormally low percentage of twins is associated with barrenness and the cause is probably the same; that is, a scarcity of Graafian follicles available for ovulation at tupping time.

Marshall (15) commenting on this scarcity, states there is no doubt that the process of repining of the follicle can be very largely influenced by insufficiency of food supply or by artificial stimulation. Scott (21) is quoted, who states that the extra number of lambs raised by artificial stimulation is on the average not great, while from "actual test" he is convinced that ewes flushed one year are never so prolific the next. Marshall states that the influence of flushing is modified by the general conditions to which ewes have been subjected previously, and that young sheep are more affected

by flushing or adverse conditions.

From lambing returns of Scottish sheep 1905 - 07 Marshall (2) concluded that some sort of extra feeding prior and during tupping results in increased lambing percentages. Twins came earliest in the lambing season but occurred equally early in ewes artificially fed and those fed as normal.

Marshall and Potts (6) found that for 125 flushed Southdown ewes gaining prior to tupping an average weight of 1·78 lb., the lambing percentage was 128 but for 167 similar ewes flushed and gaining 7·98 lb. over the same period, the lambing percentage was 146·9. The increase was due mainly to a higher proportion of twins. The influence of flushing was most marked in ewes lowest in condition and making the greatest weight gains. The kind of feed used for flushing did not appear important.

From a questionnaire to members of various English Breed Societies, Nichols (3) demonstrated a correlation between barrenness and low percentage twins, and like Marshall thought the causes to be similar. For 1755 ewes of various breeds that were flushed the lambing percentage was 149·9, compared with 124.6 for ewes of similar breeds unflushed. From the 26 Southdown flock returns Nichols (22) indicated that the three flushed flocks had a higher mean lambs percentage than for the breed, but in no case was the difference significant.

White and Roberts (16) for the Welsh Mountain breed noted a higher lambing average when ewes were kept in lowland districts. A higher incidence of twinning was the main factor responsible and the condition of the ewe at tupping was the main factor governing the percentage of twins.

The influence of plane of nutrition on ovulation rate was studied by Clark (1). Flushed grade Western ewes produced more ova than the unflushed, but for purebred Shropshire ewes which were in relatively high condition at the commencement of flushing, the flushed ewes did not

produce as many ova as unflushed ewes. The inference drawn was that the condition of the ewes prior to flushing determines the response to imposed environmental conditions. Gain in weight was not necessarily indicative of higher ovulation rate and cases of double ovulation occurred fairly uniformly throughout the breeding season.

Smith (23) found flushing increased the lamb crop 7.4 percent. The average gain of the flushed lots was 0.9 lb. while the unflushed lots lost 3.6 lb. He concludes that the results of the experiment did not justify the use of cotton seed meal fed to gaining ewes.

An increase in the number of multiple births and a reduction of the number of barren ewes by flushing is recorded by Okulicev (17). Flushing also tended to reduce the death rate of new born lambs and the percentage of still births. The number of lambs per hundred ewes for the control group was 103 and for the flushed groups 120, 112 and 110.

Poloceva (24) compared the influence on multiple births, of rations of grass, grass plus concentrates and concentrates alone. The percentages of multiple births were 51.8, 58.3 and 50.0 and the rate of lambing 119, 131 and 119 percent. He was of the opinion that flushing also caused better foetal development. The addition of phosphates to the diet did not appear to influence ovarian function.

The opinion that loss in body weight is associated with plane of nutrition, but that there is no association between these and infertility, has been expressed by Kelley (13). Absent, aberrant or irregular oestrus, some pathological condition precluding conception, or early abortion or resorption of the foetus were the main causes of the ewes' failure to bear lambs, but no correlation could be demonstrated between plane of nutrition and any of these particular causes of reduced fertility.

Darlow and Casida (25) on evidence available from initial work concerning the effects of different rations on the breeding behaviour of sheep, indicate that the

inclusion of grain in their ration before the breeding season tended to increase the rate of ovulation.

Terrill and Stoehr (18) found that the condition of the ewes during breeding as measured by gain or loss in body weight had practically no effect on the percentage of ewes producing lambs. There was, however, a direct correlation between gain or loss in weight, during breeding and fecundity. Ewes gaining weight produced 6 per cent. more twins than those losing weight during breeding.

Flushing has been demonstrated by Underwood and Shier (7) to produce a highly significant increase in fertility and this was brought about entirely by an increase in multiple births. Flushed ewes produced 109 per cent lambs and 18 per cent twins while for the unflushed ewes the corresponding figures were 91.1 and 2 per cent. Flushing did not induce a higher proportion of twins earlier in the season.

Miller, Hart and Cole (26) state that yearling ewes brought onto the better feed conditions of the University farm showed an increase of 25 per cent for lambing average. The influence of age composition, and management is, however, not estimated.

McKenzie and Terrill (12) found that ovulation rate was increased from 1.06 to 1.15 by flushing. There was no difference in the times at which most double ovulations took place between flushed and unflushed ewes.

In four groups of ewes with lambing percentages of 123, 123, 117 and 138 where the causes of variation were non-genetic, Patov (27) considers that it was the intensive feeding of group 4 that caused the high lambing percentage.

The evidence of improving plane, or high plane nutrition resulting in higher lambing percentage is considerable. Briggs et al (9) in a summation of the eight-year results was unable to substantiate the ability of flushing to increase the number of lambs dropped.

Other than the general statement that the breeding behaviour of young ewes is more affected by plane of nutrition,

there is no information available on the influence of plane of nutrition for the two-tooth ewes.

Chapter II. MATERIALS AND MANAGEMENT.

(1) The Experimental Area and its Management.

(i) Introduction.

The experiment was conducted on the Pahiatua Block of the Massey Agricultural College Sheep Farm, Palmerston North. The 14 acre paddock made available was a flat to undulating ridge top.

The soil type is classed as a Manawatu Yellow Grey loam and has no known minor or trace element deficiencies. During the previous six years no fertiliser or lime applications have been made though in earlier years the paddock had been top-dressed and limed. The winter carrying capacity of this paddock is approximately six ewes per acre.

The pasture throughout the experiment consisted of a mixed sward, dominantly perennial ryegrass and white clover. Crested dogstail was the main specie of the minor sward components, browntop and poa trivialis also being present.

Before stocking, the paddockwas divided into three areas with stake and standard netting fences.

(ii) The High Plane Area.

Since ewes on high-plane nutrition were to be allowed all the feed they would consume, this area consisted of the majority of the paddock or approximately 13 acres.

In addition to the 40 ewes set stocked during the investigation, four Galloway cows and their calves were also grazed until May 3. These cattle effected some measure of pasture control, but the pasture was generally longer than that which is ideal for sheep. Water was always available to stock.

(iii) The Low Plane Area.

In order to enforce a steady loss of live weight in the low-plane groups, the area they were to graze was restricted.

Originally, an area of two acres adjoining the sheep yards was fenced off and grazed down with a large mob of wethers. Despite the addition of twenty wethers to this area, the

low-plane ewes gained weight and on March 8, the low-plane area was reduced to three-quarters of an acre and the wethers withdrawn. Small additions to the low-plane area of approximately twenty square yards per day were made following the cold weather of mid-April in order to prevent stock from losing too much weight.

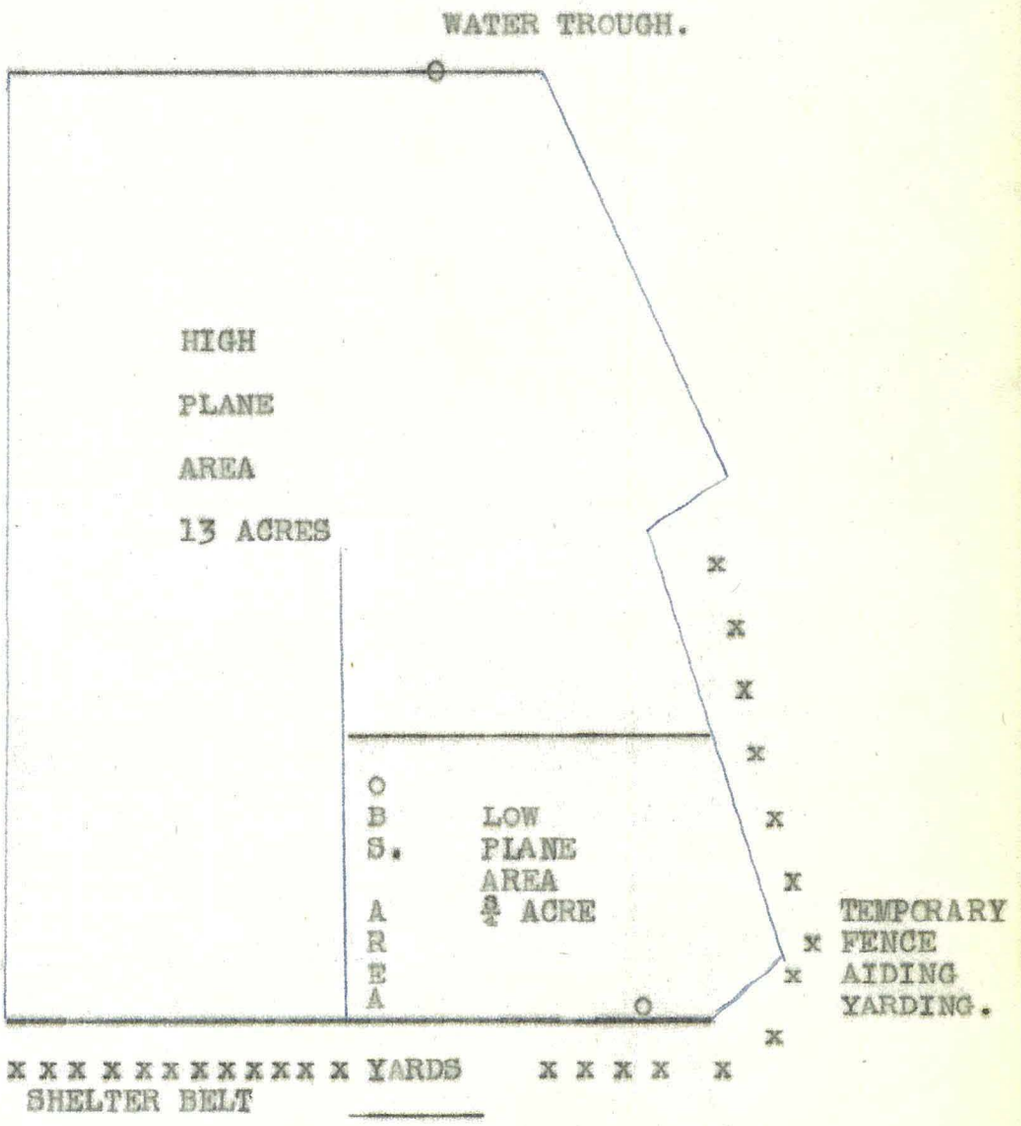
The intensive grazing and the dry autumn soon resulted in a short open and dry sward and even after the autumn rains, the pasture remained very closely cropped.

Adequate fresh water was supplied in a small drum regularly filled from a nearby tank.

(iv) The Observation Area.

Approximately one eighth of an acre adjoining the low-plane area, but separated from it by a double netting fence, was set aside for holding ewes in oestrus. This area facilitated the handling of ewes when mating or testing for oestrus. It was initially grazed down with the low-plane area but due to a lower average stocking rate, the pasture length became intermediate between those of the low- and high-plane areas.

DIAGRAM OF THE EXPERIMENTAL AREA.



EWES ON THE LOW-PLAIN AREA.

HIGH PLANE AREA.

(2) The Experimental Animals and their Management.

(i) Introduction.

For the experiment planned, the most suitable two-tooth ewes would have been a uniform group bred and reared under the same conditions of feed and management.

A straight line of 80 ewes was unable to be purchased and since stock were to be slaughtered and the carcases sold in an attempt to work within financial limits, a better class of ewe was purchased.

(ii) Ewes.

A mixed mob of 80 ewes was purchased at Feilding on Feb. 24. The main line of 69 ewes had been bred at Taihape but reared as hoggets on good Kimbolton hillcountry. These ewes were in excellent condition and an estimate of their normal live weight would be 125 lb. One of these was later discarded, being a wether.

The total of 80 head was made up by three small lines from different properties. They were mainly cull ewes, smaller boned and lighter in condition.

The late date of purchase, preceded the expected commencement of the breeding season by two weeks and it was therefore imperative to impose the high- and low-planes of nutrition as soon as possible.

On Feb. 25, the ewes were crutched, ear-tagged, weighed and their age checked by examination of incisors. By restrictive randomisation on a weight basis they were divided into four groups and during that weekend the two high-plane groups were allowed good grazing whilst the low-plane groups were placed in a hard grazed raceway. The following day they were dipped and placed in their respective experimental areas. After 22 days, on the basis of the previous randomisation 20 high-plane ewes were placed in the low-plane area and 20 low-plane ewes in the high-plane area. During the 14-day pre-mating period and the 36-day mating period, ewes were set stocked on their respective grazings. All ewes were then placed on the same plane of nutrition and slaughtering commenced on May 22.

Ewes were treated for foot-rot and dagged as required.

(iii) Rams.

The mating procedure was designed to eliminate as far as possible any influence of the rams in precluding conception. Individual records of rams and treatment are therefore important.

During the mating period, five rams were employed, but at its commencement, only three were used.

Ram A. - An aged ram, not accustomed to controlled mating and very high in condition. Following a head injury on April 7 he was seldom used.

Ram B. - Though light in condition this ram did not show any signs of improving at the commencement of mating and was used more frequently as the season progressed.

Ram C. - A keen and vigorous worker in excellent condition, this ram was used frequently at the commencement of mating, but had to be discarded on April 8 due to re-occurrence of a weakness in the back legs.

In order to mate each ewe during oestrus with at least two different rams, two additional rams were obtained on April 7. These rams, D and E, were keen workers but unaccustomed to controlled mating. Ram E was in his first season.

Prior to mating rams were crutched and their feet trimmed. A manual examination of their reproductive organs failed to reveal any abnormality and after failure to collect semen samples from all rams, this opinion was confirmed by a veterinarian.

At the commencement of mating, each ram was allowed to serve a ewe several times before being used for mating in the procedure adopted. This ensured ejaculation of normal semen.

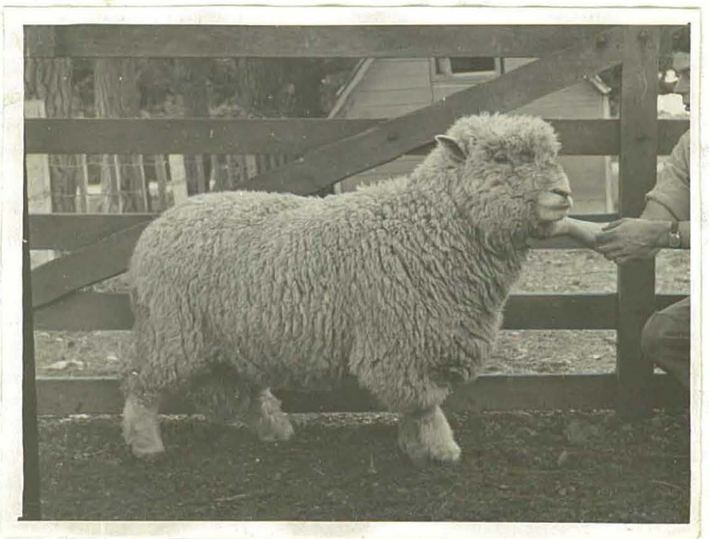
Rams were held in a small paddock adjoining the yards and were only brought into the yards during the three short mating periods each day. No supplements were fed.

(iv) Teasers.

Of the three teasers used at the commencement of the investigation, one was replaced as he could not be held within the low-plane area. The teaser replacing him was in his first season and of considerably lower vigour than the others.

The teasers run with the low- and high-plane ewes were alternated at daily intervals to minimise loss in condition and vigour..

RAM. A



RAM. B

Ram. C.

Ram D.

Ram E.

Chapter III. THE PLANES OF NUTRITION.

(1) Introduction.

In any study of the influence of plane of nutrition on animal behaviour, many factors, including intensity and duration of the planes of nutrition, the initial live weight and rate of change of live weight of the animals, must be considered. A separate chapter has therefore been given to the study of these factors.

(2) Planes of Nutrition.

The experimental plan was designed to induce four distinct planes of nutrition and although the late purchase date of stock restricted their intensity, these planes were induced.

There were two extreme planes of nutrition. One, the high-high, allowed ewes all the feed they could consume on the high-plane area, whilst the contrasting low-low plane was imposed by holding the ewes on the low-plane area.

Of the two other planes of nutrition, one, the high-low, gave the ewes unrestricted grazing on the high-plane area until 14 days prior to mating, when they were placed on the low-plane area. The remaining low-high plane, restricted the intakes of ewes on the low-plane area until 14 days before mating, when they were placed on the high-plane area. For 14 days before mating commenced, and for the 36 day mating period that followed, these two groups of ewes were held on their new grazing areas.

Following mating, all ewes were placed on the same plane of nutrition in being allowed to graze the whole paddock.

(3) Measurement of the Planes of Nutrition.

In order to measure the influence of the imposed planes of nutrition, changes in live weight were taken as the criteria. Changes in live weight were obtained by weighing all ewes once or twice a week, in a crate mounted on platform scales. The standard procedure adopted throughout the investigation was that the ewes from the low-plane area were weighed and returned to grazing before the other group was withdrawn for weighing. Ewes were always weighed early in the morning and scales were

checked with a constant weight before and after each weighing. Ewes were identified by the ear tags and weights noted. Constant dagging reduced errors of measurement from this source.

PLATFORM SCALES AND CRATE.

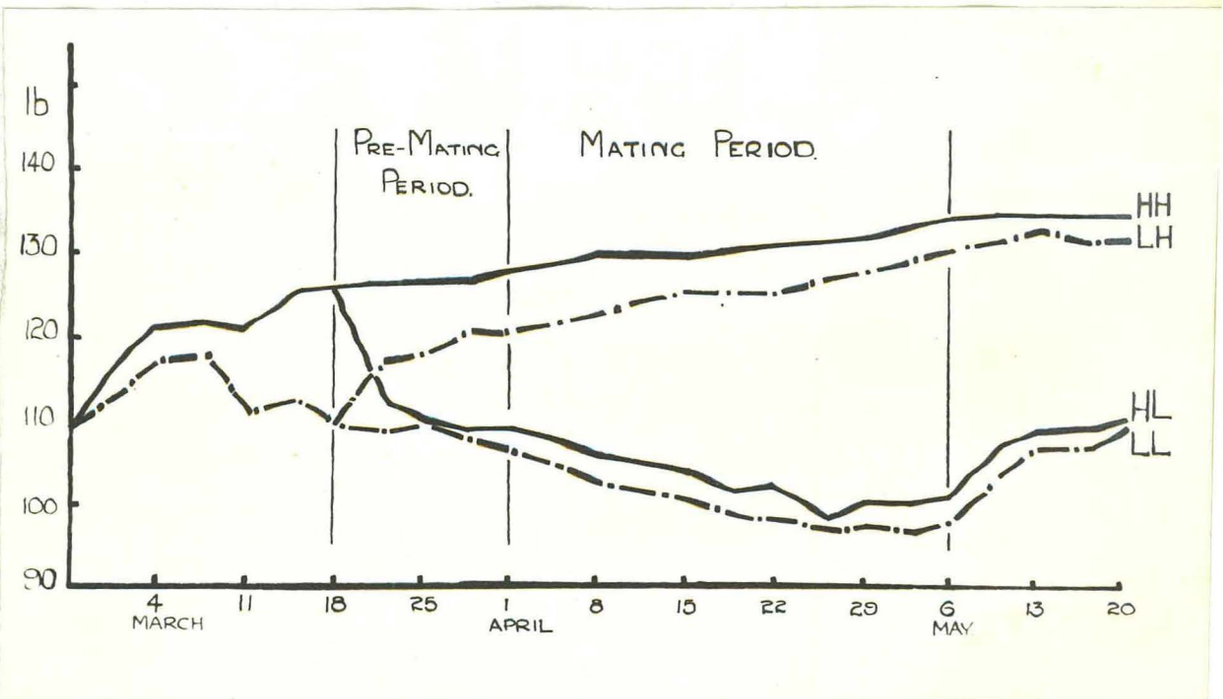
(4) Results.

Changes in live weight of the ewes for each plane of nutrition are shown in Graph 1. and are shown below in tables corresponding to the phases of the experiment. The individual weights of ewes are shown in tables 1 to 4 of the appendix.

Live weights and rate of change of live weight per day are expressed in pounds.

Table 1. - Changes in group live-weight averages to March 18.

Group	Weight Feb 25	Weight Mar 18	Gain or Loss	Rate of Gain or Loss
HH)	109	127	18	0.86
HL)	109	125	16	0.76
LH)	109	110	1	0.05
LL)	109	110	1	0.05



GRAPH 1 GROUP LIVE WEIGHT CHANGES.

On March 18, the high-low ewes were withdrawn from the high-plane area and placed in the low-plane area whilst low-high ewes were withdrawn from the low-plane and placed in the high-plane area. Changes in live weight for the following 14 day pre-mating period are shown in table 2. Live-weight changes from Feb. 25 are also indicated.

Table 2. - Changes in group live-weight averages to April 1.

Group	WEIGHT			GAIN OR LOSS		RATE OF GAIN OR LOSS.	
	Feb.25	Mar.18	April 1	Feb.25 to April 1	Mar.18 to April 1	Feb.25 to April 1	Mar.18 to April 1.
HH	109	127	128	19	1	0.54	0.07
HL	109	125	109	0	-16	0	-1.14
LH	109	110	121	12	11	0.34	0.79
LL	109	110	107	-2	-3	-0.06	-0.21

The mating of ewes commenced on April 1 and continued for 35 days. The changes in live weight for this mating period are shown in table 3.

Table 3.- Changes in group live-weight averges to May 6.

Group	WEIGHT				GAIN OR LOSS TO MAY 6 FROM			RATE OF GAIN OR LOSS TO MAY 6 FROM		
	Feb25	Mar.18	Apr.1	May 6	Feb.25	Mar.18	Apr.1	Feb25	Mar.18	Apr.1
HH	109	127	128	134	25	7	6	0.36	0.14	0.17
HL	109	125	129	101	-8	-24	-28	-0.11	-0.49	-0.8
LH	109	110	121	131	22	21	10	0.31	0.43	0.29
LL	109	110	107	98	-11	-12	-9	-0.16	-0.25	-0.26

After mating, all ewes were placed on the same plane of nutrition. Table 4 shows the changes in live weight during the first two weeks of this period.

Table 4. - Changes in group live-weight averages May 6 - May 20.

Group	WEIGHT		GAIN	RATE OF GAIN.
	May 6	May 20		
HH	134	135	1	0.07
HL	101	110	9	0.64
LH	131	132	1	0.07
LL	98	109	11	0.79

(5) Discussion.

Period 1. Feb. 25 - March 18.

Ewes were divided into four groups by restricted randomisation on a weight basis on Feb. 25 and therefore group averages are equal for this date. The ewes had been brought straight from the sale yards where they had been held all the previous day. The group live-weight averages of 109 lb. are therefore approximately empty live weight.

The gain of 17 lb. or 0.81 lb. per day of the high-plane ewes probably represents stomach contents. The low-plane ewes made an initial rapid gain but the reduction of the low-plane area to 3/4 acreon March 8, caused them to lose weight and the total gain for the period was 1 lb. or 0.05 lb. per day. The live-weight changes resulting in a 16 lb. difference between low- and high-plane groups on March 18, were found to be highly significant, but most of this weight difference is explainable in terms of stomach contents.

Table 5. - Analysis of live-weight changes Feb. 25 to March 18.

	DEGREES FREEDOM	SUM OF SQUARES	MEAN SQUARES	F VALUE
Total	78	5739		
Between Group	1	4941	4941	
Within Group	77	798	10.37	476.

Period 2. The Pre-mating period March 18 - April 1.

The high-high ewes gained an additional pound or 0.7 lb. per day. From graph 1, it will be seen that this small gain was the commencement of a continuous gain explainable in terms of body weight.

