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# OBSERVATIONS OF LAMBING BEHAVIOUR IN EWES

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OF the lambs that are to be born in New Zealand this year, at least 2,000,000 can be expected to die before reaching the age of one month.

This may appear a pessimistic and over confident prophecy in view of the few really reliable figures obtained, but I have no doubt that if anything it is an under-estimate of the yearly casualties. Barton (1947) recently analysed the losses which occurred in a Romney flock over a period of 13 years. He found that with increasing age of the ewe, losses decreased up to the full month stage, and thereafter tended to increase. The overall loss was 8.8%. The flock in question was a stud one, so that, as he pointed out, the mortality of 8.8% indicates the death rate under favourable conditions where a high standard of shepherding obtained. Barton also noted that lambs born dead accounted for the greatest part of the mortality: relatively few deaths were recorded among lambs which survived the first three days. Clarke (1947) quotes a mortality rate of 8.15% in a grade Romney flock over a four-year period. At Ruakura neo-natal mortality last year was approximately 14%. These isolated instances all relate to losses under conditions of intensive shepherding. Losses under the less favourable circumstances, which exist in commercial flocks, are difficult to ascertain but are undoubtedly considerably higher; they are certainly not likely to be less than 10% and are probably nearer the 20% figure.

Statistics show that in New Zealand approximately 19,000,000 lambs are tailed annually. If there is a 10% mortality before tailing them approximately 2,000,000 lambs are lost to the industry; if, as is more likely, the death rate is nearer 20%, the loss is of quite gigantic proportions and I need not stress the importance of such mortality to the industry and to the country.

I have mentioned the paucity of reliable information concerning the extent of the mortality in commercial flocks. It is unfortunate that even less data are available relating to the causes of the losses occurring. As already indicated, however, most of the losses are due to lambs which are either born dead or die within a few days of birth.

It was for this reason that, at Ruakura last year, we decided to focus attention rather closely upon this short period. We sought to obtain, by the continual observation of a flock of ewes during lambing at least some factual data about the process of parturition in the ewe; this in the hope that perhaps some information might emerge relating to the causes of any deaths which might occur among the lambs. The study was regarded as of a preliminary nature—we commenced it hopefully but not optimistically.

## Experimental Animals.

The experimental animals consisted of 231 flock ewes. They were Romneys, and the majority had been tupped by Romney rams and the remainder by Southdown rams. The ewes were of mixed ages and comprised 61 two-year-olds, 42 three-year-olds, 21 four-year-olds, 35 five-year-olds and 72 six-year-olds.

## **Experimental Procedure.**

The experimental procedure consisted essentially of keeping each ewe under close observation from the time she displayed the first sign of uneasiness before lambing commenced, until the process of parturition was completed and the ewe had voided the placental membranes, and had been suckled by the lamb or lambs. While being watched the following observations were made:—

- (a) Time the ewe displayed the first sign of uneasiness.
- (b) Time of bursting of water bag.
- (c) Time labour commenced.
- (d) Time lamb or lambs first seen.
- (e) Time lamb was expelled.
- (f) Whether the lamb was alive or dead when expelled.
- (g) Whether the lamb was born enveloped in or clear of the foetal membranes.
- (h) Whether or not assistance was rendered during the course of the delivery.
- (i) The manner in which the lamb was presented at delivery.
- (j) Time lamb arose upon all four feet.
- (k) Time lamb first suckled.
- (l) Whether lamb suckled strongly or weakly.
- (m) Whether the mothering ability of the ewe was good, average or poor.

After each ewe had been suckled, her lamb was weighed, its sex determined and an identification tag placed in one ear. The udder of the ewe was then examined and her milk supply classified as good, average or poor; her teats as large, medium or small, and the ease with which she could be milked was assessed as easy, medium or difficult. Finally any abnormalities of the udder were noted. Usually the last observation to be taken was the time at which she voided the placental membranes.

