

THE BEHAVIOUR OF SHEEP AT LAMBING

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ABSTRACT

A study was made of the lambing behaviour of sheep in North Sumatra. A total of 323 lambings of Sumatra, Virgin Island, and crossbred Barbados Blackbelly, Java Fat-tail and Virgin Island ewes were observed.

The duration of lambing from first observed straining to the birth of the first lamb was less than 40 minutes for the majority of ewes. In almost half the lambings the first lamb was standing within 20 minutes of birth, and in 60% of cases was suckling within 40 minutes of birth.

Immediately after lambing most lambs lay on the ground and shook their heads. Almost all ewes expressed an interest in their newborn lambs and licked them. When the lamb first stood and tried to reach the udder the majority of ewes nuzzled the lamb's tail and presented the udder.

Age of ewe had a significant effect on behaviour ($P < 0.05$). Births were quicker for multiparous ewes than primiparous ewes. Multiparous ewes were more helpful to the lamb when it was trying to suckle, were less likely to move away when the lamb was being weighed, more readily followed when the lamb was carried and were less nervous when a person approached.

There were no significant effects of litter size on behaviour. The breed types with the best behaviour characteristics were Sumatra-Barbados Blackbelly and Sumatra-Virgin Island crossbreds, but breed differences were small compared with the effects of age of ewe

Several of the behaviour variables were interrelated. Where birth was quick the lamb was more lively and stood more quickly. Time to suckle was shorter when the lamb had been vigorously licked by the ewe, when the lamb was quick to stand and when the ewe nuzzled the lamb's tail and presented the udder.

There was some indication that desirable behaviour at lambing leads to increased lamb survival, but this trend was not statistically significant.

TINGKAH LAKU DOMBA YANG SEDANG BERANAK

Ruth M Gatenby, Aron Batubara dan M Doloksaribu

ABSTRAK

Penelitian dilakukan untuk mengetahui tingkah laku induk domba yang sedang beranak di Sumatera Utara. Pengamatan dilakukan terhadap 323 ekor anak domba dari bangsa Lokal Sumatra, Virgin Island, dan persilangan Barbados Blackbelly, Ekor Gemuk dan Virgin Island.

Induk domba saat melahirkan anak pertama mulai dari tanda mau melahirkan sampai anak lahir memerlukan waktu kurang dari 40 menit. Hampir setengah dari anak yang pertama dilahirkan membutuhkan waktu 20 menit untuk dapat berdiri, dan 60% dari anak dapat menyusu 40 menit setelah dilahirkan.

Segera sesudah dilahirkan kebanyakan anak domba terbaring di lantai beberapa saat, dan kemudian menggeleng-gelengkan kepalanya. Hampir seluruh induk mencurahkan perhatian pada anaknya yang baru lahir dan kemudian menjilatinya. Ketika anak berdiri untuk pertama kali dan kemudian mencoba mencapai ambing, kebanyakan induk menyentuh ekor anak dan memberikan ambingnya.

Umur induk berpengaruh nyata terhadap tingkah laku ($P < 0.05$). Kelahiran akan cepat berlangsung pada induk yang telah beranak beberapa kali dibandingkan dengan induk yang baru beranak sekali. Induk yang telah beranak beberapa kali lebih banyak menolong anaknya jika anak tersebut mencoba untuk menyusu, tidak ketakutan ketika anak sedang ditimbang, kemudian mau mengikuti anak ketika dibawa dan tidak gelisah ketika seseorang mendekatinya.

Litter size tidak berpengaruh nyata terhadap tingkah laku. Type bangsa domba yang mempunyai sifat tingkah laku yang baik adalah persilangan Lokal Sumatra dengan Barbados Blackbelly dan persilangan Sumatra dengan Virgin Island, tetapi pengaruh perbedaan bangsa ini hanya sedikit bila dibandingkan dengan pengaruh umur induk.

Ternyata beberapa variabel tingkah laku saling berhubungan satu dengan yang lain. Anak yang cepat dilahirkan akan sangat lincah dan berdiri sangat cepat. Waktu yang diperlukan anak untuk pertama menyusu akan lebih singkat jika anak tersebut segera dijilati induknya, anak domba segera mampu berdiri, dan induk segera mendorong ekor anak dan memberikan ambingnya.

Kenyataan diatas mengindikasikan bahwa tingkah laku induk domba yang sedang beranak cenderung meningkatkan kelangsungan hidup anak domba meskipun tidak berbeda nyata secara statistik.

INTRODUCTION

At Sei Putih we are evaluating the productivity of local Sumatra sheep and their crosses with Virgin Island, Barbados Blackbelly and Java Fat-tail sheep integrated into rubber plantations. Casual observation led us to believe that there may be some differences between the genotypes in behaviour.

The grazing behaviour of sheep and their behaviour at lambing can affect production. Therefore we decided to evaluate grazing behaviour and lambing behaviour. A study of grazing behaviour by Hoogerwerf et al (1993) found that behaviour was similar for all genotypes when they were grazed together in one flock.

The purpose of the work reported here was to describe the behaviour of sheep at lambing, to compare the lambing behaviour of various genotypes and to make management recommendations based on an understanding of behaviour.

METHOD

This study was carried out in the Suka Dame flock of sheep at the Research Institute for Animal Production, Sei Putih, North Sumatra during the lambing seasons of June-July and September-October 1993.

Before the June lambing season eight staff at Suka Dame were given instructions on how to undertake the study. They filled in a questionnaire for each ewe which lambed, but only those details they personally observed. No data were collected during the night and at other times when recording staff were not present.