The low-low ewes over this period lost weight at the rate of 0.21 lbs. per day and by April 1 were 2 lb. below their approximate empty live weight on Feb. 25.

Whereas the high-plane ewes placed on the low-plane area lost 16 lb. or 1.14 lb. per day, the low-plane ewes placed on

high-plane gained only 11 lb. or 0.79 lb. per day. This difference in the change of live weight is possibly explained by the observation that the high-low ewes did not graze the low-plane area until forced to maintain themselves and were competing against the low-low ewes. The average weights of these two groups were equal on March 25, and this indicates that the 16 lb. live weight between groups on March 18 is explainable by stomach contents. The low-high ewes were not in competition for feed with the high-high ewes and their failure to equal the average of the high-high ewes by April 1 or subsequently indicates that the early low-plane feeding had imposed a check.

Period 3. - The mating Period. April 1 - May 6.

The high-high ewes gained a further 6 lb. or 0.17 lb. per day, this being a slightly lower rate of gain than the 0.21 lb. during the pre-mating period. In comparison the low-low ewes lost 9 lb. or 0.26 lb. per day, a rate of loss greater than during the pre-mating period of 0.21 lb. per day. By May 6 the high-high ewes were 25 lb. above and the low-low 11 lb. below their original weights on Feb. 25.

The high-low ewes continued to lose weight at a decreased rate to the previous period (1.14 - 0.8 lb. per day) and by May 6 were 8 lb. below their original weight. In contrast, the low-high ewes continued to gain weight but at a decreased rate to the previous period (0.79 - 0.29 lb per day), and on May 6 were 22 lb. above their original weight of Feb. 25.

Column 10 of table 3 indicates that from the beginning of the pre-mating period to the end of mating the rate of gain of low-high ewes was over three times that of high-high ewes whilst the rate of loss of the high-low ewes was almost twice as great as that of the low-low ewes.

Period 4. - May 6 - May 20.
The first two weeks after mating when all ewes were on the same plane of nutrition.

Table 4 shows that at the end of this period the high-high and low-high ewes were on the average 24 lb. heavier than

low-low and high-low ewes. Though the prolonged low-plane feeding of the last two groups would have restricted their stomach capacity, most of this 24 lb. weight difference, is probably body weight. On May 20, the weights of the low-low and high-low ewes with full stomachs are approximately equal to their original empty weight on Feb. 25. These ewes had probably been drawing on body reserves.

During periods 1 to 4 no allowance was made for wool growth or the foetal development of the periods 3 and 4. Group differences in these respects would be slight. For a similar reason no allowance was made for slightly wet sheep on March 15 and May 6.

(6) Summary.

1. The changes in live weight and rate of change of live weight of ewes on the four planes of nutrition are given and discussed in periods corresponding to the phases of the experiment.

2. The differences in live-weight changes between the high- and low-plane groups were highly significant by March 18, and resulted in a 16 lb. difference in average weight of groups. On this date, the high-low ewes were placed on low-plane of nutrition and the low-high ewes on high-plane of nutrition.

3. Most of this 16 lb. live weight difference could be accounted for in terms of stomach contents.

4. During the pre-mating period of 14 days, the high-high ewes gained 1 lb. and the low-high ewes 11 lb. Over the same period, the low-low ewes lost 3 lb. and the high-low 16 lb.

5. From the commencement of the pre-mating period to the end of mating, high-high ewes gained 7 lb. and the low-high ewes 21 lb. For the same period the low-low ewes lost 12 lb. and the high-low 24 lb.

6. After two weeks on the same plane of nutrition, there was a 24 lb. live-weight difference between ewes that had been on high-plane, and ewes on low-plane during the pre-mating and mating periods.

Chapter IV. THE INFLUENCE OF PLANE OF NUTRITION ON THE TIME OF ONSET OF THE SEXUAL SEASON.

(1) Introduction.

It is generally accepted that nutrition is an important influence conditioning the physiological state of rams early in the sexual season but experiments have not demonstrated the ability of nutrition to alter or the practice of flushing to hasten the time of onset of the sexual season of ewes. Recently, it has been shown (28) that variation in light is the controlling influence regulating the sexual season of ewes but there remains to be fully explained the variation of onset of the season between flocks of the same breed, within a similar light environment. The establishment of the controlling role of light does not eliminate the possibility of other influences modifying its expression and of the number of such influences that must be considered, nutrition is foremost and warrants further investigation.

The time of onset of the sexual season of ewes usually determines the lambing period and as this may influence the subsequent growth and development of the lamb, it is of considerable importance both to the farmer and the industry. Further, an accurate determination of the beginning of the sexual season of two-tooths and any influence in response to various planes of nutrition, would augment the knowledge of their breeding behaviour.

The experimental design enabled a study to be made of the influence of plane of nutrition on the time of onset of the sexual season for three nutritional systems. First, between high and low plane nutrition before the onset of the season, secondly between high and low plane nutrition shortly after a few ewes had come into season and finally between change and no change of plane of nutrition at the time of onset of the sexual season.

(2) Method.

The sexual season is the period of the year during which the non-pregnant ewe exhibits oestrus or a series of dioestral

cycles. (29). The onset of the sexual season is marked by the first occurrence of oestrus or the special period of desire in the female.

From February 27 when the ewes were placed on the two experimental areas, a teaser or vasectomised ram raddled on the brisket was run with each group of ewes. The teasers were run with the ewes for half a day before being raddled. At oestrus, the ewes were marked by the teasers and this procedure has been shown to be a reliable test for oestrus.(13). Ewes were inspected every day until March 7 when the first ewe came into season and thereafter three times a day when marked ewes were identified by ear tag numbers and the date recorded. Ewes so identified were marked on the head with the current colour, facilitating identification of subsequent ewes coming into season. Raddle colours were changed every 14 days.

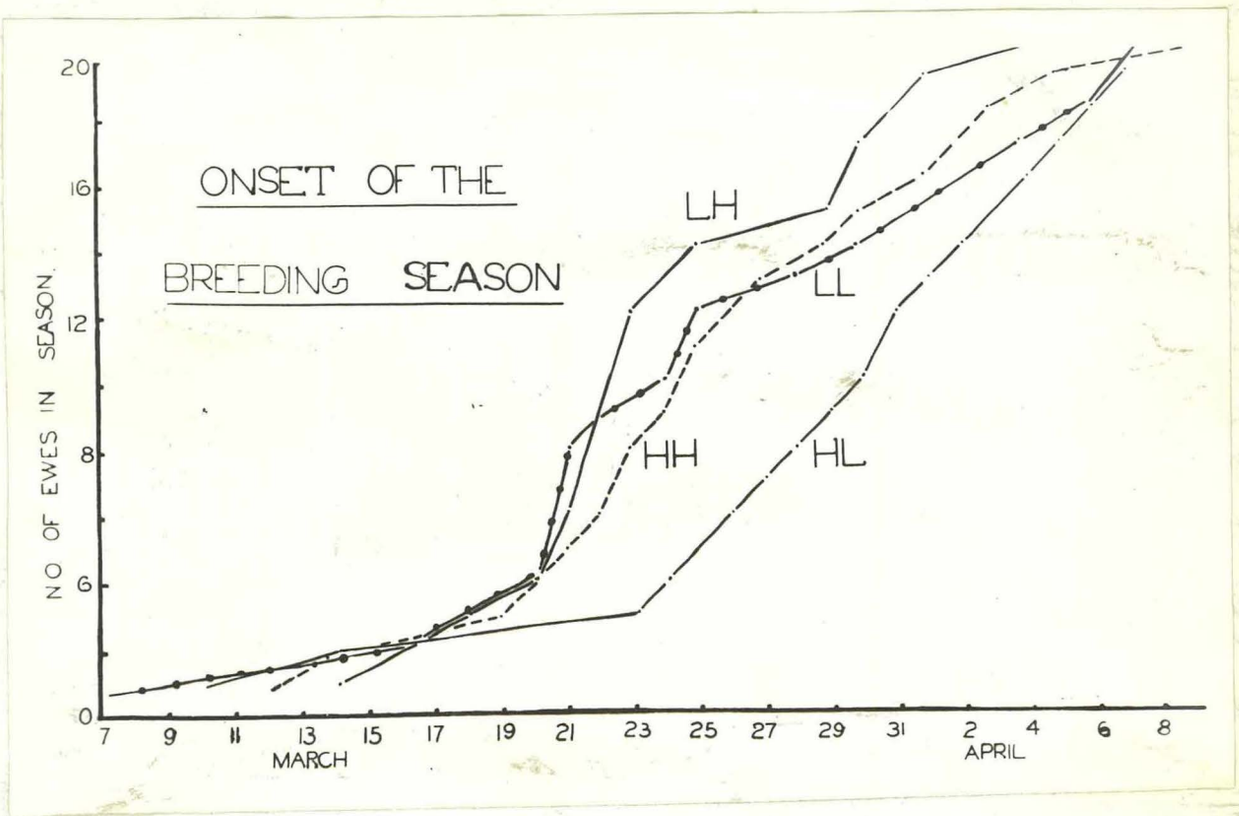
(3) Results.

The following table sets out the ewes in each plane of nutrition group, together with the date of their first oestrus or onset of the sexual season. The ewes are placed in the order in which they came into season. These results are also presented in graph I.

Table 6. - The Onset of the Sexual Season.

High-High		High-Low		Low-High		Low-Low	
Ewe	Date	Ewe	Date	Ewe	Date	Ewe	Date
327	Mar.12	165	Mar.10	167	Mar.14	421	Mar. 7
153	14	412	14	157	18	330	16
227	19	333	23	158	18	159	18
177	20	209	24	145	20	415	20
283	21	160	26	416	21	335	21
241	22	194	26	417	21	401	21
172	23	274	27	161	23	407	21
192	23	150	28	261	23	413	21
151	24	187	29	284	23	163	22
322	25	199	30	331	23	275	24
422	25	228	31	344	23	409	25
191	26	420	31	419	23	414	25
336	27	411	Apr.1	345	24	189	28
169	29	168	2	152	25	346	30
175	30	170	4	256	29	196	Apr. 4
402	Apr. 2	405	4	339	30	236	4
287	3	406	5	347	30	269	4
341	3	E168	6	183	Apr. 1	403	6
324	5	410	7	343	1	197	1
200	15	-	-	185	5	246	7

Graph I. - The Onset of the Sexual Season.



(4) Discussion.

The group live weight changes of ewes on the four planes of nutrition are shown in tables 1 - 4, Chapter III.

It is possible that some ewes may have come into season before February 27 when the teasers were first joined with the ewes but this is unlikely due to the trend shown by graph 1 and the fact that no ewe was marked between February 27 and March 7. This possibility has therefore not been considered in future analyses and discussions.

For analysis of the results, table 6 was converted into the number of days following March 5 that individual ewes came into season.

The onset of the sexual season for the experimental ewes extended from March 7 to April 15. All ewes showed breeding behaviour. The mean of the onset of the sexual season after March 5 was 21.1 days and the standard deviation 7.3 days.

The period over which ewes came into season, was divided into three sections, 5th to 24th March, 5th to 30th March and 5th March to 15th April. March 24th and 30th were chosen

because on these dates differences between plane of nutrition groups appeared greatest and April 15 because on that date all ewes were in season.

Table 7 shows an analysis of the between-group differences for these three sections of the sexual season.

Table 7. - Analysis of variance - Onset of the Sexual Season.

	Source	df	SS	MS	F
Section 1 March 5-24	Total	35	629		
	Between Groups	3	42.8	14.2	
	Within Groups	32	587	18.3	0.77 NS
Section 2 March 5-30	Total	57	1598.9		
	Between Groups	3	83	27.6	
	Within Groups	54	1515.9	28.07	0.98 NS
Section 3 March 5 - April 15	Total	78	4265.9		
	Between Groups	3	184.7	61.57	
	Within Groups	75	4081.2	54.41	1.3 NS

From this analysis it is evident that the planes of nutrition imposed for the duration of the experiment did not appear to influence the time of onset of the sexual season.

Had significant differences been found in the above analysis, then the between group differences could have been divided to test the hypothesis of an influence of early high or low-plane nutrition, late high- or low-plane n utrition or change of plane of nutrition at the time of onset of the sexual season, that is (HH HL) vs (LH LL), (HH LH) vs (LL HL) and (HL LH) vs (HH vs LL).

Since the date of purchase of the ewes preceeded the commencement of the sexual season by only two weeks the

durations of the plane of nutrition were limited and this fact together with the excellent condition of the ewes may have limited any physiological influence of the planes of nutrition. In addition, the change in plane of nutrition on March 18, coincided with the apparently normal time of onset of the sexual season. More extreme planes of nutrition for a longer period and a change in plane of nutrition prior to the onset of the season may affect the time of its onset but until further investigation this must remain a hypothesis. In interpreting any such investigation, more information concerning the occurrence of silent heat or of oestrus without ovulation in the Romney before the onset of sexual season, as has been reported for other breeds (5, 12, 30, 31, 32,), would be of considerable value.

The restriction of the onset of the sexual season and the finding that plane of nutrition did not appear to influence its time of onset is indicative of some other controlling influence and in view of Yeates' works (28) this influence is probably light. It is of interest to note that 80 percent of all ewes came into season between March 17 and April 4, a period of 18 days or the equivalent of one dioestral cycle.

(5) Summary.

1. The planes of nutrition did not appear to influence the time of onset of the sexual season.

2. The onset of the sexual season extended from March 7 to April 15, a period of 39 days.

3. The mean of the onset of the sexual season following March 5 was 21.1 days and the standard deviation 7.3 days.

Chapter V. THE INFLUENCE OF PLANE OF NUTRITION ON THE DURATION OF OESTRUS AND THE DIOESTROUS CYCLE.

(1) Introduction.

Fundamental to any study of breeding behaviour is a knowledge of the duration and rhythm of oestrus and the dioestrous cycle, for they constitute the major phases of the sexual season. Although these phases have been extensively studied in other breeds of sheep our knowledge for the Romney, and particularly the two-tooth, is limited.

The opinion is often expressed that the two tooth Romney ewe, especially when it has been bred and reared on hill country, is sexually immature but apart from a low proportion of multiple births and a higher proportion of ewes failing to breed, factual evidence for this statement is lacking. It is doubtful if such can be accepted as expressions of sexual immaturity since their cause is unknown.

Absent, aberrant or irregular oestrus has been given as one of the possible causes of infertility in Australian merinos (13) and the study of oestrus and dioestrous cycles in the two-tooth Romney is therefore of fundamental importance as a possible step in the solving of the problem of low fertility.

The object of this section of the investigation is to study the influence of various planes of nutrition on the duration of oestrus and the dioestrous cycles at the commencement of the sexual season, and to investigate their association with subsequent breeding behaviour.

(2) Method.

The sexual season of the non pregnant ewe is made up of a series of dioestrous cycles. Each dioestrous cycle consists of proœstrum, oestrus, metoestrum and dioestrum.

Oestrus is the special period of desire in the female; it is during oestrus, and only at that time, that the female is willing to receive the male and fruitful coitus rendered possible. (29). The periodicity of oestrus determines the duration of the dioestrous cycle. The measurement of the duration of oestrus and the dioestrous cycle was based on

these definitions and the planes of nutrition are given in Chapter III.

One vasectomised ram or teaser raddled on the brisket was run with each of the two groups of ewes, and following the commencement of the sexual season the ewes were yarded three times a day. Prior to April, 8, ewes were yarded at 9 a.m., 2 p.m. and 7 p.m., but after that date, due to decreased hours of daylight, yarding times were altered to 8 a.m., 2 p.m., and 6 p.m.

At yarding, ewes marked with the current colour were withdrawn and the commencement of oestrus recorded as lying between that yarding time and the previous yarding time when the ewe was unmarked.

Ewes so identified were placed in the observation area and at each subsequent yarding time were tested for oestrus by observing the mutual behaviour of the ewes and a teaser. If the ewe allowed the teaser to mount, the recording was positive, but if his attentions were refused, the recording was "off heat". This procedure is fully described in the following section of this chapter. The end of oestrus was recorded as lying between the yarding time when the teaser's attentions were first refused and the previous positive yarding time. Ewes "off heat" were marked on the head with the current colour, facilitating identification of ewes subsequently marked. Ewes "off heat" were then returned to their respective grazing areas.

The 14-hour night period made more exact measurement of duration impossible. A midnight yarding to identify ewes coming on heat or into oestrus during the night period was attempted but could not be maintained. No dog for mustering was obtainable for the short duration of the experiment.

The durations of oestrus recorded in the Appendix for individual ewes, give the minimum and maximum possible durations. The minimum duration is the number of hours between the first yarding when the ewe was withdrawn marked

and the last positive testing time. The maximum duration is the number of hours between the yarding time previous to withdrawal marked and the yarding time when the attentions of the teaser were refused.

For example:-

Previous Observation.	Withdrawal Marked	Last positive observation	Off heat
March 7/ 7p.m.	March 8/ 9a.m.	March 8/ 7p.m.	March 9/ 9a.m

Minimum 10 hours.

Maximum 38 hours.

Since this ewe could have come on heat anytime during the night of March 7 and gone off heat anytime during the night of March 8, the duration of oestrus is given as 10-38 hours.

Raddle colours were changed every 14 days, the new colour being applied further up the brisket. The colour sequence used was yellow, red, blue, green and black and the tupping paste employed was a proprietary mixture.

The duration of the dioestrous cycles was taken as the number of days lying between the date of withdrawal of the marked ewe at one oestrus and the date of withdrawal at the subsequent oestrus when the ewe was marked with a different colour. The measurement of time of onset of oestrus as lying between two yarding times did not permit more exact measurement of the duration of dioestrous cycles.

(3) Some Observations on Oestrous behaviour and Testing for Oestrus.

Within the experimental areas, the teasers were attracted to ewes coming into oestrus for an undetermined period before being allowed to mount. This period has been termed pro-oestrum (29) and the attraction results from odiferous material contained in the urine and present on the perinea of ewes (13). This period appeared to be short in most ewes but for some at least it lasted over 10 hours. Unmarked ewes to which teasers were paying attention were identified at yarding and a note made when they were withdrawn marked.

Following proœstrum ewes were marked as a result of allowing the teasers to mount and the ewes were then said to be in oestrus or on heat. At yarding the teasers were immediately separated from the ewes, and the marked ewes placed in the observation area. Ewes marked during the night were always tested at the morning yarding. The remainder of the ewes were then returned to grazing.

At each subsequent yarding time ewes were withdrawn from the observation area and placed in the largest yard which allowed freedom of movement. The teaser in his first season, and of low libido, was joined with these, and those in full oestrus were easily identified. Such ewes were returned to the observation area. This teaser was then withdrawn and was replaced with one of the other two teasers of apparently equal vigour that had been rested since yarding. That the intensity of libido of the teaser influences the interpretation of the mutual behaviour of ewes and teasers has been noted by Roux (14).

When testing for oestrus, a ewe was only recorded as in oestrus if she stood fairly still while the teaser mounted. It was observed that teasers occasionally needed to be forced to move amongst the ewes to stimulate interest, and that ewes stood for service sooner when the testing was observed from a concealed position. This was particularly so during the first oestrus when the ewes were not so accustomed to yarding. The ewes tended to be more receptive to the attentions of the teasers at the second oestrous testing. During the first testing they tended to move slightly forward and away from the teaser, and this movement could not be explained in terms of disparity in size. In the few cases where there was a disparity in size, the small framed ewes which became light in condition on low-plane nutrition appeared to be forced forward and down, a movement distinct from the slight movement forward at the first oestrus. The possibility of this latter movement being due to the fact that they had not been mated

before is entertained. When the number of ewes being tested was large, the third teaser was also used.

Occasionally, the mutual behaviour of the ewes and teasers was indecisive, and such ewes were held for further testing, but due to the period of time between testings the mutual behaviour was usually definite. The end of oestrus appeared to be abrupt and the ewes that had passed out of oestrus moved rapidly away from the teaser. This period of attraction following oestrus is termed metoestrum and was apparently of less than 6 hours duration, for when ewes were returned to grazing at 2 p.m. and 6 p.m. following positive testings at 8 a.m. and 2 p.m. respectively, the teasers showed no, or very little, interest in a number of instances.

The use of the observation area facilitated the handling of stock, and the removal of ewes in oestrus to this area served the important purpose of conserving the energy of the teasers. The alternation of teasers between low- and high-plane areas, the use of the third teaser to identify ewes in full oestrus, and the resting of teasers before testing were designed to ensure maximum libido at testing.

(4) Results.

Tables 10 - 13 abstracted from the breeding records of the appendix indicate the duration of oestrus and dioestrous cycles for all ewes in their respective plane of nutrition groups. Ewes are tabulated in order of the date of their onset of the sexual season.

At the foot of each table oestrous periods are grouped according to their duration. Two distinct groups of up to 29 hours maximum and over 29 hours minimum are made. The ill-defined range of the remainder necessitated the formation of the intermediate groups 10 - 38 hours and 24 - 48 hours, into one of which all the remaining oestrous durations may be classed. A similar classification has been employed by Kelley (13)/

Durations of oestrus are given in hours and dioestrous cycles in days.

Table 10. - Duration of Oestrus and Dioestrous Cycles High-High.

Ewe	Date First Oestrus	Duration of First Oestrus Min-Max	First Dioestrous Cycle	Second Oestrus Min-Max	Second Dioestrous Cycle	Third Oestrus Min-Max
327	Mar.12	10-38	16	24-43	18	30-48
153	14	10-38	16	24-43	16	30-48
227	19	29-48	16	34-62		
177	20	19-29	17	29-47		
283	21	19-29	16	24-43		
241	22	10-38	18	34-62		
172	23	24-43	17	34-62		
192	23	29-48	17	28-48	22	10-38
151	24	38-48	16	38-48		
322	25	29-48	16	24-42	18	10-38
422	25	29-48	17	10-38		
191	26	24-44	16	24-42		
336	27	10-38	16	24-42	17	10-38
169	29	29-48	17	24-42		
175	30	24-43	16	10-38		
402	Apr. 1	10-38	17	10-38		
287	3	10-38				
341	3	29-48				
324	5	24-43				
200	15	24-42	18	24-42		

Grouped Durations of Oestrus.

Duration	First Oestrus	Second Oestrus	Third Oestrus	Total
-29	2	0	0	2
10-38	6	3	3	12
24-48	11	10	0	21
29	1	4	2	7

Table 11. - Duration of Oestrus and Dioestrous Cycles High-Low.

Ewe	Date First Oestrus	Duration of First Oestrus Min-Max	First Dioestrous Cycle	Second Oestrus Min-Max	Second Dioestrous Cycle	Third Oestrus Min-Max
165	Mar.10	10-38	15	29-48	16	24-42
412	14	29-48	18	24-43	17	10-38
333	23	10-38	15	28-47		
209	24	29-48	16	38-48		
194	26	34-62	17	24-44		
160	26	19-29	17	Missed	21	24-44
274	27	24-43	17	20-28		
150	28	29-48	18	30-48		
187	29	10-38	17	24-42	18	14-24
199	30	19-29	17	24-44		
228	31	53-72	16	28-48		
420	31	-14	18	10-38		
411	Apr. 1	34-62	18	30-48		
168	2	14-24				
170	4	24-43				
405	4	24-34				
406	5	14-24				
E168	6	24-43				
410	7	29-47				

Grouped Durations of Oestrus after March 18.

Duration	First Oestrus	Second Oestrus	Third Oestrus	Total
-29	5	1	1	7
10-38	3	1	1	5
24-48	6	7	2	15
29	3	3	0	6

Table 12. - Duration of Oestrus and Dioestrous Cycles Low-High.