Ewes which lambed during hours of daylight were watched in the paddock; those which lambed at night were housed in a large shed. While lambing in the shed, each ewe occupied a separate pen in order that the necessary observations could be taken easily. At first it was left to the shepherd in charge of the flock to draught out each evening those ewes which he expected would lamb over night and these were transferred to the shed at dusk. This system proved unsatisfactory as quite a number of ewes not thought by the shepherd to be close to parturition, lambed unobserved at night in the paddock. In consequence, after the first few days, ewes to be watched overnight were selected upon the basis of their tupping dates. As each ewe achieved the 145th day of gestation she was admitted to the shed each night until she lambed. This method proved most satisfactory and after its adoption comparatively few animals lambed unobserved. It did mean, however, that many ewes were subjected to quite a lot of droving, handling and shedding within the few days before they lambed.

## **EXPERIMENTAL RESULTS.**

### **(a) Parturition Phenomena.**

When we come to consider the variation which existed between different ewes in respect to the time which elapsed between observation of the first sign of uneasiness, the bursting of the "water bag," the commencement of labour, or the first sight of the lamb at the vulva, and the actual birth of the lamb, the fact that many of the ewes were assisted to lamb must constantly be borne in mind. Obviously ewes which were given assistance lambed rather sooner than they would otherwise have done, thereby shortening the time intervals under consideration.

(1) Interval elapsing between time ewes first displayed uneasiness and and time lamb expelled.

Very considerable variation existed between individual ewes in respect to the length of time before lambing that symptoms of uneasiness were observed, and also in respect to how definite these symptoms were. In quite a number of ewes no sign of uneasiness whatever was noticed prior to the appearance of the water bag. Usually, however, ewes about to lamb would become markedly restless, frequently lying down, standing up or turning round in their pens and often pawing their straw bedding in a manner reminiscent of sows about to farrow. Some would display very marked interest in the newly-born lambs of other ewes.

TABLE I.

Interval elapsing between time ewes first displayed uneasiness and time lamb expelled.

Time Interval (hours)	No. of Ewes	% of Ewes
0 - 1	85	40
1 - 2	64	30
2 - 3	32	15
Over 3	31	15
Total	212	100

From Table I. it may be seen that 40% of the 212 ewes for which complete data were obtained, displayed no sign of uneasiness until within an hour of the time they delivered their lambs, while 30% and 15% respectively were first uneasy within 1-2, and 2-3 hours before lambing. In only 15% of the ewes were symptoms of uneasiness detected more than three hours before lambing. The data also revealed that the older ewes (5 and 6 years) tended to give rather less warning of the approach of parturition than did the younger animals: thus of 116 ewes of 2, 3 or 4 years of age, only 34% lambred within an hour before the first symptoms appeared, whereas 47% of 96 4 and 5-year-olds did so.

TABLE II.

Interval elapsing between time ewes first displayed uneasiness and time lamb expelled in relation to age of ewe.

Time Interval (hours)	No. of Ewes		% of Ewes	
	2, 3, & 4 year olds	5 & 6 year olds	2, 3, & 4 year olds	5 & 6 year olds
0 — 1	40	45	34	47
1 — 2	37	27	32	28
2 — 3	21	11	18	12
Over 3	18	13	16	13
Total	116	196	100	100

In analysing the data for ewes with twins the interval considered was that between the time uneasiness was first noticed and the time the first lamb was expelled.

(2) Interval elapsing between time of bursting of water bag and and time lamb expelled.

As in the case of first uneasiness, data relating to the time of bursting of the "water bag" was not secured for all ewes. In many cases the water bag burst before it became visible: in such cases, its rupture was very apt to pass unnoticed or to be confused with the process of urination. In some cases, the times recorded relate to the rupture of the chorion and allantois—but in other cases they

undoubtedly refer to the release of the amniotic fluids. In still other cases both these events probably occurred simultaneously. For these reasons the data for the "water-bag" cannot be considered satisfactory, but in order to help provide a general picture of the whole process of parturition, the relevant data are summarised below:—

TABLE III.

Interval elapsing between time of bursting of "water-bag" and time lamb expelled.

Time Interval (Hours)	No. of Ewes	% of Ewes.
0 — $\frac{1}{2}$	67	36
$\frac{1}{2}$ — 1	51	27
1 — 2	40	22
Over 2	28	15
Total	186	100

It will be noted that in rather more than a third of the ewes the "water-bag" burst within the half hour before they expelled their lambs and that in the vast majority of cases it burst within the hour prior to delivery.