Ewe	Date First Oestrus	Duration of First Oestrus Min-Max	First Dioestrous Cycle	Second Oestrus Min-Max	Second Dioestrous Cycle	Third Oestrus Min-Max
167	Mar.14	29-48	18	29-48		
157	18	24-43	18	19-29	19	24-34
158	18	19-29	16	19-29		
145	20	5-24	16	19-29		
417	21	24-43	17	28-47		
416	21	14-24	16	29-47		
331	23	5-24	17	10-38		
344	23	10-38	16	24-43		
284	23	10-38	16	24-42		
161	23	10-38	15	24-42	15	20-28
261	23	29-48	16	24-42		
419	23	29-48	17	10-38		
345	24	34-62	18	28-48		
152	25	34-62	17	10-38		
256	29	24-43	17	24-42	18	34-62
347	30	24-43	17	24-44		
339	30	19-29	17	10-38	16	24-44
343	Apr. 1	10-38	17	28-48		
183	1	24-43	17	24-42		
185	5	10-38				

Grouped Durations of Oestrus after March 18.

Duration	First Oestrus	Second Oestrus	Third Oestrus	Total
-29	5	3	1	9
10-38	5	5	1	11
24-48	7	11	1	19
29	2	0	1	3

Table 13. - Duration of Oestrus and Dioestrous Cycles Low-Low.

Ewe	Date First Oestrus	Duration of First Oestrus Min-Max	First Dioestrous Cycle	Second Oestrus Min-Max	Second Dioestrous Cycle	Third Oestrus Min-Max
421	Mar. 7	10-38	16	24-43	18	10-38
330	16	24-43	18	19-29	17	24-42
159	18	24-43	16	19-29		
415	20	10-38	17	24-43		
413	21	10-38	16	29-47	17	24-42
407	21	24-43	21	10-38		
335	21	19-29	17	29-47		
401	21	19-29	17	29-47		
163	22	19-29	-	-	31	10-38
275	24	10-38	17	18-30	21	24-42
414	25	29-48	17	10-38		
409	25	29-48	16	44-52		
189	28	29-48	20	24-44	17	24-42
346	30	24-43	17	30-48		
269	Apr. 4	29-48	17	10-38		
196	4	24-43				
236	4	24-43	17	24-42		
403	6	29-47				
246	7	29-47				
197	7	24-42				

Grouped Durations of Oestrus.

Duration	First Oestrus	Second Oestrus	Third Oestrus	Total
-29	3	2	0	5
10-38	4	4	2	10
24-48	13	7	4	24
29	0	2	0	2

(5) Discussion.

(i) Duration of oestrus.

For comparison of durations of oestrus between planes of nutrition, those oestrous periods occurring before March 18 in the high-low and low-high groups have been omitted, since this was the date of formation of these planes of nutrition.

The tables grouping oestrous durations are summarised in table 14 and are shown in histogram I, page 41.

Table 14. - Durations of Oestrus - hours.

Duration	HH	HL	LH	LL	Total	Percent. Total
-29	2	7	9	5	23	14.6
10-38	12	5	11	10	38	24.0
24-48	21	15	19	24	79	50.0
29	7	6	3	2	18	11.4
Total	42	33	42	41	158	100

The modal duration of oestrus is 24-48 hours whilst that next to modal duration is 10-38 hours. More ewes had maximum durations of oestrus under 29 hours than those with minimum durations over 29 hours, but these two groups of durations form only 26 percent of all oestrous periods.

Analysis of between plane of nutrition differences does not reveal significance (χ = 12.17 9d.f.N.S.)

The possibility of differences occurring between the durations of first and second oestrous periods within plane of nutrition groups due to cumulative effects of the imposed planes of nutrition was also investigated.

Table 15. - Durations of first and second oestrous periods,-hours.

Duration	High-High		High-Low		Low-High		Low-Low		Total	
	1	2	1	2	1	2	1	2	1	2
-29	2	0	5	1	5	3	3	2	15	6
10-38	6	3	3	1	5	5	4	4	18	13
24-48	11	10	6	7	7	11	13	7	37	35
29	1	4	3	3	2	0	0	2	6	9
Total	20	17	17	12	19	19	20	15	76	63

No significance within plane of nutrition was demonstrated; (χ HH = 4.57. HL = 3.03. LH = 3.38. LL = 3.15. 3d.f. N.S.) nor was there significance between all first and all second oestrus durations (χ = 5.56 3d.f. N.S.)

It is apparent therefore that the planes of nutrition did not appear to influence the duration of oestrus, nor did the durations of the first and second oestrous periods of the sexual season appear to differ. The large variation in measurement of the durations, together with the comparatively small number of observations, may have precluded the identification of differences due to plane of nutrition.

(ii) Duration of Dioestrous cycles.

The following table summarises the durations of dioestrous cycles presented in tables 10 - 13. Dioestrous cycles are classed as to duration and as to whether they were the first or second dioestrous cycle of the sexual season.

Table 16. - Durations of Dioestrous cycles - days.

Days	15		16		17		18		19		Over19		Average		No. of observations	
Cycle	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
HH	-	-	9	1	6	1	2	2	-	-	-	1	16.6	18.2	17	5
HL	2	-	2	1	5	1	4	1	-	-	-	1	16.8	18	13	4
LH	1	1	6	1	9	-	3	1	-	1	-	-	16.7	17	19	4
LL	-	-	4	-	8	3	1	1	-	-	2	2	17.2	17.3	15	6
Total	3	1	21	3	28	5	10	5	-	1	2	4	16.8	17.6	64	19
Total	4		24		33		15		1		6		17.2		83	
%Total	4.8		28.6		39.3		17.8		1.2		7.1					

The average durations of all first and second dioestrous cycles are 16.8 and 17.6 days respectively. The average duration for the total of 83 cycles recorded is 17.2 days.

The modal duration for all cycles is 17 days, the next to modal 16 days followed by 18 days. 4.8 percent of all cycles were 15 days whilst 7.1 per cent were over 19 days. No dioestrous cycles under 15 days were recorded.

The following table compares differences in the duration of dioestrous cycle between planes of nutrition.

Table 17. - Durations of all dioestrous cycles between planes of nutrition.

Duration	15	16	17	18	19	19+	Total
HH	-	10	7	4	-	1	22
HL	2	3	6	5	-	1	17
LH	2	7	9	4	1	-	23
LL	-	4	11	2	-	4	21
Total	4	24	33	15	1	6	83

Analysis of between plane of nutrition differences does not reveal significance (χ = 19.7. 15 d.f., N.S..)

The durations of the first and second dioestrous cycles within planes of nutrition as shown in table 16, were also analysed since it is conceivable that cumulative effects of the planes of nutrition may have influenced duration of dioestrous cycles. The analysis did not reveal significant differences, and the results are shown in Table 18.

Table 18. - Results of analysis of durations of first and second dioestrous cycles within planes of nutrition.

	HH	HL	LH	LL
χ	6.96	2.98	7.22	2.92
df.	3	4	4	3
S	NS	NS	NS	NS

The possibility that there might be a difference between all first and second dioestrous cycle durations irrespective of plane of nutrition was investigated, but no significant difference was found. The following table shows the data analysed and the results obtained.

Table 19. - Duration of all first and second dioestrous cycles.

Cycle	15	16	17	18	19	Over 19	Total
First	3	21	28	10	-	2	64
Second	1	3	5	5	1	4	19
Total	4	24	33	15	1	6	83

χ = 8.75 5 d.f. N.S.

It would appear therefore that the planes of nutrition did not influence the duration of the dioestrous cycles at the various stages of the experiment, nor did the durations of the first and second dioestrous cycles appear to differ. Though the accuracy of measurement may have been relatively greater than that of oestrous periods this limitation still exists together with that of a comparatively small number of observations. Further, only oestrous periods and dioestrous cycles of the early portion of the sexual season are recorded and no information is available of the influence of plane of nutrition on subsequent oestrous period and dioestrous cycles that would be shown by non-pregnant ewes.

In interpreting the above findings, it must be emphasised that the ewes had been reared under better conditions than are usually found for hill country hoggets, and that the planes of nutrition were only imposed shortly before the onset of the sexual season.

From table 16 it will be seen that over 85 percent of all dioestrous cycles were of 16, 17 or 18 days duration and although durations of 15 and 19 days cannot be considered abnormal, ewes with dioestrous cycles of those durations are included in the following table showing breeding records of ewes with cycles other than 16 - 18 days. The breeding records of individual

Table 20 - Breeding Records of Ewes with Dioestrous Cycles other than 16 - 18 days.

Ewe	Plane of Nutrition	Durat. of Dioest. Cycle	First or Second Cycle	Preceding Oestrus			Succeeding Oestrus			Held to First Mating	Held to Second Mating	Notes
				Date	Durat.	If Mated	Date	Durat.	If Mated			
192	HH	22	2	Apr. 9	28-48	Yes	May 1	10-38	Yes	No	No	Cystic Follicle in Right Ovary at Slaughter June 26
165	HL	15	1	Mar.10	10-38	No	Mar.25	29-48	No	Yes	-	Second Dioestrous Cycle 16 days. Ovaries Normal
333	HL	15	1	Mar.23	10-38	No	Apr. 7	28-47	Yes	Yes		Ovaries Normal
160	HL	21	2	Apr.12	Very Short	No	May. 3	24-44	Yes	No	-	Ovaries Normal One Mating only
161	LH	15	1	Mar.23	10-38	No	Apr. 7	24-42	Yes			
161		15	2	Apr. 7	24-42	Yes	Apr.22	20-28	Yes	No	No	Cystic Corpus in Left Ovary at Slaughter June 26.
157	LH	19	2	Apr. 5	19-29	Yes	Apr.24	24-34	Yes	No	Yes	Ovaries Normal
407	LL	21	1	Mar.21	24-43	No	Apr.11	10-38	Yes	Yes		Ovaries Normal
189	LL	20	1	Mar.28	29-48	No	Apr.17	24-44	Yes	No	Yes	Ovaries Normal
163	LL	31	1	Mar.22	19-29	No	Apr.22	10-38	Yes	No	-	- "Silent Heat" Reproductive Organs apparently normal One Mating only
275	LL	21	2	Apr.10	18-30	Yes	May 1	24-42	Yes	No	No	Reproductive Organs apparently normal.

Of the 10 ewes recorded 5 never conceived, although 3 of these were mated twice. Two of the latter had ovarian abnormalities. Of the remaining 5, three held to the first mating and 2 to the second. As shown in Chapter 6 only 8 ewes failed to conceive out of the total of 79. It appears that the abnormal dioestrous cycles may be associated with failure to conceive and the evidence is suggestive that cystic abnormalities of the ovaries may be one possible cause. Obviously, further investigation must be made before any conclusions can be reached.

Of the 7 ewes with dioestrous cycles over 18 days, 3 had been mated at the previous oestrous period. As the dioestrous cycles of these ewes were all under 23 days, it appears unlikely that short term implantation of the fertilised ova would be the cause but due to the lack of factual evidence no conclusions can be drawn.

No cycles of sufficient length to suggest short term resorption or abortion were recorded. The 31 day dioestrous cycle was not preceded by mating and its duration is suggestive of 2 dioestrous cycles, probably separated by ovulation without oestrous or silent heat.

(6) Summary.

1. The planes of nutrition imposed did not appear to influence the duration of oestrus or duration of dioestrous cycles within the limits of their measurement.

2. There appeared to be no difference within planes of nutrition between the duration of the first and second oestrus or between the duration of the first and second dioestrous cycles of the sexual season.

3. There appeared to be no difference between all first and second oestrous periods or between all first and second dioestrous cycles irrespective of plane of nutrition.

4. The modal duration of oestrus was 24-48 hours and the next to modal 10-38 hours.

5. The modal duration of the dioestrous cycles was 17 days; 16 and then 18 days were next to modal.

6. Some observations are made on the breeding records of ewes with dioestrous cycles other than 16 to 18 days.

Chapter VI. THE INFLUENCE OF PLANE OF NUTRITION ON CONCEPTION RATE.

(1) Introduction.

While the results of some experiments indicate that a rising plane of nutrition may reduce the number of ewes failing to breed, there is also evidence to the contrary. The ability of plane of nutrition to influence conception rate has seldom been investigated and the results obtainedhave been difficult to interpret. Further, the influence of the fertility of the ram in determining conception has seldom been eliminated. For the Romney ewe, little is known of these aspects of breeding behaviour and of the influence of plane of nutrition on them.

One of the major causes of the low lambing percentages of the two-tooth Romney ewe is a high proportion of ewes failing to conceive. Further, it is usually considered desirable to restrict the lambing period and for this to be accomplished the conception rate must be high.

This section of the investigation is a study of the influence of plane of nutrition on conception rate, eliminating as far as possible any part played by the ram in causing failure of conception. The findings are also related to data presented on ovulation rate, since this is possibly associated with conception rate.

(2) Method.

(i) The mating of ewes.

The mating procedure was designed to eliminate as far as possible any influence of impotency of rams, or time of mating, in precluding conception.

In addition to the precautions against possible impotency enumerated in Chapter II under management of the rams, each ewe at oestrus was mated with at least two different rams and after April 6 three or more matings with different rams were made where possible. As the duration of oestrus was being determined at the same time, these matings were spread over the oestrous period in an attempt to eliminate the influence of

time of mating on conception rate, as has been noted in several experiments. (33-36).

All matings were by controlled service using a tupping crate, and as the rams were held in a separate paddock, they were not subjected to the influence of the planes of nutrition.

The times of mating correspond to the times of testing for oestrus and where possible a ewe in oestrus was always mated before and after the night period of 14 hours to ensure at least one service towards the end of oestrus. Experiments have indicated that the optimum time of mating is towards the end of oestrus (33-37) and that the previous mating with a vasectomised ram has no effect on the fertility of a subsequent mating with a normal ram (13).

Most ewes failing to conceive to the first mating were mated again at the following oestrus in a similar manner. The mating period lasted 36 days.

(ii) Identification of ewes failing to conceive.

Raddled teasers on the low- and high-plane areas marked ewes returning to the first mating. At the end of the mating period when the ewes were placed on one plane of nutrition, the teasers were left with the ewes for a further 20 days and ewes returning to the second mating were marked by them. During this post-mating period ewes were only yarded every two or three days and the exact date of returns to the second service was therefore not available. After a post-mating period of 20 days the teasers were withdrawn.

Ewes not marked by teasers following mating were all found to be pregnant on examination at slaughter.

(3) Results.

Extracted from the breeding records of the Appendix, tables 21 - 24 show the number of ewes returning to the first and second matings for each plane of nutrition group, together with data pertaining to the mating.

Table 21. - Mating Records of High-High Ewes.

	First Mating				Second Mating				
Ewe	If held to Mating	Date Day/ Month	Rams	First Second or third Oestrus	If held to Mating	Date Day/ Month	Rams	First Second or third Oestrus	Not in Lamb
151	*	9/4	DEBD	2					
153	*	15/4	DEAD	3					
169	*	15/4	BDE	2					
172	*	9/4	ADE	2					
175	*	15/4	ED	2					
177	*	6/4	CDC	2					
191	*	11/4	BBE	2					
192		9/4	EBED	2		1/5	DEB	3	*
200		15/4	DED	1	*	3/5	DEBE	2	
227	*	4/4	CA	2					
241	*	9/4	EDDB	2					
283	*	6/4	AC	2					
287	*	3/4	BC	1					
322		10/4	EBD	2		28/4	EAB	3	*
324	*	5/4	AC	1					
327		15/4	BDA	3	*	2/5	DEB	4	
336		12/4	DBDE	2	*	29/4	EDB	3	
341	*	3/4	BA	1					
402	*	18/4	ADE	2					
422	*	11/4	EBD	2					

* held to mating.

Table 22. - Mating Records of High-Low ewes.

Ewe	First Mating				Second Mating				
	If held to Mating	Date Day/ Month	Rams	First Second or third Oestrus	If held to Mating	Date Day/ Month	Rams	First Second or third Oestrus	Not in Lamb
150	*	15/4	EAD	2					
160		3/5	BDE	3	One service only				*
165	*	10/4	DBE	3					
168	*	2/4	CA	1					
170	*	4/4	CA	1					
187		15/4	BEE	2	*	3/5	BD	3	
194	*	12/4	DBE	2					
199	*	16/4	DEDD	2					
209	*	9/4	EBDB	2					
228		31/3	AC	1	*	16/4	EAD	2	
274	*	13/4	EDD	2					
333	*	7/4	BED	2					
405	*	4/4	AC	1					
406	*	5/4	AC	1					
410	*	7/4	ADD	1					
411		1/4	CB	1	*	19/4	DEAB	2	
E168	*	6/4	AC	1					
412	*	18/4	BDE	3					
420	*	18/4	BDE	2					

* held to mating.

Table 23. - Mating Records of Low-High ewes.

	First Mating				Second Mating				
Ewe	If held to Mating	Date Day/ Month	Rams	First Second or third Oestrus	If held to Mating	Date Day/ Month	Rams	First Second or third Oestrus	Not in Lamb
145	*	5/4	CA	2					
152	*	11/4	AD	2					
157		5/4	CA	2	*	24/4	DEBD	3	
158	*	3/4	AC	2					
161		7/4	EED	2		22/4	EDB	3	*
167	*	1/4	BC	2					
183	*	18/4	AEDB	2					
185	*	5/4	AC	1					
256		15/4	BED	2		3/5	EDEB	3	*
261	*	8/4	ABE	2					
284	*	8/4	ADB	2					
331	*	9/4	DBE	2					
339		16/4	EBD	2		2/5	DEB	3	*
343	*	18/4	BEDB	2					
344	*	8/4	DBA	2					
345	*	11/4	EDAB	2					
347	*	16/4	ADE	2					
416	*	6/4	CCD	2					
417	*	7/4	CED	2					
419	*	9/4	BDD	2					

* held to mating.

Table 24. - Mating Records of Low-Low Ewes.

Ewe	First Mating				Second Mating				
	If held to Mating	Date Day/ Month	Rams	First Second or third Oestrus	If held to Mating	Date Day/ Month	Rams	First Second or third Oestrus	Not in Lamb
159	*	3/4	CA	2					
163		22/4	BAD	3		one service only			
189		17/4	DEBE	2	*	4/5	EBD	3	
196	*	4/4	BC	1					
197	*	7/4	CEE	1					
236		4/4	CB	1	*	21/4	DAE	2	
246	*	7/4	CDA	1					
269		4/4	BC	1	*	21/4	ADB	2	
275		10/4	EA	2		1/5	ECDB	3	*
330		3/4	AC	2	*	20/4	BED	3	
335	*	7/4	DED	2					
346	*	16/4	DDE	2					
401	*	7/4	DCE	2					
403	*	6/4	ACD	1					
407	*	11/4	DBD	2					
409	*	10/4	DBE	2					
413		6/4	BEC	2	*	23/4	DBE	3	
414	*	11/4	BED	2					
415	*	6/4	BD	2					
421	*	10/4	BD	3					

* held to mating.

(4) Discussion.

The four tables of mating records are summarised and shown in table 25.

Table 25. - Mating Records of all ewes.

	HH	HL	LH	LL	Total
Number of ewes conceiving to first mating	15	15	16	13	59
Number mated	20	19	20	20	79
Number of ewes conceiving to second mating	3	3	1	5	12
Number mated	5	3	4	6	18
Number of ewes failing to conceive - to one mating only	-	1	-	1	2
- to two matings	2	-	3	1	6
Total of ewes failing to conceive	2	1	3	2	8

Of the total of 79 ewes, 59 or 74.7 per cent. conceived to the first mating, 12 or 15.2 percent. conceived to the second mating, while 8 or 10.1 percent. did not conceive after one or two matings.

The differences in the number of ewes conceiving to the first service between planes of nutrition is not significant. (χ = 0.1 3df., N.S.)

On slaughtering, four of the ewes which failed to conceive were each found to have abnormal conditions in one ovary. These were the high-high ewes 192 and 322, and the low-high ewes 161 and 256. Each of the four ewes had been mated twice. If it is presumed that these abnormalities precluded conception then table 25 may be presented as follows:

	First Mating				Second Mating			
	HH	HL	LH	LL	HH	HL	LH	LL
Number of ewes conceiving	15	15	16	13	3	3	1	5
Number of ewes mated and able to conceive	18	19	18	20	3	3	2	6
Percentage conceptions	83	79	89	65	100	100	50	83

The differences in the number of ewes on the various planes of nutrition which conceived to the first service, even after the extraction of ewes with abnormal ovaries is not significant. (χ = 0.3.3df., NS). It appears that the planes of nutrition imposed did not affect conception rate.

There remains to be explained however, why ewes failed to conceive. The most marked effect of plane of nutrition on breeding behaviour is, as shown in Chapter VII, on the frequency of double ovulations, and the availability of ova at mating was investigated as offering a possible explanation of ewes failing to conceive. Table 33 of Chapter VII is duplicated here for direct reference.

Table 33. - Ovulation rate and foetal development.

Group	HH	HL	LH	LL	Total
Number of Pregnant ewes	18	18	17	18	71
Total ewes in group	20	19	20	20	79
Right Ovary - single corpus	10	11	6	7	34
- double corpora	1	-	5	-	6
Left Ovary - single corpus	8	10	4	11	33
- double corpora	5	1	3	1	10
Ewes with - single corpus	6	13	8	16	43
- double corpora	12	5	9	2	28
Total corpora lutea vera	30	23	26	20	99
Ewes with - single foetus	13	16	11	17	57
- twin foetuses	4	2	5	1	12
- single resorptions	1	-	1	-	2
Total Foetuses	22	20	22	19	83
Total number of corpora minus total foetuses	8	3	4	1	16
Twins 2 corpora one ovary	2	-	5	-	7
1 corpus each ovary	2	2	-	1	5
Singles 2 corpora one ovary	4	1	3	1	9
1 corpus each ovary	4	2	1	-	7

The total number of corpora lutea or ovulations in each plane of nutrition group is greater than the total number of foetuses and this has resulted from a failure of ova apparently shed to reach foetal stage of development. Of the 16 ova failing to develop 50 percent are of high-high ewes, 25 percent of low-high ewes, 18.75 percent of high-low ewes and 6.25 percent of low-low ewes. It is evident from table 33 that there may be a relationship between the number of double ovulations and the number of ova failing to develop.

Table 26. - Relationship between double ovulations and ova failing to develop.

	HH	HL	LH	LL	Total
Number of ova failing to develop	8	3	4	1	16
Number of ewes having double ovulations	12	5	9	2	28

In approximately 57 percent of all double ovulations one ova failed to develop and, making allowance for the small numbers of double ovulations within planes of nutrition, this failure to develop appears to occur irrespective of plane of nutrition.

The possibility that this failure of approximately one ova in every three three to develop might also occur with single ovulations and result in ewes failing to conceive was investigated.

The number of ewes conceiving to the first mating and having single ovulations is obtained by comparing tables 21-24 with tables 28-31 of chapter VII. The assumption is made that ewes failing to conceive to the first mating had single ovulations at that mating. Some justification for such an assumption is given by table 34 of chapter VII showing the ovulation rate of all pregnant ewes in each plane of nutrition. Data pertaining to the above discussion is shown in Table 27.

Table 27.

	HH	HL	LH	LL
Number of ewes put to the ram at the first mating	20	19	20	20
Number of ewes conceiving	15	15	16	13
Number of ewes failing to conceive having normal ovaries and assumed to have single ovulations	3	4	2	7
Number of ewes conceiving to first mating and having single ovulations	4	10	8	12
Total single ovulations at first mating	7	14	10	19
The number of ewes with normal ovaries fa ling to conceive expressed as a percentage of total single ovulations	43	28	20	37

If the same failure to develop of one ovum in every 3 or approximately 33 percent. as found for double ovulations also occurs with single ovulations, as appears to be the case from the above data, then the majority of the failures to conceive at the first mating can be explained.

On the basis of the above table, further evidence for dustifying the assumption that ewes returning to service have single ovulations may be presented. In the following table the ovulation rate suggested by table 27 is computed and compared with that actually found and shown in table 34 of chapter VII. There is a similarity between the two ovulation rates.

Table 28. - Estimated ovulation rate at first mating.

	HH	HL	LH	LL
Number of ewes having normal ovaries	18	19	18	20
Number of ewes conceiving to first mating and				
- having single ovulations	4	10	8	12
- having double ovulations	11	5	8	1
Number of ewes failing to conceive and assumed to have single ovulations	3	4	2	7
Total ovulations	29	24	26	21
Estimated ovulation rate	1.6	1.26	1.44	1.05
Ovulation rate of ewes pregnant to first and second mating (table 32)	1.67	1.28	1.53	1.11

It is possible that a few ewes having double ovulations may fail to conceive due to both ova failing to develop but in view of the ovulation rates compared in table 28 the numbers of such ewes would appear to be small.