(3) Interval elapsing between onset of labour and delivery of lamb.

Symptoms of labour were much more marked in some ewes than in others, and in some cases were so slight as to pass unnoticed.

TABLE IV.

Interval elapsing between onset of labour and delivery of lambs.

Time Interval (Hours)	No. of Ewes	% of Ewes
0 — $\frac{1}{2}$	63	36
$\frac{1}{2}$ — 1	63	36
1 — 2	31	18
Over 2	16	9
Total	173	99

Approximately 72% of the 173 ewes for which data were secured, were first seen in labour during the hour prior to the time of delivery; only 27% commenced labour more than an hour before their lambs were born. More than a third of the ewes were first seen in labour a half hour or less before they lambed.

(4) Interval elapsing between appearance and delivery of lambs.

There was tremendous variation between the ewes in this respect.

TABLE V.

Interval elapsing between appearance and delivery of lambs.

Time Interval (minutes)	No. of Ewes.	No. of Ewes assisted.	% of Ewes lambing during each interval.
0 — 15	79	16	37
16 — 30	58	23	28
31 — 60	46	25	22
Over 61	28	22	13
Total	211	86	100

It will be noticed that a high proportion of the ewes (37%) delivered their lambs within 15 minutes of their being seen at the vulva, but that 28 cases were recorded where the lambs were not

delivered for an hour or more after this. There was naturally a strong tendency to assist those ewes whose lambs had been visible for a considerable period and actually of these 28 ewes, 22 were assisted to lamb. In the course of the investigation the longest interval which elapsed between a lamb being seen and its unassisted birth was one hour and forty-five minutes. This lamb was born dead, but other unassisted lambs were delivered alive after intervals ranging up to one hour forty minutes. Quite a number of lambs which were finally assisted away and born alive, had been visible for even longer periods—two to three hours—before assistance was given. Unfortunately in such cases, it was impossible to say whether such lambs would have been born alive had they been unassisted.

#### (5) Time of lambing.

Lambings were spread fairly evenly throughout the 24 hour period although there is a suggestion that more ewes tend to lamb between midnight and 4 o'clock in the morning than during any of the other four hour periods.

TABLE VI.  
Time of lambing.

Period	No. of Ewes which lambed.	% of Ewes which lambed.
12.00 a.m. — 4.00 a.m.	50	22
4.00 a.m. — 8.00 a.m.	34	15
8.00 a.m. — 12.00 a.m.	32	14
12.00 a.m. — 4.00 p.m.	42	18
4.00 p.m. — 8.00 p.m.	35	15
8.00 p.m. — 12.00 p.m.	37	16
Total	230	100

This finding is of interest in view of the belief held by some farmers that the vast majority of ewes lamb during the night.

#### (6) Type of Presentation.

In Table VII, the lambs whose births were observed have been classified according to the type of presentation. Approximately 70% of the lambs were delivered in what may be regarded as the correct manner, with head and both fore feet appearing together. Of the remaining 30% which were mal-presented—the majority, accounting for 18% of all lambs born, were expelled with one fore foot retained. Another fairly common type of mal-presentation was that in which the head was presented alone, with both fore feet retained. This type accounted for 6.5% of all lambs born.

TABLE VII.  
Classification of births according to type of presentation.

Type of Presentation	No. of lambs.	% of lambs.
1. Anterior. Head and fore feet presented together	191	69.5
2. Anterior. Head and one fore foot—the second fore foot retained	49	17.8
3. Anterior. Head alone—both fore feet retained	18	6.5
4. Anterior. Fore feet alone—head retained	2	0.7
5. Breach—both hind legs retained	7	2.5
6. Posterior—lamb lying right way up and both hind feet presented	2	0.7
7. Posterior—lamb lying upside down	1	0.4
8. Other types	5	1.8
Total	275	100

(7) Time Taken by lamb after birth to get up upon all four feet.

This interval was recorded as a measure of the vitality of the lamb. It could be determined fairly accurately. Probably some of the lambs born in the shed would have stood up sooner had they been in the paddock—the confined space, the straw bedding and the disturbances of the ewes were not helpful. Under the conditions prevailing, however, about 30% of the lambs arose within a quarter of an hour of being born and by the end of half an hour over 70% had stood up.