Despite the lack of factual data it seems from the consistent evidence that conception rate may be associated with the frequency of double ovulations and this is due to approximately 33% of all ova failing to reach foetal stage of development.

As previously shown this failure to develop appears to occur irrespective of plane of nutrition and irrespective of whether the ovulations at oestrus are single or double. As indicated at the foot of table 33 duplicated from chapter VII, this failure of ova to develop in double ovulations also occurs irrespective of whether two ova are shed from the same ovary or one ovum from each ovary.

It is not known at what stage the development of the ova failed, but certain assumptions that may be made appear to suggest that failure of development occurred at the implantation stage following ovulation and fertilisation.

Of the 158 ovaries examined, only four showed abnormal organisation or cystic development and it appears that ovulation was normal in the majority of cases and that the ova

were probably shed. The mating procedure was designed to eliminate any influence of impotency of rams or time of mating on fertilisation. The two or more matings probably ensured a copious number of sperms and the spread of the matings would probably ensure that if asynchronous ovulations occurred, there would be sperm available to bring about fertilisation. There appears to be no reason why the majority of ova shed should not be fertilised. Blockages of the fallopian tubes are known to occur in sheep but the incidence of this condition is apparently low.

Since there were no dioestrous cycles preceded by mating over 22 days and only 3 between 18 and 22 (table 20), it would appear that early abortion or resorption of the embryo does not explain ova apparently fertilised failing to reach foetal stage of development. Further, examinations of the uteri of pregnant ewes having double ovulations but only a single foetus, failed to show any other signs of embryonic or foetal development. No macroscopic pathological conditions of the uteri of ewes failing to conceive were found on slaughter, and the fact that 12 of the 14 ewes with normal ovaries returning to the first mating, conceived to the second mating indicates that permanent pathological conditions did not preclude the development of ova.

From the above discussion it is apparent that failure of ova to reach foetal stage of development may be due to the ova not becoming implanted in the uterus following fertilisation and passage down the fallopian tube. However, before such a hypothesis can be accepted further investigation is necessary.

Two cases of foetal resorption are recorded in table 32. These were found on uterine examination of ewe 200, high-high, 53 days pregnant and ewe 417, low-high, 52 days pregnant. Both uteri were slightly larger than maiden uteri and contained viscous fluid. Immersed in this was a placental remnant approximately 8 cms long with a wet weight of 5.1 gms. This placental tissue contained a dark coloured embryo about 1 cm long. The ovaries, corpora lutea vera and uteri showed no signs of pathological conditions.

Graph I of the appendix shows that the foetus of the low-low ewe 197, is below the crown rump length expected for its age of 65 days. The foetus itself and the foetal cotyledons appeared to be engorged with venous blood and placental attachment to the maternal cotyledons appeared to be very weak. The single corpus luteum verum was large and apparently normal.

The association between duration of dioestrous cycles and subsequent breeding behaviour including conception is discussed in table 20, chapter V. The four abnormal ovaries of ewes failing to conceive are described below. All had been mated twice.

Ewe 322 HH. Right Ovary - 0.85 gms. Apparently normal.

Left Ovary - 1.69 gms. Small cystic corpus with a large central cavity.

Uterus moderately pigmented and apparently normal.

Ewe 192 HH. Right Ovary - 5.12 gms. Large cystic follicle and a small cystic corpus. Also a medium sized Graafian follicle was present.

Left Ovary - 0.76 gms. Apparently normal.

Uterus lightly pigmented and apparently normal.

Ewe 161 LH. Right Ovary - 1.0 gms. Two medium sized Graafian follicles. Ovary apparently normal.

Left Ovary - 3.98 gms. Single large cystic corpus luteum with large central cavity.

Uterus apparently normal.

Ewe 256 LH Right Ovary - 4.56 gms. Abnormally large. The connective tissue of the medulla appeared to be hypertrophied and rigid. Between the tissue framework was a light grey coloured, viscous fluid. Several small periferal follicles but no organised corpus.

Left Ovary - 1.8 gms. Large, apparently normal corpus luteum.

Uterus pigmented and apparently normal.

These four ewes were slaughtered several weeks after their previous mating and at what stage the abnormal conditions developed is not known. Since the teasers had been withdrawn previously, the phase of the dioestrous cycle at slaughter cannot be given.

One ovary of each ewe was apparently normal and the uteri

showed no macroscopic pathological conditions. It is not known if these abnormal conditions in only one ovary will preclude conception, but since the ewes did not conceive to either of the two matings, it appears likely that this is so. These conditions are certainly likely to disrupt the delicate endocrine relationship necessary for conception to take place.

(5) Summary.

1. 74·7 percent of all ewes conceived to the first mating; 15·2 percent to the second mating while 10·1 percent failed to conceive to one or two matings.

2. The planes of nutrition imposed did not appear to influence conception rate.

3. Approximately one third of all ova failed to reach foetal stage of development. This appeared to occur irrespective of plane of nutrition or number of ova produced by one or both ovaries.

4. The possibility that failure of development of ova may explain failure of ewes to conceive is discussed.

5. The data presented and mating procedure adopted appear to suggest that ova failing to develop may not become implanted in the uterus.

6. Foetal resorptions and abnormal conditions of some ovaries are discussed.

Chapter VII. THE INFLUENCE OF PLANE OF NUTRITION ON OVULATION RATE.

(1) Introduction.

With the exception of one long term investigation, most experiments have shown that a rising plane of nutrition or the practice of flushing appears to increase the ovulation rate or the number of multiple births, provided the ewes are not in high condition. There is remarkably little information on the influence of flushing on the ovulation rate, lambing percentage or incidence of multiple births of two-tooth ewes, and this statement is applicable to the Romney breed. The general opinion however is that though flushing does appear to increase the lambing percentage of two-tooths, the increase is small. It is not known if this increase results from more ewes bearing lambs or from a higher proportion of multiple births.

As the ovulation rate determines the potential lambing percentage, its study should be included in any investigation of breeding behaviour. Moreover, a study of ovulation rate and the influence of plane of nutrition is likely to be a further step towards the solution of the problem of low fertility and fecundity of the two-tooth Romney ewe.

This phase of the experiment is a study of the influence of plane of nutrition on ovulation rate and attempts to relate this and other data to the potential lambing percentage of ewes in the various planes of nutrition.

(2) Method.

The method is based on the fact that each Graafian follicle shedding an ovum towards the end of or shortly after oestrus develops into an organised gland or corpus luteum which in the pregnant ewe does not undergo marked change in colour or size until just prior to parturition. Slight changes apparently do occur at the end of the third month of gestation. The corpus luteum of pregnancy, or corpus luteum verum, is distinguished by its comparatively large size and dark red colour from the corpus of the previous oestrus. The latter undergoes marked atrophy and reduction in size after the

formation of the new corpus, the colour changing to yellow and then to a dark brownish yellow. Cyclic changes of the corpus have been fully discussed by Quilan and Mare. (10)

All pregnant ewes were slaughtered between 30 and 90 days gestation and the reproductive organs removed. The uterus was placed on a disecting dish with the ventral surface uppermost and the cervix furthermost from the operator. The right ovary was carefully disected from the broad ligament following the margin of the ovary, and an external examination made to record the number of corpora. The ovary was then weighed and placed in a jar labelled with the number of the ewe and containing 4 percent formalin. The left ovary was then treated in a similar manner.

Commencing at the tip of each cornua, the uterus was laid open and a note taken of the number of foetuses. Each foetus was then weighed and its crown-rump measurement noted. A standard method was employed and the results of these two measurements are shown in Graph I of the Appendix but are not discussed in this investigation. The uterus was then examined for other signs of embryonic or foetal development. Foetuses of pregnant ewes and reproductive organs of ewes failing to conceive were preserved in 4 percent formalin.

Later, all ovaries were sectioned into thin slices and note taken of the number of corpora lutea vera. The rapid external count at slaughter was not found to be accurate due to the fact that two closely allied corpora may be mistaken for a single large corpus. This difficulty has also been recorded by Winters and Feuffal. (38).

(3) Results.

Summarised from the breeding records of the Appendix, tables 29 - 32 show the number of corpora lutea vera for the right and left ovaries of all pregnant ewes. The ewes are grouped according to their plane of nutrition. Ewes having ovaries with two corpora are classed as to whether these occur in the same ovary or one in each ovary and these ewes are further divided according to whether one foetus or twin foetuses were

found on uterine disection.

No triplet foetuses or three corpora were recorded for any ewe. The "pregnant corpora" of the appendix records refers to corpora lutea vera.

Table 29.

Ovarian and Foetal records of pregnant high-high ewes.

Number of pregnant ewes = 18.

Number of Ewe	Corpora Lutea: Right Ovary	Corpora Lutea: Left Ovary	Corpora Lutea: Total	Vera: Single Foetus or Twins	Single Foetus: Two Corpora one ovary	Single Foetus: One Corpus each ovary	Twin Foetuses: Two Corpora one ovary	Twin Foetuses: One Corpus each ovary
151	1	1	2	S		x		
153	1	"	1	S				
169	"	1	1	S				
172	"	2	2	S	x			
175	1	1	2	T				x
177	1	1	2	S		x		
191	1	1	2	T				x
192								
200	1	"	1	S				
227	2	"	2	S	x			
241	"	2	2	S	x			
283	"	2	2	T			x	
287	"	2	2	T			x	
322								
324	1	1	2	S		x		
327	1	1	2	S		x		
336	1	"	1	S				
341	1	"	1	S				
402	"	2	2	S	x			
422	"	1	1	S				
Total	12	18	30	22	4	4	2	2

Table 30.

Ovarian and Foetal records of pregnant high-low ewes.

Number of pregnant ewes = 18.

	Corpora Lutea Vera				Single Foetus		Twin Foetuses	
Number of Ewe	Right Ovary	Left Ovary	Total	Single Foetus or Twins	Two Corpora one ovary	One Corpus each ovary	Two Corpora one ovary	One Corpus each ovary
150	-	1	1	S				
160								
165	1	-	1	S				
168	1	1	2	T				*
170	-	1	1	S				
187	1	-	1	S				
194	1	1	2	S		x		
199	1	-	1	S				
209	-	1	1	S				
228	-	1	1	S				
274	1	-	1	S				
333	-	1	1	S				
405	1	1	2	S		x		
406	-	2	2	S	x			
410	-	1	1	S				
411	1	-	1	S				
E168	1	-	1	S				
412	1	-	1	S				
420	1	1	2	T				*
Total	11	12	23	20	1	2	-	2

Table 31.

Ovarian and Foetal records of pregnant low-high ewes.

Number of pregnant ewes = 17.

Number of Ewe	Corpora Lutea: Right Ovary	Corpora Lutea: Left Ovary	Corpora Lutea: Total	Vera: Single Foetus or Twins	Single Foetus: Two Corpora one ovary	Single Foetus: One Corpus each ovary	Twin Foetuses: Two Corpora one ovary	Twin Foetuses: One Corpus each ovary
145	1	-	1	S ↙				
152	-	1	1	S ↙				
157	-	2	2	T ↙			*	
158	1	-	1	S ↙				
161								
167	-	2	2	T ↙			*	
183	2	-	2	T ↙			*	
185	1	1	2	S ↙		x		
256								
261	2	-	2	S ↙	x			
284	1	-	1	S ↙				
331	-	1	1	S ↙				
339								
343	2	-	2	S ↙	x			
344	2	-	2	T ↙			*	
345	1	-	1	S ↙				
347	1	-	1	S ↙				
416	-	1	1	S ↙				
417	-	2	2	S ↙	x			
419	2	-	2	T ↙			*	
Total	16	10	26	22	3	1	5	-

Table 32.

Ovarian and Foetal records of pregnant low-low ewes.

Number of pregnant ewes = 18.

Number of Ewe	Corpora Lutea: Right Ovary	Corpora Lutea: Left Ovary	Corpora Lutea: Total	Vera: Single Foetus or Twins	Vera: Single Foetus: Two Corpora one ovary	Vera: Single Foetus: One Corpus each ovary	Vera: Twin Foetuses: Two Corpora one ovary	Vera: Twin Foetuses: One Corpus each ovary
159	-	1	1	S♂				
163								
189	-	1	1	S♂				
196	1	-	1	S♂				
197	-	1	1	S♂				
236	1	1	2	T♂				*
246	-	2	2	S♂	x			
269	-	1	1	S♂				
275								
330	1	-	1	S♂				
335	-	1	1	S♂				
346	1	-	1	S♂				
401	-	1	1	S♂				
403	-	1	1	S♂				
407	1	-	1	S♂				
409	-	1	1	S♂				
413	-	1	1	S♂				
414	-	1	1	S♂				
415	1	-	1	S♂				
421	1	-	1	S♂				
Total	7	13	20	19	1	-	-	1

(4) Discussion.

Tables 29 - 32 are summarised and shown below.

Table 33. - Ovulation rate and foetal development.

Group		HH	HL	LH	LL	Total
Number of Pregnant ewes		18	18	17	18	71
Total ewes in group		20	19	20	20	79
Right Ovary	- single corpus	10	11	6	7	34
	- double corpora	1	-	5	-	6
Left Ovary	- single corpus	8	10	4	11	33
	- double corpora	5	1	3	1	10
Ewes with	- single corpus	6	13	8	16	43
	- double corpora	12	5	9	2	28
Total corpora lutea vera		30	23	26	20	99
Ewes with	- single foetus	13	16	11	17	57
	- twin foetuses	4	2	5	1	12
	- single resorptions	1	-	1	-	2
Total foetuses		22	20	22	19	83
Total number of corpora minus total foetuses		8	3	4	1	16
Twins 2 corpora one ovary		2	-	5	-	7
1 corpus each ovary		2	2	-	1	5
Single 2 corpora one ovary		4	1	3	1	9
1 corpus each ovary		4	2	1	-	7

It is agreed that while the majority of twins in sheep are of dizygotic origin, identical or monozygotic twins, though rare, may occur (39, 40, 41). There are but few cases of identical twins recorded for sheep (38, 42 - 44.) In view of the above statements each corpus luteum verum was considered as being the production of a single ovum and the ovulations and ovulation rates subsequently referred to are based on this concept.

The following table gives the ovulation rates for pregnant ewes on each plane of nutrition. The data is extracted from Table 33. The ovulation rates do not differ significantly from those expected if the planes of nutrition had no influence.

Table 34. - Ovulation Rate.

	HH	HL	LH	LL	Total
Total ovulations	30	23	26	20	99
Number of pregnant ewes	18	18	17	18	71
Ovulation rate	1.67	1.28	1.53	1.11	1.39

χ = 1.013 d.f.,N.S.

The influence of plane of nutrition on the frequency of single and double ovulations was also investigated.

Data for the following table is also extracted from Table 33.

Table 35. - Frequency of single and double ovulations.

	HH	HL	LH	LL	Total
Ewes with single ovulations	6	13	8	16	43
Ewes with double ovulations	12	5	9	2	28
Total pregnant ewes	18	18	17	18	71

The frequency of the single and double ovulations differed significantly. While further analysis showed that the frequency of single and double ovulations did not differ significantly for either early high-plane of nutrition, or change of plane of nutrition, the frequency did differ significantly for late high-plane nutrition. The high-high and low-high ewes appeared to have a higher proportion of double ovulations. The method and results of these analyses are shown in table 36.

Table 36.

Source	χ	d.f	S
HH,HL,LH and LL	14.9	3	P .01
HH & HL/LH & LL	1.85	1	NS
HL & LH/HH & LL	0	1	NS
HH & LH/HL & LL	12.21	1	P .01

Coming from hill country grazing, the high-high ewes were placed on a productive ryegrass white clover pasture and they made a moderately steady gain in live-weight till the end of mating. The yarding three times a day may have ensured what is commonly termed a thriving condition, and combination of these two factors is considered conducive to a higher proportion of multiple ovulations. The low-high ewes, although initially on low-plane nutrition, were allowed all the feed they could consume from 14 days before mating, a practice somewhat similar to flushing; the latter has been shown to result in a higher proportion of multiple ovulations and births.

The exact mechanism of nutrition resulting in a higher proportion of multiple ovulations is not known, but it has been suggested that the rising plane of nutrition increases the physiological activity of the ovaries directly or indirectly by increased stimulation of gonadotrophin secreted by the anterior pituitary. The theory of indirect stimulation is more generally accepted and the control of the anterior pituitary on ovulation has been demonstrated by hypophysectomy and injection of gonadotrophins (45.)

Both the low-low and high-low groups of ewes suffered losses in live weight during the pre-mating period of 14 days, but the low-low ewes had been only lowplane of nutrition since the commencement of the experiment. The comparitively low frequency of double ovulations in these two groups of ewes may be due to decreased stimulation by gonadotrophins. Mulinos and Pomerantz (46) have suggested that under-nutrition affects in some degree all cells, and the effect on the pituitary

could be a decreased hormone secretion affecting secondary dependent glands such as the ovaries, as well as the effect of under-nutrition on this gland.

The failure of ova apparently shed, to reach foetal stage of development has been discussed in chapter 6.

From the data presented in this investigation, it is possible to show the potential lambing percentages of the experimental ewes on various planes of nutrition from the time of ovulation to approximately 40 - 80 days pregnancy. The factors reducing the maximum potential lambing percentage are indicated. The sources of data are indicated by table numbers. The lambing percentage discussed is calculated as lambs docked per 100 ewes put to the ram.

Table of Potential Lambing percentages. - Data in error!

	HH	HL	LH	LL	Average
Total numbers of ewes	20	19	20	20	20
Potential lambing percentage of ewes based on ovulation rate (Table 34)	167	128	153	111	139
Minus ewes failing to conceive (Table 25) THIS SHOULD BE EXPRESSED IN NO. OF OVA	10	5	15	10	9
Minus ova failing to develop (Table 33) OF EWES CONCEIVING	157 40	123 15	138 20	101 5	130 20
Minus resorptions of foetuses (Table 33) OF EWES CONCEIVING	117 5	108 -	118 5	96 5	110 4
	112	108	113	91	106

These potential lambing percentages apply only to the experimental ewes managed under the design of the investigation. The greatest loss in potential lambing percentage is due to ova failing to develop, and since this loss appears to be proportional to the frequency of double ovulations the difference in potential lambing percentages between the late high- and late low-plane groups decreases. To this loss, ewes failing to

conceive and ewes having abnormal foetal development are added. The losses in potential lambing percentage to time of slaughter are HH, 55 percent, HL, 20 percent, LH, 40 percent and LL 12 percent.

Had these ewes remained alive possible additional losses due to the death of pregnant ewes, foetal abortion and resorption, lambs born dead or died at birth and lamb deaths to docking would have to be added to give the actual lambing percentage of lambs docked per 100 ewes put to the ram.

(5) Summary.

1. The planes of nutrition imposed did not appear to influence ovulation rate.

2. The late high planes of nutrition - low-high and high-high - appeared to cause ewes to have a higher frequency of double ovulations.

3. Potential lambing percentages of the experimental ewes are given.

Chapter VIII. CONCLUSIONS.

The experiment animals were a small sample of a population and appeared to be better grown and in higher condition than the average of two-tooths during the late summer months. As hoggets, the crucial stage of a ewe's life, they had been lightly stocked on good pastures whereas the majority of hill country two-tooths probably suffer rather than benefit from treatment received as hoggets.

The planes of nutrition imposed were of short duration and as shown by the live weight changes of ewes moderately severe. The comparison of the high-high plane of nutrition with stud conditions, the high-low with good summer growth followed by a dry autumn, the low-high with flushing and the low-low with hill country conditions cannot be justified although a faint resemblance may exist.

The management and mating of the ewes was unusual. The management was adopted to suit the purpose of the investigation and the mating to preclude as far as possible, any external factor such as impotency of rams causing failure of conception.

The results of the investigation are not directly applicable to farming conditions or practices.

The investigation was designed to study some aspects of breeding behaviour and the influence of plane of nutrition on their expression. Within the limits of measurement, the planes of nutrition imposed appeared to have no influence on the time of onset of the sexual season, duration of the first and second oestrus or dioestrous cycles, conception or ovulation rate of the experimental ewes. High plane nutrition shortly before mating did however appear to increase the frequency of double ovulations.

It was felt that the results of the investigation might indicate how future experiments on the problem of the low-lambing percentage of two-tooth Romney ewes could best be carried out.

The findings of the investigation, considered in conjunction

with the few flock records available (47.48.) indicate two main avenues for future study. These relate to ewes failing to breed and to the failure of ova apparently shed to reach foetal stage of development.

In the past, it has been merely accepted that some females of all genera fail to breed. Today, the science of physiology of reproduction, aided by additional knowledge and new technique, is asking the question "why do these animals fail to breed?".

The flock records indicate that ewes failing to bear lambs as two-tooths often fail to breed in subsequent years. These ewes are usually culled as four-tooths and sold fat to the works. It would be possible to follow up these ewes and to obtain their reproductive organs for examination. This procedure would probably answer the question, arising from this investigation, as to whether abnormal conditions of one ovary are responsible for ewes failing to breed. It appears unlikely, until some investigation of this nature is carried out, that the reason for ewes failing to breed will be known. The suggested procedure however is probably but a step towards the solution of the problem of infertility in ewes.

The results of this investigation suggest that approximately one third of all ova probably shed by the ovaries of the experimental ewes failed to reach the foetal stage of development. This appeared to occur irrespective of plane of nutrition or the number of ova produced by one or both ovaries. The significance of this loss is apparent if these ova are converted into a potential lambing percentage, or if they are considered as a reduction in the incidence of multiple births and as a proportion of the ewes with single ovulations (and possibly ewes with double ovulations) returning to the ram. It has been generally accepted for ewes that the number of ova shed is similar to the number of embryos that develop, and that a low incidence of multiple births is associated with a scarcity of ova available for fertilisation at mating (49,15). Several questions immediately arise from this finding that approximately 33 percent of ova apparently fail to reach foetal stage of

development. Are these ova definitely shed from the follicle? Does this failure also occur in older Romney ewes and is it more common in Romneys than other breeds of sheep? At what stage does development of the ovum fail? Finally, the question must be asked; why do ova apparently shed fail to develop? Is the suggestion made in this investigation correct that the ova are fertilised but fail to become implanted in the uterus?

These two problems which appear to result in a low lambing percentage of two-tooth Romney ewes, would certainly seem to warrant further investigation.

ACKNOWLEDGEMENT.

I wish to thank Mr. W.M. Webster for examining the rams used in this investigation, and the Sheep Farm Staff for assistance in the handling of stock.

REFERENCES.

(1) Clark R.T. 1934 - Studies in the Physiology of Reproduction of Sheep:

(1) Ovulation Rate of the Ewe as affected by the Plane of Nutrition. Anat.Rec.,Vol. 60:125

(2) Marshall F.H.A. 1908 - Fertility in Scottish Sheep. Trans.High.Ag.Soc. 20:139

(3) Nichols J.E. 1924 - Fertility in Sheep. J.Minist.Agric. 31:835

(4) Marshall F.H.A. and Hammond J. 1945 - Physiology of Animal Breeding. G.B. Ministry of Agric. and Fisheries Research Monograph No.2 London.

(5) Grant R. 1933 - Occurrence of Ovulation without "Heat" in the Ewe. Nature 131:802

(6) Marshall F.R. and Potts C.G. 1924 - Flushing and other Means of Increasing Lamb Yields. U.S.D.A. Bull. 996.

(7) Underwood E.J. and Shier F.L. 1941-The Effect of Nutritional Flushing Upon Fertility. J.Dept.Agric. W.Australia 18:13.

(8) McKenzie F.F. and Phillips R.W. 1932 - The Effect of Temperature and Diet on the Onset of the Breeding Season of Sheep. Univ.of Missouri. Rept.Year Ending June 30th 1932.

(9) Briggs H.M. et al. 1942 - The Influence of Nutrition on Reproduction of Ewes. Okla.Agric.Exp.Sta.Bull. 255.

(10) Quinlan J. and Mare G.S. 1931 - Physiological Changes in the Ovary of the Merino Sheep in South Africa. 17th Rept. of the Dir.of Vety.Serv. and Anim.Ind., Union of S.A. 663.

(11) Asdell S.A. 1926 - Variation in the Onset of the Breeding Year in the Goat. Jour.Agric.Sc., 16:632

(12) McKenzie F.F. and Terrill C.E. 1937 - Oestrus, Ovulation and Related Phenomena in the Ewe. Mo.Agric.Exp.Sta.Res.Bull.264.

(13) Kelley R.B. 1937 - Studies in Fertility of Sheep. Aust.Council Sci.Indust.Res.Bull.112.

(14) Roux L.L. 1936 - Sex Physiology of Sheep. Onderstepoort J. Vet.Sci. 6:465

(15) Marshall F.H.A. 1904 - Fertility in Sheep. Trans.High.Agric.Soc. 16:34

(16) White R.G. and Roberts E.J. 1927 - Fertility and Sex Ratios in Sheep. Welsh J.Agric. 3:70.

(17) Okulicev G. 1934 - The Influence of Feeding ewes on their Fertility.
Ovcevodstvo 9:33. An.Br.Abs.2:329 1934

(18) Terrill C.E. and J.A. Stoehr 1939. - Reproduction in Range Sheep.
Proc.Amer.Soc.Anim.Prod. 31 Annual Meeting P.369

(19) Darlow A.E. and Hawkins L.E. 1932 - Influence of Nutrition on Oestrous Cycle of Ewe.
Proc.Amer.Soc.Anim.Prod. 25th Annual Meeting P.173

(20) Heape W. 1899 - Abortion Barrenness and Fertility in Sheep.
J.Royal Agric.Soc.Engl. 10:217

(21) Scott - The Practice of Sheep Farming
Miles Modern Practical Farriery,Lond..

(22) Nichols J.E. 1926 - Fertility in Sheep
J.Minist.Agric. 33:218

(23) Smith S.L. 1933 - Flushing and Winter Grain Feeding Results with Sheep. no.9 p.17.
Natl.Wool Grower 23:~~17~~.

(24) Polovceva V.V. 1938 - The effect of Feeding on the Fertility of Ewes.
Probl.Zivotn 1:55. An.Br.Abs. 8:52 1938

(25) Darlow A.E. and Casida L.E. 1939.- The Influence of Flushing Ewes on Rate of Ovulation and subsequent Rate of Lambing.
Wisc.Agric.Exp.Sta.Bull. 443:86.

(26) Miller R.F., Hart G.H. and Cole H.H. 1942 - Fertility of Sheep as affected by Nutrition During the Breeding season and Pregnancy.
Calif.Agric.Exp.Sta.Bull.672

(27) Patov Z. 1933 - Genetic Studies on Sheep
Z.Zuchts 26:285
An.Br.Abs. 1:19 1933

(28) Yeates N.T.M. 1949 - The Breeding Season of Sheep and its Modification by Light.
J.Agric.Sci. 39:1

(29) Heape W. 1900 - The Sexual Season of Mammals.
Quart J. Micr.Sci. 44:1

(30) Cole H.H. and Miller R.F. 1935 - Hormonal Control of Oestrous Phenomena in the Anoestrous Ewe.
J. Endocrinol. 36:370.

(31) Hammond J., Jr. 1944 - The Breeding Season in Sheep.
J.Agric.Sci. 34:97

(32) Panyseva L.V. 1939 - The Sexual Cycle of the Ewe
Sn.Br.Abs. 7:131 1939

(33) McKenzie F.F. and Phillips R.W. 1930. - Some Observations on the Oestral Cycle in Sheep.
Proc.Amer.Soc.Anim.Prod. 23rd Annual Meeting P.278.

(34) Quinlan J., Mare G.S. and Roux L.L. 1932 - The Vitality of Spermatozoon in the Genital Tract of the Merino Ewe.
18th Rept. of the Dir. of Vety.Serv. and Anim.Ind. Union of S.A.

(35) Kardymovic M. et al 1934 - Insemination of Sheep at Different Times during Oestrus. Probl.Zivotn. 5:110 An.Br.Abs. 3:35 1934

(36) Zajac T. 1935 - The Determination of the Optimum Time of Insemination. Ovcevodstvo 8:15. An.Br.Abs. 3:391

(37) Phillips R.W. et al. 1940 - Transportation of Ram Semen for Artificial Insemination. Proc.2nd Nat'l.Ital.Congress of Vet. surgeons.

(38) Winters L.M. and Feuffal G. 1936 - Physiology of Reproduction in Sheep. Minn.Agric.Exp.Sta.Tech.Bull. 118

(39) Clark R., 1932 - Mode of Production of Twins in Sheep. Proc.Amer.Soc.Anim.Prod. 24th Annual Meeting P.207

(40) Chapman A.B. and Lush J.L. 1932 - Twinning, SexRatios and Genetic Heritability of Birth Weight in Sheep. J.Heredity 23:473

(41) Johannson I. 1932 - Multiple Births in Sheep. Proc.Amer.Soc.Anim.Prod.25th Annual Meeting P.285

(42) Henning W.L. 1937 - A double sheep Pregnancy with A Single Corpus Luteum. J.Heredity 28:61.

(43) Morley F.H.W. 1948 - Identical Twins in Merinos. Austr.Vet.Journ. 24:72

(44) Assheton R. 1898 - A Blastodermic Vesicle of Sheep with Twin Germinal Areas. J.Anat. and Physiol. 32.362

(45) Frank A.H. 1943 - Induction of Oestrous and Ovulation in Ewes. J.Anim.Sc. 2:251

(46) Mulinos M.G. and Pomerantz L. 1941. - The Reproductive Organs in Malnutrition. Endocrinol 29:267.

(47) Barton R.A. 1947 - Fertility in the Romney Ewe. Proc.10th Annual Meeting Sheep Farmers, Massey Coll.N.Z.

(48) Goot H. - Private Communication

(49) Hammond J. Jr. 1941 - Flushing Ewes. J.Minist.Agric. 48:77

TABLE 1. - LIVE WEIGHTS OF HIGH-HIGH EWES EXPRESSED IN POUNDS.

Ewe	Feb. 25	Mar. 1	Mar. 4	Mar. 8	Mar. 11	Mar. 15	Mar. 18	Mar. 22	Mar. 25	Mar. 29	Apr. 1	Apr. 8	Apr. 15	Apr. 22	Apr. 29	May 6	May 10	May 13	May 17	May 20
151	112	122	126	127	128	132	130	131	126	131	132	134	136	136	136	139	139	138	133	135
153	105	112	116	116	113	112	117	119	122	120	118	128	125	125	128	130	132	130	132	133
169	110	118	123	125	127	132	132	133	136	132	131	140	136	131	138	140	141	143	141	141
172	119	129	134	133	131	140	139	140	135	130	140	142	140	144	146	148	147	149	149	150
175	103	112	118	120	116	122	123	123	124	122	119	126	120	126	127	132	133	131	133	135
177	116	126	130	133	130	133	136	133	139	136	137	129	140	144	145	146	142	141	136	136
191	107	116	119	123	124	122	125	125	129	123	130	130	128	131	131	130	132	131	132	135
192	103	109	116	116	116	119	120	121	109	119	122	122	122	123	124	124	125	123	121	122
200	106	114	118	116	115	122	121	122	124	124	123	127	126	125	128	126	129	130	133	130
227	125	143	138	137	138	142	143	136	141	146	145	147	150	152	156	158	159	160	159	162
241	117	127	133	131	136	140	136	132	132	136	134	138	136	137	135	135	133	128	124	124
283	116	124	129	129	129	128	131	125	128	130	133	132	134	134	134	130	132	134	135	137
287	119	121	131	132	129	135	135	133	135	135	138	136	140	143	144	150	152	150	150	149
322	93	103	108	108	110	113	116	114	113	113	115	118	118	120	112	122	125	123	124	122
324	101	106	110	114	112	115	117	118	120	119	121	119	120	121	125	126	126	130	129	130
327	109	121	122	132	124	124	124	129	126	122	129	131	130	132	133	135	136	138	140	137
336	96	104	108	110	110	111	112	115	117	115	115	116	115	119	119	120	123	124	124	125
341	107	115	118	116	119	122	123	124	126	125	125	127	129	130	131	131	133	133	133	135
402	123	131	133	131	136	140	134	137	141	139	140	140	143	139	144	145	148	140	148	150
422	95	108	111	111	110	114	117	117	117	114	118	116	113	117	119	117	114	117	114	117
Total	2182	2361	2441	2460	2453	2518	2531	2527	2540	2531	2565	2598	2601	2629	2655	2684	2701	2693	2690	2705
Aver.	109	118	122	123	123	126	127	127	127	127	128	130	130	131	132	134	135	135	135	135

TABLE 2. - LIVE WEIGHTS OF HIGH-LOW EWES EXPRESSED IN POUNDS.

Ewe	Feb. 25	Mar. 1	Mar. 4	Mar. 8	Mar. 11	Mar. 15	Mar. 18	Mar. 22	Mar. 25	Mar. 29	Apr. 1	Apr. 8	Apr. 15	Apr. 19	Apr. 22	Apr. 26	Apr. 29	May 3	May 6	May 10	May 13	May 17	May 20
150	105	115	118	121	120	121	124	107	103	100	102	100	101	98	96	94	94	95	96	100	105	106	108
160	96	102	108	110	103	114	113	96	93	98	95	97	94	91	91	90	91	93	95	100	101	101	100
165	106	113	112	116	104	117	119	107	104	104	104	105	105	103	101	98	98	98	100	105	106	107	108
168	118	123	128	129	132	134	134	120	124	121	121	115	111	111	112	107	109	110	110	115	119	120	121
170	92	100	104	104	103	109	108	91	94	90	90	90	88	86	88	85	88	88	88	97	98	95	96
187	107	117	120	113	113	124	125	111	107	107	104	101	97	95	96	94	94	97	97	105	108	108	109
194	120	127	130	133	131	136	133	124	122	118	121	119	114	112	112	111	112	115	116	124	125	124	126
199	112	122	128	127	127	132	131	114	113	114	112	110	109	104	106	101	102	100	100	103	102	103	106
209	96	102	113	108	114	114	111	102	101	103	96	95	91	91	90	88	89	88	90	96	99	99	97
228	109	121	123	125	125	131	129	112	116	115	116	109	108	105	108	105	106	105	105	115	113	114	115
274	116	126	127	128	128	129	131	121	117	113	112	111	109	107	107	105	103	105	103	111	116	117	119
333	102	112	116	115	114	118	116	106	104	102	106	101	99	98	96	93	94	92	93	98	100	100	105
405	116	118	120	119	120	127	128	118	115	113	110	109	108	107	108	104	106	111	108	118	119	116	119
406	109	122	127	129	126	135	135	114	115	113	114	106	104	104	102	101	104	101	103	109	113	113	114
410	107	116	120	120	121	124	124	110	107	104	102	101	100	100	98	97	96	94	95	102	105	106	108
411	122	127	132	131	132	135	134	128	126	124	133	122	117	116	117	117	116	118	119	120	124	125	125
E168	131	136	138	140	140	144	146	135	134	132	129	122	120	118	117	114	114	112	112	113	114	112	113
412	105	114	122	122	120	117	120	105	101	102	100	101	100	99	99	95	96	97	97	101	104	102	104
420	102	110	111	100	102	113	113	99	97	97	97	101	98	94	92	90	88	88	89	95	96	99	98
Total	2071	2223	2297	2290	2275	2374	2374	2120	2093	2070	2064	2015	1973	1939	1936	1889	1900	1906	1916	2027	2067	2067	2091
Aver.	109	117	121	121	120		125	112	110	109	109	106	104	102	102	99	100	100	101	107	109	109	110

TABLE 3. - LIVE WEIGHTS OF LOW-HIGH EWES EXPRESSED IN POUNDS.

Ewe	Feb. 25	Mar. 1	Mar. 4	Mar. 8	Mar. 11	Mar. 15	Mar. 18	Mar. 22	Mar. 25	Mar. 29	Apr. 1	Apr. 8	Apr. 15	Apr. 22	Apr. 29	May 6	May 10	May 13	May 17	May 20
145	105	110	118	118	107	105	104	114	117	118	120	120	121	122	124	126	128	130	128	130
152	107	113	117	120	115	114	112	116	116	115	118	121	121	120	125	125	126	125	124	126
157	110	116	118	118	109	109	111	115	119	120	118	122	127	129	130	133	135	133	133	135
158	96	105	107	108	100	101	98	110	113	116	115	116	120	121	125	126	130	129	126	130
161	118	124	129	128	120	118	120	124	125	127	129	128	134	135	137	135	138	140	138	140
167	120	127	130	130	125	122	121	128	133	134	132	135	138	134	137	139	138	141	140	140
183	102	104	113	114	104	101	101	114	115	116	116	120	127	118	123	127	128	129	130	127
185	116	121	117	126	118	120	119	127	129	131	131	131	134	134	138	140	141	143	142	144
256	116	122	127	128	121	121	120	127	128	125	122	131	130	130	134	129	131	133	133	133
261	100	103	109	108	100	103	99	106	103	109	110	110	112	111	114	117	119	120	119	119
284	106	110	111	110	109	108	107	112	111	112	116	118	120	120	120	122	121	120	116	118
331	107	112	114	114	109	110	109	114	112	117	116	122	122	126	126	130	132	132	133	133
339	111	121	121	130	115	115	111	120	124	126	122	131	133	134	135	139	137	140	139	136
343	118	120	128	130	122	120	115	127	134	131	133	137	136	134	140	143	147	149	148	147
344	105	112	116	118	108	110	108	115	116	119	121	120	124	124	128	130	130	133	133	134
345	127	131	135	139	131	135	132	139	129	137	140	141	138	140	143	149	150	149	151	152
347	108	111	117	116	106	115	114	121	121	120	115	124	128	128	127	129	134	131	131	133
416	99	96	101	99	94	92	90	96	104	107	110	98	106	107	109	112	113	116	111	117
417	123	127	125	129	122	125	120	125	126	131	132	129	138	140	141	145	150	150	148	139
419	95	96	103	100	90	91	94	103	96	105	106	109	111	111	114	118	119	119	120	119
Total	2189	2281	2356	2375	2225	2235	2205	2353	2371	2416	2422	2463	2520	2518	2570	2614	2647	2662	2643	2642
Aver.	109	114	118	119	111	112	110	118	118	121	121	123	126	126	128	131	132	133	132	132

TABLE 4. - LIVE WEIGHTS OF LOW-LOW EWES EXPRESSED IN POUNDS.

Ewe	Feb. 25	Mar. 1	Mar. 4	Mar. 8	Mar. 11	Mar. 15	Mar. 18	Mar. 22	Mar. 25	Mar. 29	Apr. 1	Apr. 8	Apr. 15	Apr. 19	Apr. 22	Apr. 26	Apr. 29	May 3	May 6	May 10	May 13	May 17	May 20
159	117	120	125	124	115	123	116	117	119	115	112	109	106	105	104	102	102	103	105	115	116	118	120
163	116	120	124	124	119	119	115	111	113	112	110	109	107	105	104	103	100	100	100	102	107	106	109
189	108	111	119	115	107	113	111	106	107	107	106	100	97	96	94	92	93	93	94	99	100	102	105
196	106	109	114	115	107	108	105	109	106	102	103	99	95	93	92	89	98	89	91	99	105	106	105
197	107	114	117	115	104	111	111	101	112	108	109	104	100	100	101	99	100	99	100	109	113	112	111
236	129	130	135	134	127	129	128	127	127	126	124	121	118	116	116	112	113	110	110	113	118	117	118
246	104	108	111	113	102	110	105	104	105	105	104	100	99	97	101	97	100	103	103	110	113	113	115
269	122	121	125	126	120	126	126	125	128	125	121	116	113	110	110	108	106	108	110	116	119	119	119
275	113	118	122	122	118	121	119	115	118	118	115	111	109	107	106	103	105	103	105	108	110	111	111
330	96	100	100	95	94	100	97	95	94	96	96	96	93	93	91	92	97	93	95	98	101	98	101
335	109	117	120	118	112	115	112	111	111	112	109	104	103	100	100	98	97	97	97	101	106	108	109
346	116	126	129	130	125	125	120	121	119	118	118	109	110	107	108	106	106	105	107	115	120	120	121
401	105	110	114	113	105	108	105	106	108	106	105	102	97	93	95	92	94	95	94	102	105	105	106
403	118	115	126	129	119	122	117	115	116	114	112	110	109	106	105	102	104	101	103	107	110	110	114
407	109	108	104	109	106	110	106	104	108	105	105	104	101	98	101	97	100	101	101	107	110	110	111
409	119	127	132	133	127	124	122	118	120	117	114	112	108	106	105	103	102	101	105	109	111	114	117
413	91	94	100	103	93	94	92	92	90	88	88	87	85	84	84	80	84	84	84	92	94	94	95
414	102	104	108	110	101	101	98	99	98	94	96	94	92	89	90	86	87	84	85	89	90	89	90
415	101	110	114	109	102	102	100	104	107	94	93	88	86	86	89	86	87	90	90	99	101	99	102
421	95	99	105	104	99	101	98	100	91	100	98	93	93	90	92	90	90	90	91	99	100	97	99
Total	2183	2261	2344	2341	2202	2262	2203	2180	2197	2162	2138	2068	2021	1971	1988	1937	1965	1949	1970	2089	2149	2148	2178
Aver.	109	113	117	117	110	113	110	109	110	108	107	103	101	99	99	97	98	97	98	104	107	107	109

Ewe Number = 151
Plane of Nutrition = HH

FIRST OESTRUS Date = March 24
Previous Obs. 24/2 First Obs. 24/7 Last Obs. 26/9 Off. 26/2

Duration of Oestrus = 38-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 9
Previous Obs. 9/2 First Obs. 9/6 Last Obs. 11/8 Off. 11/2

Duration of Oestrus = 38-48 hours.
Times of Service and Ram = 9/6 D, 10/8 E, 10/6 B, 11/8 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	112
Mar. 1	122
4	126
8	127
11	128
15	132
18	130
22	131
25	126
29	131
Apl. 1	132
8	134
15	136
19	-
22	136
26	-
29	136
May 3	-
6	139
10	139
13	138
17	133
20	135
June 3	137

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 6/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.20	= 1
Left Ovary =	1.31	= 1

Foetus A.		Foetus B.
Weight gms. =	46.7	=
Length cms. =	10.9	=
Age days =	56	=

NOTES:-

Ewe Number = 153
Plane of Nutrition = HH

FIRST OESTRUS Date = March 14
Previous Obs. 13/7 First Obs. 14/9 Last Obs. 14/7 Off. 15/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = March 30
Previous Obs. 29/7 First Obs. 30/9 Last Obs. 31/9 Off. 31/2
Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

THIRD OESTRUS. Date = April 15
Previous Obs. 14/6 First Obs. 15/8 Last Obs. 16/2 Off. 16/6
Duration of Oestrus = 30-48 hours.
Times of Service and Ram = 15/6 E, 16/8 A, 16/2 D.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	105
Mar. 1	112
4	116
8	116
11	113
15	112
18	117
22	119
25	122
29	120
Apl. 1	118
8	128
15	125
19	-
22	125
26	-
29	128
May 3	-
6	130
10	132
13	130
17	132
20	133
June 3	
June 17	138

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 19/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.31	= 1
Left Ovary =	0.56	= -

	Foetus A.	Foetus B.
Weight gms. =	118.6	=
Length cms. =	14.3	=
Age days =	64	=

NOTES:-

Ewe Number = 169
Plane of Nutrition = HH

FIRST OESTRUS Date = March 29
Previous Obs. First Obs. Last Obs. Off.
28/7 29/9 30/2 20/7
Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 15
Previous Obs. First Obs. Last Obs. Off.
15/2 15/6 16/6 17/8
Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 15/6 B, 16/2 D, 16/6/ E

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	110
Mar. 1	118
4	123
8	125
11	127
15	132
18	132
22	133
25	136
29	132
Apl. 1	131
8	140
15	136
19	-
22	131
26	-
29	138
May 3	-
6	140
10	141
13	143
17	141
20	141
~~June 3~~	
June 10	141

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	0.54	-
Left Ovary	1.35	1

Foetus A.		Foetus B.
Weight gms. =	51.8	=
Length cms. =	11.2	=
Age days =	57	=

NOTES:-

Ewe Number = 172
Plane of Nutrition = HH

FIRST OESTRUS Date = March 23

Previous Obs.	First Obs.	Last Obs.	Off.
22/7	23/9	24/9	24/2

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 9

Previous Obs.	First Obs.	Last Obs.	Off.
8/6	9/8	10/6	11/8

Duration of Oestrus = 34-62 hours.
Times of Service and Ram = 9/6 A, 10/8 D, 10/6 E.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	119
Mar. 1	129
4	134
8	133
11	131
15	140
18	139
22	140
25	135
29	130
Apl. 1	140
8	142
15	140
19	-
22	144
26	-
29	146
May 3	-
6	148
10	147
13	149
17	149
20	150
~~June 3~~	

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 22/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	0.84	-
Left Ovary	2.61	2

	Foetus A.	Foetus B.
Weight gms.	11.1	
Length cms.	4.7	
Age days	42	

NOTES:-

Ewe Number = 175
Plane of Nutrition = HH

FIRST OESTRUS Date = March 30
Previous Obs. First Obs. Last Obs. Off.
29/7 30/9 31/9 31/2
Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 15
Previous Obs. First Obs. Last Obs. Off.
14/6 15/8 15/6 16/8
Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 15/2 E, 15/6 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	103
Mar. 1	112
4	118
8	120
11	116
15	122
18	122
22	123
25	124
29	122
Apl. 1	119
8	126
15	120
19	-
22	126
26	-
29	127
May 3	-
6	132
10	133
13	131
17	133
20	135
~~June 3~~	
June 10	134

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.26	= 1
Left Ovary =	1.00	= 1

Foetus A.		Foetus B.	
Weight gms. =	~~111.7~~ 55.8	=	~~111.5~~ 55.7
Length cms. =	11.3	=	11.3
Age days =	58	=	58

NOTES:-

Ewe Number = 177
Plane of Nutrition = HH

FIRST OESTRUS Date = March 20

Previous Obs.	First Obs.	Last Obs.	Off.
20/2	20/7	21/2	21/7

Duration of Oestrus = 19-29 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 6

Previous Obs.	First Obs.	Last Obs.	Off.
6/9	6/2	7/7	8/8

Duration of Oestrus = 29-47 hours.
Times of Service and Ram = 6/2 C, 7/9 D, 7/2 C.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	116
Mar. 1	126
4	130
8	133
11	130
15	133
18	136
22	133
25	139
29	136
Apl. 1	137
8	128
15	140
19	-
22	144
26	-
29	145
May 3	-
6	146
10	142
13	141
17	136
20	136
~~May 3~~	
May 27	139

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 0.98	= 1
Left Ovary	= 1.75	= 1

Foetus A.		Foetus B.
Weight gms. =	29.0	=
Length cms. =	9.1	=
Age days =	52	=

NOTES:-

Ewe Number = 191
Plane of Nutrition = HH

FIRST OESTRUS Date = March 26
Previous Obs. First Obs. Last Obs. Off.
25/7 26/9 27/9 27/3
Duration of Oestrus = 24-44 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 11
Previous Obs. First Obs. Last Obs. Off.
11/2 11/6 12/6 13/8
Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 11/6 B, 12/2 B, 12/6 E.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	107
Mar. 1	116
4	119
8	123
11	124
15	122
18	125
22	125
25	129
29	123
Apl. 1	130
8	130
15	128
19	-
22	131
26	-
29	131
May 3	-
6	130
10	132
13	131
17	132
20	135
June 3	136

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 6/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 1.47	= 1
Left Ovary	= 1.10	= 1

	Foetus A.	Foetus B.
Weight gms.	= 35.9	= 38.1
Length cms.	= 9.6	= 9.6
Age days	= 55	= 55

NOTES:-

Ewe Number = 192
Plane of Nutrition = HH

FIRST OESTRUS Date = March 23
Previous Obs. 29/9 | First Obs. 23/2 | Last Obs. 24/7 | Off. 25/9
Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 9
Previous Obs. 9/8 | First Obs. 9/2 | Last Obs. 10/6 | Off. 11/8
Duration of Oestrus = 28-48 hours.
Times of Service and Ram = 9/2 E, 9/6 B, 10/8 E, 10/6 D.