The time taken by a lamb to stand up after birth was regarded as the best available indication of vigour and was related to various factors of possible significance. There appeared, however, to be little or no relationship between vigour and sex, type of birth, age of ewe, birth weight, type of presentation, times between first uneasiness and birth, onset of labour and birth, and first appearance of lamb and birth.

(8) Time elapsing after birth before lamb suckled.

It was frequently difficult to determine accurately the time at which a lamb first suckled, but the data obtained on this point are considered as satisfactory as could be expected. The results are summarised in Table VIII. Single and twin lambs were treated separately in order to see whether differences existed.

TABLE VIII.  
Time elapsing after birth before lamb suckled.

Time Interval (Hours)	Singles		Twins	
	No.	%	No.	%
0 — $\frac{1}{2}$	39	24	15	18
$\frac{1}{2}$ — 1	65	39	33	40
1 — 2	44	27	22	26
Over 2	17	10	13	16
Total	165	100	83	100

Lambs most commonly suckled from  $\frac{1}{2}$  to 1 hour after birth. There is a slight suggestion that twin lambs tend to be somewhat more tardy in suckling than are single lambs, but greater numbers would need to be observed to confirm this.

(9) Time of voiding of the placenta.

Table IX shows the proportion of ewes which expelled their after-birth during successive hours after birth. The placenta was most commonly voided between 2 and 3 hours after lambing. Of the 11 ewes which "cleaned" with an hour of birth, six represented cases where the placenta came away with the lamb. Naturally all such lambs were born dead.

TABLE IX.  
Time elapsing after birth before voiding of placenta.

Time Interval (Hours)	No. of Ewes	% of Ewes
0 — 1	11	6
1 — 2	21	11
2 — 3	91	50
3 — 4	45	24
Over 4	16	9
Total	184	100

(10) The mothering ability of the ewe.

Each ewe was graded rather arbitrarily as being a good, medium or poor mother. There was a distinct tendency for young ewes (2 and 3 year olds) to grade lower for mothering ability, this despite a possible inclination on the part of the observer to make allowance for 2-teeths when assigning a grade. Also ewes which took over an hour to expel their lambs after they were first sighted tended to be graded as poorer mothers. There can be little doubt that prolonged labour and consequent fatigue may cause a ewe to take little notice of its lamb for a period after delivery.

TABLE X.

Relationship between mothering ability and time elapsing between appearance of lamb at vulva and birth.

Time Interval (Mins.)	Good Mothers (No.)	Medium Mothers (No.)	Poor Mothers (No.)	Med. & Poor Mothers as % of all ewes.
0 — 15	48	26	3	38
16 — 30	32	22	2	43
31 — 60	27	15	2	39
Over 61	12	12	1	52

(11) Udder abnormalities.

Thirteen of the 231 ewes examined, were classed as having udder abnormalities. Of these, three had little or no milk, eight had one blind or dry quarter, three of which had obviously resulted from shearing cuts, one had extremely large teats, and one had a very pendulous udder. The importance of examining the udders of ewes at culling time is emphasised by these results.

B. Lamb mortality.

(1) Mortality in relation to age of lamb.

Of the 283 lambs born during the course of the investigation, 37 died either before or at the time of birth, or during the first month of post natal life. In Table XI. these deaths have been summarised according to the stage at which they occurred.

TABLE XI.

Mortality in relation to stage at which it occurred.

	No. of lambs.	% of all lambs born.
Born dead .... .... .... ....	20	7.1
Died during first week .... ....	7	2.5
Died between 7 and 28 days ....	10	3.5
Total ....	37	13.1

(2) Mortality in relation to causes.

The lambs which were born dead and which died after birth, have been further classified according to the probable cause of death.

TABLE XII.  
Mortality in relation to causes.

(1)	<b>Lambs born dead.</b>	
a.	Milk fever	8
b.	Other lambs obviously dead appreciable time before birth	3
c.	Lambs born dead but not putrid	9
	Total	20
(2)	<b>Lambs which died in first week.</b>	
a.	Drowned	1
b.	Died in storm	2
c.	Unsound udders	2
d.	No apparent cause	2
	Total	7
(3)	<b>Lambs which died between 1 and 4 weeks of age.</b>	
a.	Accidental deaths	5
b.	Dam difficult to milk	1
c.	Dam had milk fever	1
d.	No cause assigned	3
	Total	10

Of the 20 lambs which were born dead, 8 represented 4 sets of twins from ewes which contracted milk fever from 2-4 days before lambing and at stages of pregnancy ranging from 4-9 days before their anticipated lambing dates, 147 days after tupping. In some of these cases the lambs were born putrid, and in all, the placenta were delivered with the lambs and were highly decomposed.

A further 3 lambs had obviously been dead some time before birth. One of these was a single lamb from a ewe with no teeth which was in a very weak and emaciated condition. The lamb had to be dismembered before removal. Another was a single lamb from a ewe with a very small vagina with a hymen present—this lamb was a breach presentation. The third was mate to a viable twin and which was presented with one fore leg bent back.

Of the remaining 9 lambs which were born dead but not putrid, one was probably dead some time before delivery. The gestation length was 152 days, the lamb was presented head alone and the placenta came away with the lamb. The second was a twin lamb removed from the uterus of a dead ewe, the uterus of which, was ruptured in the process of being assisted with the delivery of her first lamb. Two others were difficult and protracted deliveries by 2-tooth ewes—one a 10.4lb. lamb presented normally—the other a 9.0lb. lamb presented fore feet alone. One other was a very small twin lamb weighing 5.0lb., which was the second of a twin pair to be expelled after assistance had been given during a very protracted parturition. Another three were head alone presentations which resulted in difficult deliveries—one of these was a twin from a ewe which contracted milk fever two days before lambing. The last case was a large 12.0lb. lamb presented with one fore foot back and not given assistance.

Of the 7 lambs which died during the first week, one was drowned and 2 died during the course of a storm during the first day after lambing. Two others belonged to ewes which had udders one "quarter" of which was unsound. The other two deaths had no cause assigned.

Of the ten lambs which died between one and four weeks of age, 5 met with accidental deaths—4 were drowned in drains and one disappeared down a hole. One belonged to a dam noted as being very

difficult to milk and one belonged to a ewe which had milk fever and which died a day after the lamb. Three had no cause assigned.

In Table XIII an attempt has been made to summarise the overall mortality picture.

TABLE XIII.  
Mortality in lambs during first month.

Cause or category.	No. of deaths.	Deaths as % of all lambs born.
Milk Fever .... .... .... .... .... ....	8	2.8
Dead before birth .... .... .... .... ....	3	1.1
Malpresentations and difficult deliveries	8	2.8
Unsound udders .... .... .... .... ....	3	1.1
Death of ewe .... .... .... .... ....	2	0.7
Accidental deaths .... .... .... .... ....	6	2.1
Storm .... .... .... .... ....	2	0.7
No apparent cause .... .... .... .... ....	5	1.8
Total .... ....	37	13.1

(3) Mortality in relation to age of ewe.

The number of animals involved in the investigation was insufficiently large to throw any light upon this question.

(4) Mortality in relation to type of presentation.

The case histories already detailed make it clear that a high proportion of neo-natal deaths are associated with mal-presentations and consequent prolonged deliveries. This is further brought out in Table XIV.

TABLE XIV.  
Mortality in relation to types of presentation.

Type of Presentation.	No. of lamb deaths.	Total births.	% Deaths.
1. Anterior—Head and fore feet together .... ....	2	191	1.1
2. " —One fore foot retained .... ....	5	49	10.2
3. " —Both fore feet retained .... ....	4	18	22.2
4. " —Head retained .... ....	1	2	50.0
5. Posterior—Right way up and both feet presented .... ....	0	2	0.0
6. " —Both legs retained .... ....	1	7	14.3
7. " —Lamb upside down .... ....	0	1	0.0
8. Other types .... .... .... ....	0	5	0.0
Total .... ....	13	275	4.7

Normal presentations, i.e., those with head and two fore legs together accounted for about 70% of the total births and included 2 lambs born dead, which represented approximately only 1% mortality among lambs born in this fashion. The remaining types of presentation, classed as "abnormal" represented 30% of the total births and included 11 deaths representing a 13.1% mortality. It is difficult to determine how many lambs which were assisted would otherwise have died at birth, but it is reasonable to suppose that a proportion was saved. On the other hand the possibility that the number of mal-presentations was increased by the frequent handling of the ewes before and during the experiment cannot be overlooked.