Duration of Dioestrous Cycle = 22 days.

THIRD OESTRUS. Date = May 1
Previous Obs. 30/6 | First Obs. 1/8 | Last Obs. 1/6 | Off. 2/8
Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 1/8 D, 1/2 E, 1/6 B.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	103
Mar. 1	109
4	116
8	116
11	116
15	119
18	120
22	121
25	109
29	119
Apl. 1	122
8	122
15	122
19	-
22	123
26	-
29	124
May 3	-
6	124
10	125
13	123
17	121
20	122
~~June 3~~	
June 24	127

Held to first service = No
Held to second service = No

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 5.12	= -
Left Ovary	= 0.76	= -

Foetus A. Foetus B.

Weight gms. = Not in lamb. =
Length cms. = =
Age days = =

NOTES.-

Ewe Number = 200
Plane of Nutrition = HH

FIRST OESTRUS Date = April 15

Previous Obs.	First Obs.	Last Obs.	Off.
15/2	15/6	16/6	17/8

Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 16/8 D, 16/2 E, 16/6/ D

Duration of Dioestrous Cycle = 18 days.

SECOND OESTRUS. Date = May 3

Previous Obs.	First Obs.	Last Obs.	Off.
3/2	3/6	4/6	5/8

Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 3/6 D, 4/8 E, 4/2 B, 4/6 E.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	106
Mar. 1	114
4	118
8	116
11	115
15	122
18	121
22	122
25	124
29	124
Apl. 1	123
8	127
15	126
19	-
22	125
26	-
29	128
May 3	-
6	126
10	129
13	130
17	133
20	130
~~June 3~~	
June 24	131

Held to first service = No
Held to second service = Yes

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.07	= 1
Left Ovary =	0.81	= -

Foetus A.		Foetus B.
Weight gms. =	Foetus in an advanced stage of reabsorption.	=
Length cms. =		=
Age days =	53	=

NOTES.-

Ewe Number = 227
Plane of Nutrition = HH

FIRST OESTRUS Date = March 19
Previous Obs. 18/7 | First Obs. 19/9 | Last Obs. 20/2 | Off. 20/7
Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 4
Previous Obs. 3/7 | First Obs. 4/9 | Last Obs. 5/7 | Off. 6/9
Duration of Oestrus = 34-62 hours.
Times of Service and Ram = 4/2 C, 5/9 A.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	125
Mar. 1	143
4	138
8	137
11	138
15	142
18	143
22	136
25	141
29	146
Apl. 1	145
8	147
15	150
19	-
22	152
26	-
29	156
May 3	-
6	158
10	159
13	160
17	159
20	162
~~June 3~~	

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 22/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 2.28	= 2
Left Ovary	= 1.05	= -

Foetus A.		Foetus B.
Weight gms. =	18.1	=
Length cms. =	6.8	=
Age days =	47	=

NOTES:-

Ewe Number = 241
Plane of Nutrition = HH

FIRST OESTRUS Date = March 22
Previous Obs. First Obs. Last Obs. Off.
21/7 22/9 22/7 23/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 18 days.

SECOND OESTRUS. Date = April 9
Previous Obs. First Obs. Last Obs. Off.
8/6 9/8 10/6 11/8
Duration of Oestrus = 34-62 hours.
Times of Service and Ram = 9/8 E, 9/6 D, 10/8 D, 10/6 B.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	117
Mar. 1	127
4	133
8	131
11	136
15	140
18	136
22	132
25	132
29	136
Apl. 1	134
8	138
15	136
19	-
22	137
26	-
29	135
May 3	-
6	135
10	133
13	128
17	124
20	124
June 3	128

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 6/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.51	= -
Left Ovary =	1.57	= 2

Foetus A.		Foetus B.
Weight gms. =	52.1	=
Length cms. =	11.1	=
Age days =	57	=

NOTES:-

Ewe Number = 283
Plane of Nutrition = HH

FIRST OESTRUS Date = March 21
Previous Obs. First Obs. Last Obs. Off.
21/9 21/2 22/9 22/2
Duration of Oestrus = 19-29 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 6
Previous Obs. First Obs. Last Obs. Off.
5/7 6/9 7/9 7/2
Duration of Oestrus = 24-43 hours.
Times of Service and Ram = 6/9 A, 6/7 C.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	116
Mar. 1	124
4	129
8	129
11	129
15	128
18	131
22	125
25	128
29	130
Apl. 1	133
8	132
15	134
19	-
22	134
26	-
29	134
May 3	-
6	130
10	132
13	134
17	135
20	137
~~June 3~~	
May 27	140

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.71	= -
Left Ovary =	2.18	= 2

	Foetus A.	Foetus B.
Weight gms. =	29.1	= 29.6
Length cms. =	9.3	= 9.3
Age days =	52	= 52

NOTES:-

Ewe Number = 287
Plane of Nutrition = HH

FIRST OESTRUS Date = April 3
Previous Obs. 2/7 First Obs. 3/9 Last Obs. 3/7 Off. 4/9

Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 3/9 B, 3/7 C

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	119
Mar. 1	121
4	131
8	132
11	129
15	135
18	135
22	133
25	135
29	135
Apl. 1	138
8	136
15	140
19	-
22	143
26	-
29	144
May 3	-
6	150
10	152
13	150
17	150
20	149
June 3	

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 22/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.66	= -
Left Ovary =	2.19	= 2

Foetus A.		Foetus B.
Weight gms. =	20.1	= 19.8
Length cms. =	7.4	= 6.8
Age days =	49	= 49

NOTES:-

Ewe Number = 322
Plane of Nutrition = HH

FIRST OESTRUS Date = March 25

Previous Obs.	First Obs.	Last Obs.	Off.
24/7	25/9	26/2	26/7

Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 10

Previous Obs.	First Obs.	Last Obs.	Off.
10/2	10/6	11/6	12/8

Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 11/8 E, 11/2 D, 11/6 B

Duration of Dioestrous Cycle = 18 days.

THIRD OESTRUS. Date = April 28

Previous Obs.	First Obs.	Last Obs.	Off.
27/6	28/8	28/6	29/8

Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 28/8 E, 28/2 A, 28/6 B.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	93
Mar. 1	103
4	108
8	108
11	110
15	113
18	116
22	114
25	113
29	113
Apl. 1	115
8	118
15	118
19	-
22	120
26	-
29	112
May 3	-
6	122
10	125
13	123
17	124
20	122
June 3	
June 24	128

Held to first service = No
Held to second service = No

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 0.85	= -
Left Ovary	= 1.69	= -

Foetus A.		Foetus B.
Weight gms. =		=
Length cms. =	Not in lamb.	=
Age days =		=

NOTES:-

Ewe Number = 324
Plane of Nutrition = HH

FIRST OESTRUS Date = April 5

Previous Obs.	First Obs.	Last Obs.	Off.
5/7	5/9	6/9	6/2

Duration of Oestrus = 24-43 hours.
Times of Service and Ram = 5/9 A, 6/7 C.

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	101
Mar. 1	106
4	110
8	114
11	112
15	115
18	117
22	118
25	120
29	119
Apl. 1	121
8	119
15	120
19	-
22	121
26	-
29	125
May 3	-
6	126
10	126
13	130
17	129
20	130
~~June 3~~	
May 27	130

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.1	= 1
Left Ovary =	1.2	= 1

Foetus A.		Foetus B.
Weight gms. =	33.3	=
Length cms. =	9.7	=
Age days =	52	=

NOTES:-

Ewe Number = 327
Plane of Nutrition = HH

FIRST OESTRUS Date = March 12
Previous Obs. 11/7 | First Obs. 12/9 | Last Obs. 12/7 | Off. 13/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = March 28
Previous Obs. 27/7 | First Obs. 28/9 | Last Obs. 29/9 | Off. 29/2
Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 18 days.

THIRD OESTRUS. Date = April 15
Previous Obs. 14/6 | First Obs. 15/8 | Last Obs. 16/2 | Off. 16/6
Duration of Oestrus = 30-48 hours.
Times of Service and Ram = 15/6 B, 16/8 D, 16/2 A.

Duration of Dioestrous Cycle = 17 days.

FOURTH OESTRUS. Date = May 2
1/6 | 2/8 | 2/6 | 3/8
Times of Service and Ram = 2/8 D, 2/2 E, 2/6 B.
~~Duration of Oestrus = 10-38~~
Held to first service = No
Held to second service = Yes

Date	Weight lbs.
Feb. 25	109
Mar. 1	121
4	122
8	132
11	124
15	124
18	124
22	129
25	126
29	122
Apl. 1	129
8	131
15	130
19	-
22	132
26	-
29	133
May 3	-
6	135
10	136
13	138
17	140
20	137
~~June 3~~	
June 24	144

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 1.13	= 1
Left Ovary	= 1.76	= 1

Foetus A.		Foetus B.
Weight gms. =	38.3	=
Length cms. =	9.9	=
Age days =	55	=

NOTES:-

Ewe Number = 336
Plane of Nutrition = HH

FIRST OESTRUS Date = March 27
Previous Obs. 26/7 | First Obs. 27/9 | Last Obs. 27/7 | Off. 28/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 12
Previous Obs. 12/2 | First Obs. 12/6 | Last Obs. 13/6 | Off. 14/8
Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 12/6 D, 13/8 B, 13/2 D, 13/6 E.

Duration of Dioestrous Cycle = 17 days.

THIRD OESTRUS. Date = April 29
Previous Obs. 28/6 | First Obs. 29/8 | Last Obs. 29/6 | Off. 30/8
Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 29/8 E, 29/2 D, 29/6 B.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	96
Mar. 1	104
4	108
8	110
11	110
15	111
18	112
22	115
25	117
29	115
Apl. 1	115
8	116
15	115
19	-
22	119
26	-
29	119
May 3	-
6	120
10	123
13	124
17	124
20	125
June 3	
June 24	126

Held to first service = No
Held to second service = Yes

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.28	= 1
Left Ovary =	0.48	= -

Foetus A.		Foetus B.
Weight gms. =	55.0	=
Length cms. =	10.8	=
Age days =	58	=

NOTES:-

Ewe Number = 341
Plane of Nutrition = HH

FIRST OESTRUS Date = April 3
Previous Obs. 3/9 | First Obs. 3/2 | Last Obs. 4/7 | Off. 5/9
Duration of Oestrus = 29-48 hours.
Times of Service and Ram = 3/7 B, 4/2 A.

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	107
Mar. 1	115
4	118
8	116
11	119
15	122
18	123
22	124
25	126
29	125
Apl. 1	125
8	127
15	129
19	-
22	130
26	-
29	131
May 3	-
6	131
10	133
13	133
17	135
20	135
~~June 3~~	

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 22/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.59	= 1
Left Ovary =	1.20	= -

	Foetus A.	Foetus B.
Weight gms. =	19.27	=
Length cms. =	7.6	=
Age days =	48	=

NOTES:-

Ewe Number = 402
Plane of Nutrition = HH

FIRST OESTRUS Date = April 1
Previous Obs. First Obs. Last Obs. Off.
31/7 1/9 1/7 2/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 18
Previous Obs. First Obs. Last Obs. Off.
17/6 18/8 18/6 19/8
Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 18/8 A, 18/2 D, 18/6 E.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	123
Mar. 1	131
4	133
8	131
11	136
15	140
18	134
22	137
25	141
29	139
Apl. 1	140
8	140
15	143
19	-
22	139
26	-
29	144
May 3	-
6	145
10	148
13	140
17	148
20	150
June 3	

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.71	= -
Left Ovary =	2.1	= 2

	Foetus A.	Foetus B.
Weight gms. =	8.0	=
Length cms. =	4.3	=
Age days =	41	=

NOTES:-

Ewe Number = 422
Plane of Nutrition = HH

FIRST OESTRUS Date = March 25
Previous Obs. 25/9 First Obs. 25/2 Last Obs. 26/7 Off. 27/9
Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 11
Previous Obs. 10/6 First Obs. 11/8 Last Obs. 11/6 Off. 12/8
Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 11/8 E, 11/2 B, 11/6 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	95
Mar. 1	108
4	111
8	111
11	110
15	114
18	117
22	117
25	117
29	114
Apl. 1	118
8	116
15	113
19	-
22	117
26	-
29	119
May 3	-
6	117
10	114
13	117
17	114
20	117
June 3	
June 17	123

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 19/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.52	= -
Left Ovary =	1.32	= 1

Foetus A.		Foetus B.
Weight gms. =	154.4	=
Length cms. =	15.4	=
Age days =	69	=

NOTES:-

Ewe Number = 150
Plane of Nutrition = HL

FIRST OESTRUS Date = March 28
Previous Obs. 27/7 | First Obs. 28/9 | Last Obs. 29/2 | Off, 29/7
Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 18 days.

SECOND OESTRUS. Date = April 15
Previous Obs. 14/6 | First Obs. 15/8 | Last Obs. 16/2 | Off, 16/6
Duration of Oestrus = 30-48 hours.
Times of Service and Ram = 15/2 E, 16/8 A, 16/2 D

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	105
Mar. 1	115
4	118
8	121
11	120
15	121
18	124
22	107
25	103
29	100
Apl. 1	102
8	100
15	101
19	98
22	96
26	94
29	94
May 3	95
6	96
10	100
13	105
17	106
20	108
June 3	
June 24	113

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.31	= -
Left Ovary =	0.93	= 1

Foetus A.		Foetus B.
Weight gms. =	178	=
Length cms. =	16.3	=
Age days =	71	=

NOTES:-

Ewe Number = 160
Plane of Nutrition = ML

FIRST OESTRUS Date = March 26

Previous Obs.	First Obs.	Last Obs.	Off.
26/2	26/7	27/2	27/7

Duration of Oestrus = 19-29 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 12

Previous Obs.	First Obs.	Last Obs.	Off.
MARKED 12 - MISSED - SHORT HEAT			

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 21 days.

THIRD OESTRUS. Date = May 3

Previous Obs.	First Obs.	Last Obs.	Off.
2/6	3/8	4/8	4/2

Duration of Oestrus = 24-44 hours.
Times of Service and Ram = 3/8 B, 3/6 D, 4/8 E.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	96
Mar. 1	102
4	108
8	110
11	103
15	114
18	113
22	96
25	93
29	98
Apl. 1	95
8	97
15	94
19	91
22	91
26	90
29	91
May 3	93
6	95
10	100
13	101
17	101
20	100
~~June 3~~	
July 1	110

Held to first service = No
Held to second service = -

DATE OF SLAUGHTER =

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =		=
Left Ovary =		=

	Foetus A.	Foetus B.
Weight gms. =	Not in lamb.	=
Length cms. =		=
Age days =		=

NOTES:-

Mated once only.
Uterus cervix and both ovaries apparently normal.

Ewe Number = 165
Plane of Nutrition = HL

FIRST OESTRUS Date = March 10
Previous Obs. 9/7 First Obs. 10/9 Last Obs. 10/7 Off. 11/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 15 days.

SECOND OESTRUS. Date = March 25
Previous Obs. 24/7 First Obs. 25/9 Last Obs. 26/2 Off. 26/7
Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

THIRD OESTRUS. Date = April 10
Previous Obs. 10/2 First Obs. 10/6 Last Obs. 11/6 Off. 12/8
Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 11/8 D, 11/2 B, 11/6 E.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	106
Mar. 1	113
4	112
8	116
11	104
15	117
18	119
22	107
25	104
29	104
Apl. 1	104
8	105
15	105
19	103
22	101
26	98
29	98
May 3	98
6	100
10	105
13	106
17	107
20	108
June 3	
June 10	117

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora
Right Ovary =	1.11	= 1
Left Ovary =	0.72	= -

	Foetus A.	Foetus B.
Weight gms. =	73.3	=
Length cms. =	12.8	=
Age days =	62	=

NOTES:-

Ewe Number = 168
Plane of Nutrition = HL

FIRST OESTRUS Date = April 2
Previous Obs. First Obs. Last Obs. Off.
2/2 2/7 3/9 3/2
Duration of Oestrus = 14-24 hours.
Times of Service and Ram = 2/7 C, 3/9 A.

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	118
Mar. 1	123
4	128
8	129
11	132
15	134
18	134
22	120
25	124
29	121
Apl. 1	121
8	115
15	111
19	111
22	112
26	107
29	109
May 3	110
6	110
10	115
13	119
17	120
20	121
June 3	
May 27	124

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora
Right Ovary =	1.1	= 1
Left Ovary =	1.0	= 1

	Foetus A.	Foetus B.
Weight gms. =	47.4	= 46.9
Length cms. =	11.2	= 11.1
Age days =	56	= 56

NOTES:-

Ewe Number = 170
Plane of Nutrition = HL

FIRST OESTRUS Date = April 4

Previous Obs.	First Obs.	Last Obs.	Off.
3/7	4/9	5/9	5/2

Duration of Oestrus = 24-43 hours.
Times of Service and Ram = 4/2 C, 5/9 A.

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	92
Mar. 1	100
4	104
8	104
11	103
15	109
18	108
22	91
25	94
29	90
Apl. 1	90
8	90
15	88
19	86
22	88
26	85
29	88
May 3	88
6	88
10	97
13	98
17	95
20	96
~~June 3~~	
July 1	110

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 3/7/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.33	= -
Left Ovary =	0.94	= 1

Foetus A.		Foetus B.
Weight gms. =	- } Single	=
Length cms. =	24 }	=
Age days =	89	=

NOTES:-

Ewe Number = 187
Plane of Nutrition = HL

FIRST OESTRUS Date = March 29
Previous Obs. 28/7 | First Obs. 29/9 | Last Obs. 29/7 | Off. 30/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 15
Previous Obs. 15/2 | First Obs. 15/6 | Last Obs. 16/6 | Off. 17/8
Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 16/8 B, 16/2 E, 16/6 E.

Duration of Dioestrous Cycle = 18 days.

THIRD OESTRUS. Date = May 3
Previous Obs. 3/2 | First Obs. 3/6 | Last Obs. 4/8 | Off. 4/2
Duration of Oestrus. = 14-24 hours.
Times of Service and Ram = 3/6 B, 4/8 D

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	107
Mar. 1	117
4	120
8	113
11	113
15	124
18	125
22	111
25	107
29	107
Apl. 1	104
8	101
15	97
19	95
22	96
26	94
29	94
May 3	97
6	97
10	105
13	108
17	108
20	109
~~June 3~~	
July 1	120

Held to first service = No
Held to second service = Yes

DATE OF SLAUGHTER = 3/7/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.25	= 1
Left Ovary =	0.29	= -

Foetus A.		Foetus B.
Weight gms. =	61.0	=
Length cms. =	11.8	=
Age days =	60	=

NOTES:-

Ewe Number = 194
Plane of Nutrition = HL

FIRST OESTRUS Date = March 26
Previous Obs. First Obs. Last Obs. Off.
25/7 26/9 27/7 28/9
Duration of Oestrus = 34-62 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 12
Previous Obs. First Obs. Last Obs. Off.
11/6 12/8 13/8 13/2
Duration of Oestrus = 24-44 hours.
Times of Service and Ram = 12/2 D, 12/6 B, 13/8 E.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	120
Mar. 1	127
4	130
8	133
11	131
15	136
18	133
22	124
25	122
29	118
Apl. 1	121
8	119
15	114
19	112
22	112
26	111
29	112
May 3	115
6	116
10	124
13	125
17	124
20	126
June 3	134

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 6/6/50

	Weight gms.	No. of "pregnant" corpora
Right Ovary =	1.32	= 1
Left Ovary =	0.72	= 1

	Foetus A.	Foetus B.
Weight gms. =	38.9	=
Length cms. =	10.4	=
Age days =	54	=

NOTES:-

Ewe Number = 199
Plane of Nutrition = HL

FIRST OESTRUS Date = March 30

Previous Obs.	First Obs.	Last Obs.	Off.
30/9	30/2	31/9	31/2

Duration of Oestrus = 19-29 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 16

Previous Obs.	First Obs.	Last Obs.	Off.
15/6	16/8	17/8	17/2

Duration of Oestrus = 24-44 hours.
Times of Service and Ram = 16/8 D, 16/2 E, 16/6 D, 17/8 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	112
Mar. 1	122
4	128
8	127
11	127
15	132
18	131
22	114
25	113
29	114
Apl. 1	112
8	110
15	109
19	104
22	106
26	101
29	102
May 3	100
6	100
10	103
13	102
17	103
20	106
June 3	123

Held to first service = Yes
Held to second service =

DATE OF SLAUGHTER = 19/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.92	= 1
Left Ovary =	1.11	= -

Foetus A.	Foetus B.
Weight gms. = 127	=
Length cms. = 8.1	=
Age days = 63	=

NOTES:-

Ewe Number = 209
Plane of Nutrition = HL

FIRST OESTRUS Date = March 24
Previous Obs. 24/9 First Obs. 24/2 Last Obs. 25/7 Off. 26/9
Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 9
Previous Obs. 9/2 First Obs. 9/6 Last Obs. 11/8 Off. 11/2
Duration of Oestrus = 38-48 hours.
Times of Service and Ram = 9/6 E, 10/8 B, 10/6 D, 11/8 B.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	96
Mar. 1	102
4	113
8	108
11	114
15	114
18	111
22	102
25	101
29	103
Apl. 1	96
8	95
15	91
19	91
22	90
26	88
29	89
May 3	88
6	90
10	96
13	99
17	99
20	97
June 3	
July 1	110

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 3/7/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.31	= -
Left Ovary =	0.97	= 1

Foetus A.		Foetus B.
Weight gms. =	-	=
Length cms. =	22 } Single	=
Age days =	83	=

NOTES:-

Ewe Number = 228
Plane of Nutrition = HL

FIRST OESTRUS Date = March 31
Previous Obs. 30/7 | First Obs. 31/9 | Last Obs. 2/2 | Off. 2/7
Duration of Oestrus = 53-72 hours.
Times of Service and Ram = 1/9 A, 2/9 C.

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 16
Previous Obs. 16/8 | First Obs. 16/2 | Last Obs. 17/6 | Off. 18/8
Duration of Oestrus = 28-48 hours.
Times of Service and Ram = 16/6 E, 17/8 A, 17/6 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	109
Mar. 1	121
4	123
8	125
11	125
15	131
18	129
22	112
25	116
29	115
Apl. 1	116
8	109
15	108
19	105
22	108
26	105
29	106
May 3	105
6	105
10	115
13	113
17	114
20	115
June 3	
June 10	128

Held to first service = No
Held to second service = Yes

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.73	= -
Left Ovary =	1.22	= 1

Foetus A.		Foetus B.
Weight gms. =	48.5	=
Length cms. =	10.7	=
Age days =	56	=

NOTES:-

Ewe Number = 274
Plane of Nutrition = HL

FIRST OESTRUS Date = March 27

Previous Obs.	First Obs.	Last Obs.	Off.
26/7	27/9	28/9	28/2

Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 13

Previous Obs.	First Obs.	Last Obs.	Off.
13/2	13/6	14/2	14/6

Duration of Oestrus = 20-28 hours.
Times of Service and Ram = 13/6 E, 14/8 D, 14/2 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	116
Mar. 1	126
4	127
8	128
11	128
15	129
18	131
22	121
25	117
29	113
Apl. 1	112
8	111
15	109
19	107
22	107
26	105
29	103
May 3	105
6	103
10	111
13	116
17	117
20	119
~~June 3~~	
June 10	128

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.45	= 1
Left Ovary =	0.72	= -

Foetus A.		Foetus B.
Weight gms. =	58.5	=
Length cms. =	11.5	=
Age days =	59	=

NOTES:-

Ewe Number = 333
Plane of Nutrition = HL

FIRST OESTRUS Date = March 23
Previous Obs. 22/7 First Obs. 23/9 Last Obs. 23/7 Off. 24/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 15 days.

SECOND OESTRUS. Date = April 7
Previous Obs. 7/9 First Obs. 7/2 Last Obs. 8/6 Off. 9/8
Duration of Oestrus = 28-47 hours.
Times of Service and Ram = 7/7 B, 8/8 E, 8/6 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	102
Mar. 1	112
4	116
8	115
11	114
15	118
18	116
22	106
25	104
29	102
Apl. 1	106
8	101
15	99
19	98
22	96
26	93
29	94
May 3	92
6	93
10	98
13	100
17	100
20	105
June 3	
June 10	119

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	0.64	-
Left Ovary	1.24	1

Foetus A.		Foetus B.
Weight gms.	108.5	
Length cms.	13.9	
Age days	65	

NOTES:-

Ewe Number = 405
Plane of Nutrition = HL

FIRST OESTRUS Date = April 4
Previous Obs. First Obs. Last Obs. Off.
4/9 4/2 5/2 5/7
Duration of Oestrus = 24-34 hours.
Times of Service and Ram = 4/7 A, 5/9 C.

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	116
Mar. 1	118
4	120
8	119
11	120
15	127
18	128
22	118
25	115
29	113
Apl. 1	110
8	109
15	108
19	107
22	108
26	104
29	106
May 3	111
6	108
10	118
13	119
17	116
20	119
June 3	124

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 6/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.96	= 1
Left Ovary =	1.1	= 1

Foetus A.		Foetus B.
Weight gms. =	72.1	=
Length cms. =	12.0	=
Age days =	62	=

NOTES:-

Ewe Number = 406
Plane of Nutrition = HL

FIRST OESTRUS Date = April 5

Previous Obs.	First Obs.	Last Obs.	Off.
5/2	5/7	6/9	6/2

Duration of Oestrus = 14-24 hours.
Times of Service and Ram = 5/7 A, 6/9 C.

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	109
Mar. 1	122
4	127
8	129
11	126
15	135
18	135
22	114
25	115
29	113
Apl. 1	114
8	106
15	104
19	104
22	102
26	101
29	104
May 3	101
6	103
10	109
13	113
17	113
20	114
~~June 3~~	
May 27	114

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 0.8	= -
Left Ovary	= 1.5	= 2

	Foetus A.	Foetus B.
Weight gms.	= 28.7	=
Length cms.	= 9.2	=
Age days	= 53	=

NOTES:-

Ewe Number = 410
Plane of Nutrition = HL

FIRST OESTRUS Date = April 7
Previous Obs. 6/7 | First Obs. 7/9 | Last Obs. 8/2 | Off. 8/6
Duration of Oestrus = 29-47 hours.
Times of Service and Ram = 7/9 A, 7/7 D, 8/8 A.

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	107
Mar. 1	116
4	120
8	120
11	121
15	124
18	124
22	110
25	107
29	104
Apl. 1	102
8	101
15	100
19	100
22	98
26	97
29	96
May 3	94
6	95
10	102
13	105
17	106
20	108
June 3	
June 17	115

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 19/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.35	= -
Left Ovary =	0.94	= 1

Foetus A.		Foetus B.
Weight gms. =	178.1	=
Length cms. =	16.1	=
Age days =	72	=

NOTES:-

Ewe Number = 411
Plane of Nutrition = HL

FIRST OESTRUS Date = April 1
Previous Obs. First Obs. Last Obs. Off.
31/7 1/9 2/7 3/9
Duration of Oestrus = 34-62 hours.
Times of Service and Ram = 1/2 C, 2/2 B.

Duration of Dioestrous Cycle = 18 days.

SECOND OESTRUS. Date = April 19
Previous Obs. First Obs. Last Obs. Off.
18/6 19/8 20/2 20/6
Duration of Oestrus = 30-48 hours.
Times of Service and Ram = 19/8 D, 19/2 E, 19/6 A, 20/8 B.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	122
Mar. 1	127
4	132
8	131
11	132
15	135
18	134
22	128
25	126
29	124
Apl. 1	133
8	122
15	117
19	116
22	117
26	117
29	116
May 3	118
6	119
10	120
13	124
17	125
20	125
~~June 3~~	
June 17	131

Held to first service = No
Held to second service = Yes

DATE OF SLAUGHTER = 19/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.99	= 1
Left Ovary =	0.62	= -

Foetus A.		Foetus B.
Weight gms. =	70.1	=
Length cms. =	11.2	=
Age days =	60	=

NOTES:-

Ewe Number = 412
Plane of Nutrition = HL

FIRST OESTRUS Date = March 14

Previous Obs.	First Obs.	Last Obs.	Off.
13/7	14/9	15/2	15/7

Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 18 days.

SECOND OESTRUS. Date = April 1

Previous Obs.	First Obs.	Last Obs.	Off.
31/7	1/9	2/9	2/2

Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

THIRD OESTRUS. Date = April 18

Previous Obs.	First Obs.	Last Obs.	Off.
17/6	18/8	18/6	19/8

Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 18/8 B, 18/2 D, 18/6 E.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	105
Mar. 1	114
4	122
8	122
11	120
15	117
18	120
22	105
25	101
29	102
Apl. 1	100
8	101
15	100
19	99
22	99
26	95
29	96
May 3	97
6	97
10	101
13	104
17	102
20	104
~~June 3~~	
July 1	118

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 3/7/50

	Weight gms.	No. of "pregnant" corpora
Right Ovary	= 1.17	= 1
Left Ovary	= 0.43	= -

Foetus A.		Foetus B.
Weight gms. =	238.2	=
Length cms. =	18.5	=
Age days =	76	=

NOTES:-

Ewe Number = E168
Plane of Nutrition = HL

FIRST OESTRUS Date = April 6
Previous Obs. 5/7 | First Obs. 6/9 | Last Obs. 7/9 | Off. 7/2
Duration of Oestrus = 24-43 hours.
Times of Service and Ram = 6/9 A, 7/9 C.

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	131
Mar. 1	136
4	138
8	140
11	140
15	144
18	146
22	135
25	134
29	132
Apl. 1	129
8	122
15	120
19	118
22	118
26	114
29	114
May 3	112
6	112
10	113
13	114
17	112
20	113
~~June 3~~ May 27	116

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	2.1	= 1
Left Ovary =	0.7	= -

Foetus A.		Foetus B.
Weight gms. =	23.9	=
Length cms. =	8.7	=
Age days =	52	=

NOTES:-

Ewe Number = 417
Plane of Nutrition = LH

FIRST OESTRUS Date = March 21
Previous Obs. 20/7 | First Obs. 21/9 | Last Obs. 22/9 | Off. 22/2
Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 7
Previous Obs. 7/9 | First Obs. 7/2 | Last Obs. 8/6 | Off. 9/8
Duration of Oestrus = 28-47 hours.
Times of Service and Ram = 7/2 C, 8/8 E, 8/6 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	123
Mar. 1	127
4	125
8	129
11	122
15	125
18	120
22	125
25	126
29	131
Apl. 1	132
8	129
15	138
19	-
22	140
26	-
29	141
May 3	-
6	145
10	150
13	150
17	148
20	139
~~June 3~~	

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 0.7	= -
Left Ovary	= 2.2	= 2

Foetus A.		Foetus B.
Weight gms.	=	=
Length cms.	=	=
Age days	=	=

NOTES:-

Ewe Number = 420
Plane of Nutrition = HL

FIRST OESTRUS Date = March 31
Previous Obs. First Obs. Last Obs. Off.
30/7 - MARKED - 31/9
Duration of Oestrus = 0-14 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 18 days.

SECOND OESTRUS. Date = April 18
Previous Obs. First Obs. Last Obs. Off.
17/6 18/8 18/6 19/8
Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 18/8 B, 18/2 D, 18/6 E.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	102
Mar. 1	110
4	111
8	100
11	102
15	113
18	113
22	99
25	97
29	97
Apl. 1	97
8	101
15	98
19	94
22	92
26	90
29	88
May 3	88
6	89
10	95
13	96
17	99
20	98
~~June 3~~	
July 1	117

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 3/7/50

	Weight gms.	No. of "pregnant" corpora
Right Ovary	= 1.21	= 1
Left Ovary	= 1.33	= 1

	Foetus A.	Foetus B.
Weight gms.	= 230.0	= 241.0
Length cms.	= 18.0	= 18.0
Age days	= 76	= 76

NOTES:-

Ewe Number = 145
Plane of Nutrition = LH

FIRST OESTRUS Date = March 20
Previous Obs. 20/9 First Obs. 20/2 Last Obs. 20/7 Off 21/9

Duration of Oestrus = 5-24 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 5
Previous Obs. 5/2 First Obs. 5/7 Last Obs. 6/2 Off 6/7

Duration of Oestrus = 19-29 hours.
Times of Service and Ram = 5/7 C, 6/2 A

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	105
Mar. 1	110
4	118
8	118
11	107
15	105
18	104
22	114
25	117
29	118
Apl. 1	120
8	120
15	121
19	-
22	122
26	-
29	124
May 3	-
6	126
10	128
13	130
17	128
20	130
June 3	
May 27	134

Held to first service = Yes
Held to second service =

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.53	= 1
Left Ovary =	0.97	= -

Foetus A.		Foetus B.
Weight gms. =	32.7	=
Length cms. =	9.2	=
Age days =	53	=

NOTES:-

Ewe Number = 152
Plane of Nutrition = LH

FIRST OESTRUS Date = March 25
Previous Obs. First Obs. Last Obs. Off.
24/7 25/9 26/7 27/9
Duration of Oestrus = 34-62 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 11
Previous Obs. First Obs. Last Obs. Off.
10/6 11/8 11/6 12/8
Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 11/8 A, 11/6 D

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	107
Mar. 1	113
4	117
8	120
11	115
15	114
18	112
22	116
25	116
29	115
Apl. 1	118
8	121
15	121
19	-
22	120
26	-
29	125
May 3	-
6	125
10	126
13	125
17	124
20	126
~~June 3~~	
June 3	130

Held to first service = Yes
Held to second service =

DATE OF SLAUGHTER = 6/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 0.62	= -
Left Ovary	= 1.75	= 1

Foetus A.		Foetus B.
Weight gms. =	39.1	=
Length cms. =	10.4	=
Age days =	56	=

NOTES:-

Ewe Number = 157
Plane of Nutrition = LH

FIRST OESTRUS Date = March 18

Previous Obs.	First Obs.	Last Obs.	Off.
18/2	18/7	19/7	20/9

Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 18 days.

SECOND OESTRUS. Date = April 5

Previous Obs.	First Obs.	Last Obs.	Off.
5/2	5/7	6/2	6/7

Duration of Oestrus = 19-29 hours.
Times of Service and Ram = 5/7 C, 6/9A

Duration of Dioestrous Cycle = 19 days.

THIRD OESTRUS. Date = April 24

Previous Obs.	First Obs.	Last Obs.	Off.
24/8	24/2	25/2	25/6

Duration of Oestrus = 24-34 hours.
Times of Service and Ram = 24/2 D, 24/6 E, 25/8 B, 25/2 D.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	110
Mar. 1	116
4	118
8	118
11	109
15	109
18	111
22	115
25	119
29	120
Apl. 1	118
8	122
15	127
19	-
22	129
26	-
29	130
May 3	-
6	133
10	135
13	133
17	133
20	135
~~June 3~~	
June 24	140

Held to first service = No
Held to second service = Yes

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.48	= -
Left Ovary =	2.37	= 2

Foetus A.		Foetus B.	
Weight gms. =	72.5	=	68.0
Length cms. =	12.2	=	12.2
Age days =	62	=	62

NOTES:-

Ewe Number = 158
Plane of Nutrition = LH

FIRST OESTRUS Date = March 18

Previous Obs.	First Obs.	Last Obs.	Off.
18/2	18/7	19/2	19/7

Duration of Oestrus = 19-29 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 3

Previous Obs.	First Obs.	Last Obs.	Off.
3/2	3/7	4/2	4/7

Duration of Oestrus = 19-29 hours.
Times of Service and Ram = 3/7 A, 4/9 C

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	96
Mar. 1	105
4	107
8	108
11	100
15	101
18	98
22	110
25	113
29	116
Apl. 1	115
8	116
15	120
19	-
22	121
26	-
29	125
May 3	-
6	126
10	130
13	129
17	126
20	120
~~June 3~~	
May 27	129

Held to first service = Yes
Held to second service =

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.9	= 1
Left Ovary =	1.1	= -

	Foetus A.	Foetus B.
Weight gms. =	38.2	=
Length cms. =	10.3	=
Age days =	55	=

NOTES:-

Ewe Number = 161
Plane of Nutrition = LM

FIRST OESTRUS Date = March 23

Previous Obs.	First Obs.	Last Obs.	Off.
22/7	23/9	23/7	24/9

Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 15 days.

SECOND OESTRUS. Date = April 7

Previous Obs.	First Obs.	Last Obs.	Off.
7/2	7/6	8/6	9/8

Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 7/7 E,8/8 E,8/6 D

Duration of Dioestrous Cycle = 15 days.

THIRD OESTRUS. Date = April 22

Previous Obs.	First Obs.	Last Obs.	Off.
22/2	22/6	23/2	23/6

Duration of Oestrus = 20-28 hours.
Times of Service and Ram = 22/6 E,23/8 D,23/2 B.

Duration of Dioestrous Cycle = 16 days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	118
Mar. 1	124
4	129
8	128
11	120
15	118
18	120
22	124
25	125
29	127
Apl. 1	129
8	128
15	134
19	-
22	135
26	-
29	137
May 3	-
6	135
10	138
13	140
17	138
20	140
~~June 3~~	
June 24	144

Held to first service = No
Held to second service = No

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 1.0	= -
Left Ovary	= 3.98	= -

Foetus A.		Foetus B.
Weight gms. =	Not in lamb.	=
Length cms. =		=
Age days =		=

NOTES:-

Ewe Number = 167
Plane of Nutrition = LH

FIRST OESTRUS Date = March 14
Previous Obs. First Obs. Last Obs. Off.
14/9 14/2 15/7 16/9
Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 18 days.

SECOND OESTRUS. Date = April 1
Previous Obs. First Obs. Last Obs. Off.
1/9 1/2 2/7 3/9
Duration of Oestrus = 29-48 hours.
Times of Service and Ram = 1/7 B, 2/7 C.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	120
Mar. 1	127
4	130
8	130
11	125
15	122
18	121
22	128
25	133
29	134
Apl. 1	132
8	135
15	138
19	-
22	134
26	-
29	137
May 3	-
6	139
10	138
13	141
17	140
20	140
~~June 3~~	

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 22/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.88	= -
Left Ovary =	2.12	= 2

	Foetus A.	Foetus B.
Weight gms. =	21.9	= 13.35
Length cms. =	7.7	= 6.4
Age days =	50	= 50

NOTES:-

Ewe Number = 183
Plane of Nutrition = LH

FIRST OESTRUS Date = April 1
Previous Obs. 1/2 | First Obs. 1/7 | Last Obs. 2/7 | Off. 3/9
Duration of Oestrus = 24-43 hours.
Times of Service and Ram = 1/7 C, 2/2 A

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 18
Previous Obs. 18/2 | First Obs. 18/6 | Last Obs. 19/6 | Off. 20/8
Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 18/6 A, 19/8 E, 19/2 D, 19/6 B.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	102
Mar. 1	104
4	113
8	114
11	104
15	101
18	101
22	114
25	115
29	116
Apl. 1	116
8	120
15	127
19	-
22	118
26	-
29	123
May 3	-
6	127
10	128
13	129
17	130
20	127
June 3	
June 24	134

Held to first service = No
Held to second service = Yes

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 2.89	= 2
Left Ovary	= 0.65	= -

Foetus A.		Foetus B.	
Weight gms.	= 150	=	147
Length cms.	= 14.3	=	14.1
Age days	= 68	=	68

NOTES:-

Ewe Number = 185
Plane of Nutrition = LH

FIRST OESTRUS Date = April 5

Previous Obs.	First Obs.	Last Obs.	Off.
4/7	5/9	5/7	6/9

Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 5/9 A, 5/7 C

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	116
Mar. 1	121
4	117
8	126
11	118
15	120
18	119
22	127
25	129
29	131
Apl. 1	131
8	131
15	134
19	-
22	134
26	-
29	138
May 3	-
6	140
10	141
13	143
17	142
20	144
~~June 3~~	

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 22/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.33	= 1
Left Ovary =	1.09	= 1

Foetus A.		Foetus B.
Weight gms. =	17.72	=
Length cms. =	6.4	=
Age days =	47	=

NOTES:-

Ewe Number = 256
Plane of Nutrition = LH

FIRST OESTRUS Date = March 29

Previous Obs.	First Obs.	Last Obs.	Off.
28/7	29/9	30/9	30/2

Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 15

Previous Obs.	First Obs.	Last Obs.	Off.
15/2	15/6	16/6	17/8

Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 16/8 B, 16/2 E, 16/6 D

Duration of Dioestrous Cycle = 18 days.

THIRD OESTRUS. Date = May 3

Previous Obs.	First Obs.	Last Obs.	Off.
2/6	3/8	4/6	5/8

Duration of Oestrus = 34-62 hours.
Times of Service and Ram = 3/8 E, 3/6 D, 4/8 E, 4/6 B.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	116
Mar. 1	122
4	127
8	128
11	121
15	121
18	120
22	127
25	128
29	125
Apl. 1	122
8	131
15	130
19	-
22	130
26	-
29	134
May 3	-
6	129
10	131
13	133
17	133
20	133
~~June 3~~	
June 17	140

Held to first service = No
Held to second service = No

DATE OF SLAUGHTER = 19/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 4.56	= -
Left Ovary	= 1.8	= -

Foetus A.		Foetus B.
Weight gms. =	Not in lamb	=
Length cms. =		=
Age days =		=

NOTES:-

Ewe Number = 261
Plane of Nutrition = LH

FIRST OESTRUS Date = March 23

Previous Obs.	First Obs.	Last Obs.	Off.
23/9	23/2	24/7	25/9

Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 8

Previous Obs.	First Obs.	Last Obs.	Off.
8/2	8/6	9/6	10/8

Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 8/6 A, 9/8 B, 9/6 E

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	100
Mar. 1	103
4	109
8	108
11	100
15	103
18	99
22	106
25	103
29	109
Apl. 1	110
8	110
15	112
19	-
22	111
26	-
29	114
May 3	-
6	117
10	119
13	120
17	119
20	119
~~June 3~~	
June 3	121

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 6/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 1.57	= 2
Left Ovary	= 0.56	= -

Foetus A.		Foetus B.
Weight gms. =	58.5	=
Length cms. =	11.7	=
Age days =	58	=

NOTES:-

Ewe Number = 284
Plane of Nutrition = LM

FIRST OESTRUS Date = March 23
Previous Obs. 22/7 | First Obs. 23/9 | Last Obs. 23/7 | Off. 24/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 8
Previous Obs. 8/2 | First Obs. 8/6 | Last Obs. 9/6 | Off. 10/8
Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 9/8 A, 9/2 D, 9/6 B

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.
Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	106
Mar. 1	110
4	111
8	110
11	109
15	108
18	107
22	112
25	111
29	112
Apl. 1	116
8	118
15	120
19	-
22	120
26	-
29	120
May 3	-
6	122
10	121
13	120
17	116
20	118
~~June 3~~	
June 3	120

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 6/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 1.3	= 1
Left Ovary	= 0.37	= -

	Foetus A.	Foetus B.
Weight gms.	= 60.3	=
Length cms.	= 11.6	=
Age days	= 58	=

NOTES:-

Ewe Number = 331
Plane of Nutrition = LH

FIRST OESTRUS Date = March 23
Previous Obs. First Obs. Last Obs. Off.
22/7 23/9 23/2 23/7
Duration of Oestrus = 5-24 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 9
Previous Obs. First Obs. Last Obs. Off.
8/6 9/8 9/6 10/8
Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 9/8 D, 9/2 B, 9/6 E

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	107
Mar. 1	112
4	114
8	114
11	109
15	110
18	109
22	114
25	112
29	117
Apl. 1	116
8	122
15	122
19	-
22	126
26	-
29	126
May 3	-
6	130
10	132
13	132
17	133
20	133
~~June 3~~	

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.7	= -
Left Ovary =	1.4	= 1

	Foetus A.	Foetus B.
Weight gms. =	14.0	=
Length cms. =	6.8	=
Age days =	50	=

NOTES:-

Ewe Number = 339
Plane of Nutrition = LH

FIRST OESTRUS Date = March 30

Previous Obs.	First Obs.	Last Obs.	Off.
30/9	30/2	31/9	31/2

Duration of Oestrus = 19-29 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 16

Previous Obs.	First Obs.	Last Obs.	Off.
15/6	16/8	16/6	17/8

Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 16/8 E, 16/2 B, 16/6 D,

Duration of Dioestrous Cycle = 16 days.

THIRD OESTRUS. Date = May 2

Previous Obs.	First Obs.	Last Obs.	Off.
2/6	3/8	4/8	4/2

Duration of Oestrus = 24-44 hours.
Times of Service and Ram = 3/8 D, 3/6 E, 4/8 B.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	111
Mar. 1	121
4	121
8	130
11	115
15	115
18	111
22	120
25	124
29	126
Apl. 1	122
8	131
15	133
19	-
22	134
26	-
29	135
May 3	-
6	139
10	137
13	140
17	139
20	136
~~June 3~~	
June 24	139

Held to first service = No
Held to second service = No

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 1.8	= -
Left Ovary	= 0.77	= -

Foetus A.		Foetus B.
Weight gms. =	Not in lamb.	=
Length cms. =		=
Age days =		=

NOTES:-

Ewe Number = 343
Plane of Nutrition = LH

FIRST OESTRUS Date = April 1
Previous Obs. First Obs. Last Obs. Off.
31/7 1/9 1/7 2/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 18
Previous Obs. First Obs. Last Obs. Off.
18/8 18/2 19/6 20/8
Duration of Oestrus = 28-48 hours.
Times of Service and Ram = 18/2 B, 18/6 E, 19/8 D, 19/2 B.
Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	118
Mar. 1	120
4	128
8	130
11	122
15	120
18	115
22	127
25	134
29	131
Apl. 1	133
8	137
15	136
19	-
22	134
26	-
29	140
May 3	-
6	143
10	147
13	149
17	148
20	147
~~June 3~~	

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 22/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	2.78	= 2
Left Ovary =	0.86	= -

Foetus A.		Foetus B.
Weight gms. =	1.45	=
Length cms. =	2.6	=
Age days =	33	=

NOTES:-

Ewe Number = 344
Plane of Nutrition = LH

FIRST OESTRUS Date = March 23
Previous Obs. 22/7 | First Obs. 23/9 | Last Obs. 23/7 | Off. 24/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 8
Previous Obs. 7/7 | First Obs. 8/8 | Last Obs. 9/8 | Off. 9/8
Duration of Oestrus = 24-43 hours.
Times of Service and Ram = 8/8 D, 8/6 B, 9/8 A.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	105
Mar. 1	112
4	116
8	118
11	108
15	110
18	108
22	115
25	116
29	119
Apl. 1	121
8	120
15	124
19	-
22	124
26	-
29	128
May 3	-
6	130
10	130
13	133
17	133
20	134
June 3	

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 6/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.48	= 2
Left Ovary =	0.52	= -

	Foetus A.	Foetus B.
Weight gms. =	51.5	= 48.7
Length cms. =	11.4	= 11.1
Age days =	58	= 58

NOTES:-

Ewe Number = 345
Plane of Nutrition = LH

FIRST OESTRUS Date = March 24

Previous Obs.	First Obs.	Last Obs.	Off.
23/7	24/9	25/7	26/9

Duration of Oestrus = 34-62 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 18 days.