(5) Mortality in relation to birth weight.

The average birth weight was 9.5lb. and the distribution of the birth weights of dead lambs was essentially the same as for lambs born alive. There was no indication of a greater chance of death for lambs of either high or low birth weight, but the numbers involved were really insufficient for study of this factor.

### C. Reasons for Giving Assistance.

Altogether 119 lambs representing 42% of the 283 born were assisted at birth. These have been classified according to the reason why help was given.

TABLE XV.  
Assistance to ewes at lambing.

Reason for giving assistance	No.	% of Total Assisted
Tight fit	38	32
Malpresentation	63	53
Other reasons	18	15
Total	119	100

It will be seen that more than half the lambs assisted were mal-presentations and approximately one third were normal presentations, which gave rise to "tight fits." The fact that the incidence of mal-presentations was 53% among assisted lambs and only 12% among un-assisted lambs shows very clearly that mal-presentations result in difficult deliveries.

Approximately the same percentage of lambs was assisted irrespective of age of their mothers. However, as 2-tooth ewes produced fewer sets of twins than did the older animals, a rather higher proportion of 2-tooth ewes was actually assisted. In the same way, while a higher proportion of single than twin lambs was assisted (45% as compared with 37%), a slightly greater percentage of the ditokous ewes was helped.

### Summary and Discussion.

We have now reached the stage where it is legitimate to pose the question "What useful findings, if any, have come out of this investigation?"

Interest, perhaps, centres mainly upon the subject of lamb mortality. In this connection results have frankly been disappointing. Despite the ewes being kept under constant observation and despite their having been given assistance in lambing whenever such assistance was considered helpful, there was a disappointingly high lamb wastage at the time of birth and also during the first month thereafter—the excessive handling to which the ewes were subject may have been a contributing factor: it is certainly considered that the lamb deaths which resulted from ewes which contracted milk fever can fairly be ascribed to this cause.

While we do not pretend to have encountered all the types of lamb mortality which exist in New Zealand or indeed to have thrown much light upon the relative importance of the various causal factors, yet we do claim to have made some useful contribution in that our results emphasise the point that there is not one single clearly defined problem that is involved in the question of neo-natal lamb mortality. The picture presented is one of many minor causal factors each contributing their small but quite significant share to the heavy over all mortality. For this reason there can not be one single easy preventive measure against lamb mortality. Rather in any attempt to reduce mortality the approach must be one of careful and sustained attention to many things. Losses due to such complaints as milk fever and sleepy sickness are preventable by the adoption of good husbandry methods before and during lambing; losses due to accidental deaths can be minimised by such measures as the fencing off of drains, the covering of water troughs, and the filling in of holes; losses due to inclement weather at lambing time can be tackled from both the long and short term points of view—by providing more and better shelter belts and by more intensive shepherding. Losses due to udder abnormalities can be largely eliminated by careful attention to this point at culling time; losses

due to blood poisoning may be largely controlled by vaccination; losses due to mis-mothering may be reduced by more careful shepherding as may also those due to mal-presentation and difficult deliveries. Obviously much can be done; equally obviously much is likely to be left undone—this in view of the conditions prevailing upon New Zealand sheep farms, where the amount of shepherding assistance at present available and likely to be available in the future is definitely limited and from an obstetric point of view only semi-skilled.

Finally, have we perhaps tended to lose the true perspective of our problem since we started counting our dead lambs? Admitted that lamb mortality is high—but is it unduly high?—or even relatively high as compared with that in other classes of live stock. I do not think so. Of 574 calves born at the two main dairies at Ruakura during the last 3 years 6.8% were born dead. Of 716 pigs born at the Ruakura piggery during the last two years 8.4% were born dead. These figures take no account of losses after birth and compare very neatly with the 7.1% for lambs born dead in our investigation.

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## Discussion on Dr. Wallace's Paper

Mr. HUNT: I note that none of the deaths were attributed to pulpy kidney.

Dr. WALLACE: As far as that is concerned I mentioned that I did not think we encountered all the causes that one comes across in the industry. It just so happened we did not get any of those losses in the particular flock we were concerned with.

Mr. HUNT: No precaution was taken to prevent it?

Dr. WALLACE: No.

Mr. SIMPSON: In Manutuke this last season we kept 250 ewes under observation. Actually we did not have tupping details as Dr. Wallace did and it was purely guess work on our part in picking whether a ewe was going to lamb. We saw about 177 lambs born and we missed about 92. Of the 177 born, 5 were born dead. They were simply mal-presentations—I think they were born with the head and perhaps one leg forward, and even when the ewe was assisted, the lambing was generally prolonged and it died perhaps an hour after birth. In the 90 odd that were lambed out in the paddock roughly 15 per cent. were born dead. Observation of the position of the lamb when found indicated that about 50 per cent. of those lambs were malpresented. The other deaths were through protracted lambing and membranes over the nose preventing the lungs from inflating. One thing I am interested in is that Dr. Wallace gives the average weight of lambs at 9.5lb. The average weight of all our lambs at Manutuke was 11 lb. Of the lambs that were assisted with the normal type of presentation the average

was 11½ lb. It appeared to me as though that extra half pound weight probably caused a bit of the trouble. In the case of ewes with large teats several of the lambs could not get them into the mouth unless they were assisted or unless the teat was milked out and deflated. The lamb was then able to get the teat into its mouth. In the case of ewes with small teats we found the lamb could not get hold of it as the teat wobbled. Dr. Wallace was talking about the culling of the ewes. I feel perhaps if that was done at lambing time we might be getting somewhere in that we would be cutting out those ewes with small teats, large teats and an odd one where the teat is jammed up against the leg and the lamb cannot get hold of it. The mothering ability of the ewe is rather interesting, I think. We found one or two ewes that were classified as good mothers. They were so good that they would not let the lamb drink; they just simply licked and nuzzled the lamb every time it went to drink. She did not attempt to run away. We had to tie the ewes up against the fence or in the shed to let the lambs drink. I do not know whether Dr. Wallace had any experience of that happening at Ruakura.

Mr. ROACH: In looking at the fundamental, I think any line of research is pathological, we come up against the fact that we do not know enough about the fundamentals. Most of it is based on hearsay. I would like to emphasise what Dr. Wallace has said in that it is more an experiment to observe lambing behaviour than to collect data on lambing. I feel the only experiment that could be designed to get the figures on lambing losses would be the technique Hancock used in observing his twins. In this present case, however, the observations would definitely interfere with the lambing. I would like to ask Dr. Wallace one or two questions. Certain animals do not like to be observed during parturition. When a cow is in a field she will spend a lot of time trying to find somewhere where you cannot see her. Is there any suggestion that some similar psychology was present with the ewes here? Similarly, Dr. Wallace refers to the lambing percentage at night between 12 and 4 a.m. He created an artificial day so that the experiment cannot be comparable with natural lambing and he must naturally have had a number of observers all presumably new to the job. How were the observations standardised? Would not the observers tend to become more critical with experience? I notice in the deaths between 0 and 7 days there are only two classified as being of no cause. In other words it would appear that ewes' milk, and good mothering, does not have any substantial relationship whatsoever to lambing losses. Losses appear to be due mainly to accidents. Were these lambing losses compared with losses in other animals? Has Dr. Wallace access to any data in relation to similar situations, say, as to highland farming in Scotland or lowland farming in other countries?

Dr. WALLACE: There is one point dealing with the psychology of the ewe. I would not like to say anything about that at all. Of course, it is inevitable that in any study of this nature one would have to be within distance of the ewes and hence would be likely to disturb them to some extent. Mr. Roach is quite right that there had to be lighting for ewes at night, and I am in no better position than he is to say whether that influences the numbers born at different times. I think I am right in saying that Mr. Roach rather thought that none of the deaths occurring had been due to udder normalities. That is not quite true. Of the lambs which died in the first week two were thought to be due to the unsound udders of the ewes. There were cases among those that died between one and four weeks thought to be due to the ewes being particularly difficult to milk. I have no information on percentage losses in other parts of the world for similar breeds. I think the losses we sustain in New Zealand are undoubtedly higher than sheepherds hope to get under better conditions.