SECOND OESTRUS. Date = April 11

Previous Obs.	First Obs.	Last Obs.	Off.
11/8	11/2	12/6	13/8

Duration of Oestrus = 28-48 hours.
Times of Service and Ram = 11/6 E, 12/8 D, 12/2 A, 12/6 B.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	127
Mar. 1	131
4	135
8	139
11	131
15	135
18	132
22	139
25	129
29	137
Apl. 1	140
8	141
15	138
19	-
22	140
26	-
29	143
May 3	-
6	149
10	150
13	149
17	151
20	152
~~June 3~~	

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 22/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	2.27	= 1
Left Ovary =	0.93	= 0

	Foetus A.	Foetus B.
Weight gms. =	6.98	=
Length cms. =	4.6	=
Age days =	40	=

NOTES:-

Ewe Number = 347
Plane of Nutrition = LH

FIRST OESTRUS Date = March 30

Previous Obs.	First Obs.	Last Obs.	Off.
29/7	30/9	31/9	31/2

Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 16

Previous Obs.	First Obs.	Last Obs.	Off.
15/6	16/8	17/8	17/2

Duration of Oestrus = 24-44 hours.
Times of Service and Ram = 16/8 A, 16/2 D, 17/8 E.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	108
Mar. 1	111
4	117
8	116
11	106
15	115
18	114
22	121
25	121
29	120
Apl. 1	115
8	124
15	128
19	-
22	128
26	-
29	127
May 3	-
6	129
10	134
13	131
17	131
20	133
June 3	
June 24	135

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.15	= 1
Left Ovary =	0.51	= -

Foetus A.		Foetus B.
Weight gms. =	155.4	=
Length cms. =	15.6	=
Age days =	70	=

NOTES:-

Ewe Number = 416
Plane of Nutrition = LH

FIRST OESTRUS Date = March 21
Previous Obs. First Obs. Last Obs. Off.
21/2 21/7 22/9 22/2
Duration of Oestrus = 14-24 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 6
Previous Obs. First Obs. Last Obs. Off.
6/9 6/2 7/7 8/8
Duration of Oestrus = 29-47 hours.
Times of Service and Ram = 6/2 C, 7/9 C, 7/2 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	99
Mar. 1	96
4	101
8	99
11	94
15	92
18	90
22	96
25	104
29	107
Apl. 1	110
8	98
15	106
19	-
22	107
26	-
29	109
May 3	-
6	112
10	113
13	116
17	111
20	117
~~June 3~~	
June 17	117

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 19/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 0.75	= -
Left Ovary	= 1.81	= 1

Foetus A.		Foetus B.
Weight gms. =	157.6	=
Length cms. =	17.3	=
Age days =	73	=

NOTES:-

Ewe Number = 419
Plane of Nutrition = LH

FIRST OESTRUS Date = March 23
Previous Obs. First Obs. Last Obs. Off.
23/9 23/2 24/7 25/9
Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 9
Previous Obs. First Obs. Last Obs. Off.
8/6 9/8 9/6 10/8
Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 9/8 B, 9/2 D, 9/6 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	95
Mar. 1	96
4	103
8	100
11	90
15	91
18	94
22	103
25	96
29	105
Apl. 1	106
8	109
15	111
19	-
22	111
26	-
29	114
May 3	-
6	118
10	119
13	119
17	120
20	119
~~June 3~~	
June 17	124

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 19/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 1.96	= 2
Left Ovary	= 0.72	= -

	Foetus A.	Foetus B.
Weight gms.	= 157.6	= 168.2
Length cms.	= 14.7	= 16.0
Age days	= 71	= 71

NOTES:-

Ewe Number = 159
Plane of Nutrition = LL

FIRST OESTRUS Date = March 18

Previous Obs.	First Obs.	Last Obs.	Off.
18/2	18/7	19/7	20/9

Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 3

Previous Obs.	First Obs.	Last Obs.	Off.
3/2	3/7	4/2	4/7

Duration of Oestrus = 19-29 hours.
Times of Service and Ram = 3/7 C, 4/2 A.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	117
Mar. 1	120
4	125
8	124
11	115
15	123
18	116
22	117
25	119
29	115
Apl. 1	112
8	109
15	106
19	105
22	104
26	102
29	102
May 3	103
6	105
10	115
13	116
17	118
20	120
~~June 3~~	
June 10	128

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.41	= -
Left Ovary =	1.29	= 1

Foetus A.		Foetus B.
Weight gms. =	145.3	=
Length cms. =	16.1	=
Age days =	69	=

NOTES:-

Ewe Number = 163
Plane of Nutrition = LL

FIRST OESTRUS Date = March 22

Previous Obs.	First Obs.	Last Obs.	Off.
22/2	22/7	23/2	23/7

Duration of Oestrus = 19-29 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 31 days.

SECOND OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = Silent Heat? hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date = April 22

Previous Obs.	First Obs.	Last Obs.	Off.
21/6	22/8	22/6	23/8

Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 22/8 B, 22/2 A, 22/6 D.

Duration of Dioestrous Cycle = 17 days.

FOURTH OESTRUS. Date = May 9

Date	Weight lbs.
Feb. 25	116
Mar. 1	120
4	124
8	124
11	119
15	119
18	115
22	111
25	113
29	112
Apl. 1	110
8	109
15	107
19	105
22	104
26	103
29	100
May 3	100
6	100
10	102
13	107
17	106
20	109
~~June 3~~	
June 10	119

Held to first service = No
Held to second service = -

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.76	=
Left Ovary =	0.81	=

Foetus A.		Foetus B.
Weight gms. =		=
Length cms. =	Not in lamb.	=
Age days =		=

NOTES:-

Ewe Number = 189
Plane of Nutrition = LL

FIRST OESTRUS Date = March 28
Previous Obs. 28/9 | First Obs. 28/2 | Last Obs. 29/7 | Off. 30/9
Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 20 days.

SECOND OESTRUS. Date = April 17
Previous Obs. 16/6 | First Obs. 17/8 | Last Obs. 18/8 | Off. 18/2
Duration of Oestrus = 24-44 hours.
Times of Service and Ram = 17/8 D, 17/2 E, 17/6 B, 18/8 E.

Duration of Dioestrous Cycle = 17 days.

THIRD OESTRUS. Date = May 4
Previous Obs. 4/2 | First Obs. 4/6 | Last Obs. 5/6 | Off. 6/8
Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 4/6 E, 5/2 B, 5/6 D.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	108
Mar. 1	111
4	119
8	115
11	107
15	113
18	111
22	106
25	107
29	107
Apl. 1	106
8	100
15	97
19	96
22	94
26	92
29	93
May 3	93
6	94
10	99
13	100
17	102
20	105
~~June 3~~	
July 1	114

Held to first service = No
Held to second service = Yes

DATE OF SLAUGHTER = 3/7/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.49	= -
Left Ovary =	1.04	= 1

Foetus A.		Foetus B.
Weight gms. =	57.4	=
Length cms. =	11.7	=
Age days =	59	=

NOTES:-

Ewe Number = 196
Plane of Nutrition = LL

FIRST OESTRUS Date = April 4
Previous Obs. 4/2 First Obs. 4/7 Last Obs. 5/7 Off. 6/9
Duration of Oestrus = 24-43 hours.
Times of Service and Ram = 5/9 B, 5/7 C

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	106
Mar. 1	109
4	114
8	115
11	107
15	108
18	105
22	109
25	106
29	102
Apl. 1	103
8	99
15	95
19	93
22	92
26	89
29	98
May 3	89
6	91
10	99
13	105
17	106
20	105
~~June 3~~	
July 1	120

Held to first service = Yes
Held to second service =

DATE OF SLAUGHTER = 3/7/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.87	= 1
Left Ovary =	0.32	= -

Foetus A.		Foetus B.
Weight gms. =	56.7	=
Length cms. =	12.1	=
Age days =	59	=

NOTES:-

Ewe Number = 197
Plane of Nutrition = LL

FIRST OESTRUS Date = April 7

Previous Obs.	First Obs.	Last Obs.	Off.
7/2	7/6	8/6	9/8

Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 7/7 C, 8/8 E, 8/6 E.

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	107
Mar. 1	114
4	117
8	115
11	104
15	111
18	111
22	101
25	112
29	108
Apl. 1	109
8	104
15	100
19	100
22	101
26	99
29	100
May 3	99
6	100
10	109
13	113
17	112
20	111
~~June 3~~	
June 10	118

Held to first service = Yes
Held to second service =

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 0.98	= -
Left Ovary	= 1.61	= 1

Foetus A.		Foetus B.
Weight gms. =	37.5	=
Length cms. =	9.5	=
Age days =	65	=

NOTES:-

Ewe Number = 236
Plane of Nutrition = LL

FIRST OESTRUS Date = April 4
Previous Obs. 4/2 First Obs. 4/7 Last Obs. 5/7 Off. 6/9
Duration of Oestrus = 24-43 hours.
Times of Service and Ram = 5/9 C, 5/7 B

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 21
Previous Obs. 21/2 First Obs. 21/6 Last Obs. 22/6 Off. 23/8
Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 22/8 D, 22/2 A, 22/6 E.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	129
Mar. 1	130
4	135
8	134
11	127
15	129
18	128
22	127
25	127
29	126
Apl. 1	124
8	121
15	118
19	116
22	116
26	112
29	113
May 3	110
6	110
10	113
13	118
17	117
20	118
~~June 3~~	
June 10	120

Held to first service = No
Held to second service = Yes

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 1.14	= 1
Left Ovary	= 1.10	= 1

	Foetus A.	Foetus B.
Weight gms.	= 16.2	= 21.7
Length cms.	= 6.8	= 6.9
Age days	= 51	= 51

NOTES:-

Ewe Number = 246
Plane of Nutrition = LL

FIRST OESTRUS Date = April 7
Previous Obs. 6/7 First Obs. 7/9 Last Obs. 8/2 Off. 8/6

Duration of Oestrus = 29-47 hours.
Times of Service and Ram = 7/9 C, 7/7 D, 8/8 A.

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	104
Mar. 1	108
4	111
8	113
11	102
15	110
18	105
22	104
25	105
29	105
Apl. 1	104
8	100
15	99
19	97
22	101
26	97
29	100
May 3	103
6	103
10	110
13	113
17	113
20	115
June 3	
June 3	119

Held to first service = Yes
Held to second service =

DATE OF SLAUGHTER = 6/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.45	= -
Left Ovary =	1.66	= 2

Foetus A.		Foetus B.
Weight gms. =	73.6	=
Length cms. =	12.1	=
Age days =	59	=

NOTES:-

Ewe Number = 269
Plane of Nutrition = III.

FIRST OESTRUS Date = April 4

Previous Obs.	First Obs.	Last Obs.	Off.
4/9	4/2	5/7	5/9

Duration of Oestrus = 29-48 hours.
Times of Service and Ram = 4/7 B, 5/9 C

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 21

Previous Obs.	First Obs.	Last Obs.	Off.
20/6	21/8	21/6	22/8

Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 21/8 A, 21/2 D, 21/6 B.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	122
Mar. 1	121
4	125
8	126
11	120
15	126
18	126
22	125
25	128
29	125
Apl. 1	121
8	116
15	113
19	110
22	110
26	108
29	106
May 3	108
6	110
10	116
13	119
17	119
20	119
~~June 3~~	
June 10	127

Held to first service = No
Held to second service = Yes

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.64	= -
Left Ovary =	1.23	= 1

Foetus A.		Foetus B.
Weight gms. =	27.5	=
Length cms. =	8.6	=
Age days =	52	=

NOTES:-

Ewe Number = 275
Plane of Nutrition = LL

FIRST OESTRUS Date = March 24
Previous Obs. 23/7 First Obs. 24/9 Last Obs. 24/7 Off. 25/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 10
Previous Obs. 10/8 First Obs. 10/2 Last Obs. 11/8 Off. 11/2
Duration of Oestrus = 18-30 hours.
Times of Service and Ram = 10/6 E,11/8 A.

Duration of Dioestrous Cycle = 21 days.

THIRD OESTRUS. Date = May 1
Previous Obs. 1/2 First Obs. 1/6 Last Obs. 2/6 Off. 3/8
Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 1/6 E,2/8 C,2/2 D,2/6 B.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	113.
Mar. 1	118
4	122
8	122
11	118
15	121
18	119
22	115
25	118
29	118
Apl. 1	115
8	111
15	109
19	107
22	106
26	103
29	105
May 3	103
6	105
10	108
13	110
17	111
20	111
June 3	
June 24	126

Held to first service = No
Held to second service = No

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.95	= -
Left Ovary =	0.37	= -

Foetus A.
Weight gms. =
Length cms. =
Age days =
Not in lamb.

Foetus B.
=
=
=

NOTES:-

Ewe Number = 330
Plane of Nutrition = LL

FIRST OESTRUS Date = March 16
Previous Obs. 15/7 | First Obs. 16/9 | Last Obs. 17/9 | Off. 17/2
Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 18 days.

SECOND OESTRUS. Date = April 3
Previous Obs. 3/9 | First Obs. 3/2 | Last Obs. 4/9 | Off. 4/2
Duration of Oestrus = 19-29 hours.
Times of Service and Ram = 3/2 A, 4/9 C.

Duration of Dioestrous Cycle = 17 days.

THIRD OESTRUS. Date = April 20
Previous Obs. 20/2 | First Obs. 20/6 | Last Obs. 21/6 | Off. 22/8
Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 21/8 B, 21/2 E, 21/6 D.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	96
Mar. 1	100
4	100
8	95
11	94
15	100
18	97
22	95
25	94
29	96
Apl. 1	96
8	96
15	93
19	93
22	91
26	92
29	97
May 3	93
6	95
10	98
13	101
17	98
20	101
~~June 3~~	
June 24	113

Held to first service = No
Held to second service = Yes

DATE OF SLAUGHTER = 26/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 1.23	= 1
Left Ovary	= 0.57	= -

Foetus A.		Foetus B.
Weight gms. =	123	=
Length cms. =	14.5	=
Age days =	66	=

NOTES:-

Ewe Number = 335
Plane of Nutrition = LL

FIRST OESTRUS Date = March 21

Previous Obs.	First Obs.	Last Obs.	Off.
21/9	21/2	22/9	22/2

Duration of Oestrus = 19-29 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 7

Previous Obs.	First Obs.	Last Obs.	Off.
6/7	7/9	8/2	8/6

Duration of Oestrus = 29-47 hours.
Times of Service and Ram = 7/9 D, 7/2 E, 8/8 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	109
Mar. 1	117
4	120
8	118
11	112
15	115
18	112
22	111
25	111
29	112
Apl. 1	109
8	104
15	103
19	100
22	100
26	98
29	97
May 3	97
6	97
10	101
13	106
17	108
20	109
~~June 3~~	
June 10	119

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 0.714	= -
Left Ovary	= 1.32	= 1

	Foetus A.	Foetus B.
Weight gms.	= 97.4	=
Length cms.	= 13.3	=
Age days	= 65	=

NOTES:-

Ewe Number = 346
Plane of Nutrition = LL

FIRST OESTRUS Date = March 30
Previous Obs. 30/2 | First Obs. 30/7 | Last Obs. 31/7 | Off. 1/9
Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 16
Previous Obs. 15/6 | First Obs. 16/8 | Last Obs. 17/2 | Off. 17/6
Duration of Oestrus = 30-48 hours.
Times of Service and Ram = 16/2 D, 17/8 D, 17/2 E.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	116
Mar. 1	126
4	129
8	130
11	125
15	125
18	120
22	121
25	119
29	118
Apl. 1	118
8	109
15	110
19	107
22	108
26	106
29	106
May 3	105
6	107
10	115
13	120
17	120
20	121
June 3	
May 27	129

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.92	= 1
Left Ovary =	0.89	= -

	Foetus A.	Foetus B.
Weight gms. =	9.2	=
Length cms. =	4.6	=
Age days =	42	=

NOTES:-

Ewe Number = 401
Plane of Nutrition = LL

FIRST OESTRUS Date = March 21
Previous Obs. First Obs. Last Obs. Off.
21/2 21/7 22/2 22/7
Duration of Oestrus = 19-29 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 7
Previous Obs. First Obs. Last Obs. Off.
6/7 7/9 8/2 8/6
Duration of Oestrus = 29-47 hours.
Times of Service and Ram = 7/9 D, 7/7 C, 8/8 E.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	105
Mar. 1	110
4	114
8	113
11	105
15	108
18	105
22	106
25	108
29	106
Apl. 1	105
8	102
15	97
19	93
22	95
26	92
29	94
May 3	95
6	94
10	102
13	105
17	105
20	106
June 3	114

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 6/6/50

	Weight gms.	No. of "pregnant" corpora
Right Ovary =	0.35	= -
Left Ovary =	1.30	= 1

Foetus A.		Foetus B.
Weight gms. =	58.3	=
Length cms. =	11.7	=
Age days =	59	=

NOTES:-

Ewe Number = 403
Plane of Nutrition = IL

FIRST OESTRUS Date = April 6
Previous Obs. First Obs. Last Obs. Off.
6/9 6/2 7/7 8/8

Duration of Oestrus = 29-47 hours.
Times of Service and Ram = 6/2 A, 6/7 C, 7/2 D.

Duration of Dioestrous Cycle = days.

SECOND OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	118
Mar. 1	115
4	126
8	129
11	119
15	122
18	117
22	115
25	116
29	114
Apl. 1	112
8	110
15	109
19	106
22	105
26	102
29	104
May 3	101
6	103
10	107
13	110
17	110
20	114
June 3	
May 27	115

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 29/5/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.7	= -
Left Ovary =	1.7	= 1

Foetus A.		Foetus B.
Weight gms. =	26.7	=
Length cms. =	9.4	=
Age days =	52	=

NOTES:-

Ewe Number = 407
Plane of Nutrition = IL

FIRST OESTRUS Date = March 21
Previous Obs. First Obs. Last Obs. Off.
20/7 21/9 22/9 22/2
Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 21 days.

SECOND OESTRUS. Date = April 11
Previous Obs. First Obs. Last Obs. Off.
10/6 11/8 11/6 12/8
Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 11/8 D, 11/ B, 11/6 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. First Obs. Last Obs. Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	109
Mar. 1	108
4	104
8	109
11	106
15	110
18	106
22	104
25	108
29	105
Apl. 1	105
8	104
15	101
19	98
22	101
26	97
29	100
May 3	101
6	101
10	107
13	110
17	110
20	111
June 3	
June 17	120

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 19/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	1.43	= 1
Left Ovary =	0.66	= -

Foetus A.		Foetus B.
Weight gms. =	167.8	=
Length cms. =	16.1	=
Age days =	69	=

NOTES:-

Ewe Number = 409
Plane of Nutrition = LL

FIRST OESTRUS Date = March 25
Previous Obs. 25/9 | First Obs. 25/2 | Last Obs. 26/7 | Off. 27/9
Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 10
Previous Obs. 10/2 | First Obs. 10/6 | Last Obs. 12/2 | Off. 12/6
Duration of Oestrus = 44-52 hours.
Times of Service and Ram = 11/8 D, 11/6 B, 12/8 E.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	119
Mar. 1	127
4	132
8	133
11	127
15	124
18	122
22	118
25	120
29	117
Apl. 1	114
8	112
15	108
19	106
22	105
26	103
29	102
May 3	101
6	105
10	109
13	111
17	114
20	117
~~June 3~~ June 10	127

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 12/6/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 0.74	= -
Left Ovary	= 1.24	= 1

Foetus A.		Foetus B.
Weight gms. =	73.5	=
Length cms. =	12.6	=
Age days =	61	=

NOTES:-

Ewe Number = 413
Plane of Nutrition = IL

FIRST OESTRUS Date = March 21
Previous Obs. 20/7 | First Obs. 21/9 | Last Obs. 21/7 | Off. 22/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = April 6
Previous Obs. 6/9 | First Obs. 6/2 | Last Obs. 7/7 | Off. 8/8
Duration of Oestrus = 29-47 hours.
Times of Service and Ram = 6/2 B, 7/9 E, 7/7 C.

Duration of Dioestrous Cycle = 17 days.

THIRD OESTRUS. Date = April 23
Previous Obs. 23/2 | First Obs. 23/6 | Last Obs. 24/6 | Off. 25/8
Duration of Oestrus = 24-42 hours.
Times of Service and Ram = 23/6 D, 24/2 B, 24/6 E

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	91
Mar. 1	94
4	100
8	103
11	93
15	94
18	92
22	92
25	90
29	88
Apl. 1	88
8	87
15	85
19	84
22	84
26	80
29	84
May 3	84
6	84
10	92
13	94
17	94
20	95
~~June 3~~	
July 1	103

Held to first service = No
Held to second service = Yes

DATE OF SLAUGHTER = 3/7//50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary =	0.64	= -
Left Ovary =	1.04	= 1

Foetus A.		Foetus B.
Weight gms. =	Single	=
Length cms. =		=
Age days =	70	=

NOTES:-

Ewe Number = 414
Plane of Nutrition = LL

FIRST OESTRUS Date = March 25
Previous Obs. 24/7 | First Obs. 25/9 | Last Obs. 26/2 | Off. 26/7
Duration of Oestrus = 29-48 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 11
Previous Obs. 10/6 | First Obs. 11/8 | Last Obs. 11/6 | Off. 12/8
Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 11/8 B, 11/2 E, 11/6 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =
Previous Obs. | First Obs. | Last Obs. | Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	102
Mar. 1	104
4	108
8	110
11	101
15	101
18	98
22	99
25	98
29	94
Apl. 1	96
8	94
15	92
19	89
22	90
26	86
29	87
May 3	84
6	85
10	89
13	90
17	89
20	90
June 3	
July 1	112

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 3/7/50

	Weight gms.	No. of "pregnant" corpora
Right Ovary =	0.79	= -
Left Ovary =	1.51	= 1

Foetus A.		Foetus B.
Weight gms. =	Single	=
Length cms. =		=
Age days =	83	=

NOTES:-

Ewe Number = 415
Plane of Nutrition = M.

FIRST OESTRUS Date = March 20

Previous Obs.	First Obs.	Last Obs.	Off.
19/7	20/9	20/7	21/9

Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 17 days.

SECOND OESTRUS. Date = April 6

Previous Obs.	First Obs.	Last Obs.	Off.
5/7	6/9	7/9	7/2

Duration of Oestrus = 24-43 hours.
Times of Service and Ram = 6/9 B, 7/9 D.

Duration of Dioestrous Cycle = days.

THIRD OESTRUS. Date =

Previous Obs.	First Obs.	Last Obs.	Off.

Duration of Oestrus = hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	101
Mar. 1	110
4	114
8	109
11	102
15	102
18	100
22	104
25	107
29	94
Apl. 1	93
8	88
15	86
19	86
22	89
26	86
29	87
May 3	90
6	90
10	99
13	101
17	99
20	102
~~June 3~~	
July 1	116

Held to first service = Yes
Held to second service =

DATE OF SLAUGHTER = 3/7/50

	Weight gms.	No. of "pregnant" corpora.
Right Ovary	= 1.56	= 1
Left Ovary	= 0.58	= -

Foetus A.		Foetus B.
Weight gms. =	Single	=
Length cms. =		=
Age days =	87	=

NOTES:-

Ewe Number = 421
Plane of Nutrition = IL

FIRST OESTRUS Date = March 7
Previous Obs. First Obs. Last Obs. Off.
6/7 7/9 7/7 8/9
Duration of Oestrus = 10-38 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 16 days.

SECOND OESTRUS. Date = March 23
Previous Obs. First Obs. Last Obs. Off.
23/2 23/7 24/7 25/9
Duration of Oestrus = 24-43 hours.
Times of Service and Ram =

Duration of Dioestrous Cycle = 18 days.

THIRD OESTRUS. Date = April 10
Previous Obs. First Obs. Last Obs. Off.
9/6 10/8 10/6 11/8
Duration of Oestrus = 10-38 hours.
Times of Service and Ram = 10/8 B, 10/6 D.

Duration of Dioestrous Cycle = days.

FOURTH OESTRUS. Date =

Date	Weight lbs.
Feb. 25	95
Mar. 1	99
4	105
8	104
11	99
15	101
18	98
22	100
25	91
29	100
Apl. 1	98
8	93
15	93
19	90
22	92
26	90
29	90
May 3	90
6	91
10	99
13	100
17	97
20	99
~~June 3~~	
July 1	110

Held to first service = Yes
Held to second service = -

DATE OF SLAUGHTER = 3/7/50

	Weight gms.	No. of "pregnant" corpora
Right Ovary =	1.27	= 1
Left Ovary =	0.37	= -

	Foetus A.	Foetus B.
Weight gms. =	-	=
Length cms. =	22.6	=
Age days =	84	=

NOTES:-