The questionnaire used in June and July is shown in Table 1. A slightly modified version was used in September and October. There were a total of nine questions relating to ewe and lamb behaviour. The first six related to behaviour during lambing, and the final three to behaviour when the ewes and lambs were subjected to normal post-natal activities in the sheep house.

Data were collected during two lambing periods from June 9 to July 18 and from September 4 to October 16. They were entered onto the computer using Lotus 1-2-3, and analysed using SAS.

Table 1. Questionnaire used in June. For an English translation of the September questionnaire see Table 4.

LAMBING BEHAVIOUR, JUNE-JULY 1993

Nomor induk

Nama orang

1. Waktu lahir, setelah induk mulai merejan, berapa lama sampai anak dilahirkan
 - kurang dari 20 menit
 - 20 menit s/d 1 jam
 - lebih dari 1 jam
 - tidak tahu
2. Sesudah anak lahir, bagaimana keadaan anaknya
 - tidur diam saja
 - geleng kepala
 - lincah sekali
3. Sesudah beranak, apakah induk menjilati anak
 - tidak sama sekali
 - pelan-pelan
 - dengan semangat
4. Setelah anak dilahirkan, berapa lama sampai anak berdiri
 - kurang dari 10 menit
 - 10 s/d 30 menit
 - lebih dari 30 menit
5. Waktu anak mulai berdiri dan mencari ambing, bagaimana sikap induk
 - menanduk / menyruduk anak
 - jalan-jalan sehingga anak tidak bisa menyusui
 - berdiri saja
 - berdiri dan membantu anak dengan mencium ekornya
6. Setelah anak dilahirkan, berapa lama sampai anak menyusui
 - kurang dari 10 menit
 - 10 s/d 30 menit
 - lebih dari 30 menit
7. Waktu anak ditimbang, bagaimana sikap induk
 - jalan dari tempat sebab gelisah
 - berdiri saja / diam
 - perhatian besar kepada anak
8. Waktu mengantarkan anak dari tempat lahir ke tempat khusus untuk anak, bagaimana sikap induk
 - susah dan tidak mengikuti anak
 - ikut pelan-pelan tetapi agak takut pada orang
 - gampang ikut
9. Di tempat khusus untuk anak, jika seseorang mendekati, bagaimana sikap induk
 - berdiri saja
 - sedikit takut
 - takut sekali
 - marah, hentak-hentak kaki

Catatan:

Genotypes

The breed types studied were

S Sumatra
H Virgin Island (plus 75% and 87% backcrosses)
B1 Barbados Blackbelly x S, first generation
E1 Java Fat-tail x S, first generation
H1 H x S, first generation
HC H x S, second and subsequent generations

Each ewe was individually identified and had been mated to a ram of the same breed, so the genotypes of lambs born were uniform within each breed group.

RESULTS AND DISCUSSION

In June and July a total of 148 lambings were observed. The data collected from these animals were analysed and the questionnaire was modified for the September-October lambing season. Only three questions were changed, numbers 1, 4 and 6. This was to give a more even distribution of animals among the time categories and thus give better discrimination of behaviour.

In September and October a further 175 lambings were observed, and recording staff accompanied the flocks to the grazing area each day to get more complete data for each animal.

The analyses presented here are for all 323 ewes, but omitting the data collected in June and July for variables 1, 4 and 6.

The numbers of lambings observed are shown in Table 2. More than half the ewes had been born in 1992 and were lambing for the first time; in Table 2 and subsequently these are classed as "Primiparous" ewes. The B1 and E1 ewes were all primiparous, but the other breed types were both primiparous and multiparous.

Table 2. Numbers of ewes observed

	Breed type						All
	S	B1	E1	H1	HC	H	
Primiparous	36	26	43	54	19	10	188
Multiparous	62	0	0	35	25	13	134
Total	98	26	43	89	44	23	323

Litter size ranged from 1 to 4 lambs (Table 3). Two litter size categories were used in the analyses, "Single" and "Multiple". The lambs born in multiple litters were smaller than those born as singles.

Table 3. Litter size and birth weight

<u>Litter size</u>	<u>Number of ewes</u>	<u>Percentage of ewes</u>	<u>Mean birth weight of lambs (kg)</u>
1	207	64.1	2.4
2	99	30.7	1.8
3	15	4.6	1.5
4	2	0.6	1.3

A summary of the data is presented in Table 4. Although there were a total of 323 ewes in this study not all were observed during the complete lambing process.

Duration of lambing

The data for variable 1 (Table 4) show that in the majority of lambings, duration from the start of observed straining to the birth of the first lamb was less than 40 minutes. A substantial proportion of births were quicker than 20 minutes. There were four cases of dystocia and these births were assisted only after more than 40 minutes.

Our observations are consistent with those of Sutama and Inounu (1993) that mean duration of lambing was between 25 and 32 minutes for three strains of Java Thin-tail ewe. International reviewers (Lynch et al, 1992) summarise that the duration of lambing from the start of straining to the birth of the first lamb is about 25-30 minutes. On the other hand, Kilgour and Dalton (1984) stated that normal births of single lambs take about 1 hour.

The position of the ewe while lambing was not recorded, but almost all ewes gave birth lying down. In contrast Merino and Racka ewes in Hungary were reported to give birth while standing (Keszthelyi et al, 1987).

Table 4. Summary of data

	n	%
<u>1. Duration of lambing</u>		
Less than 20 minutes	18	32
20 - 40 minutes	25	45
More than 40 minutes	13	23
<u>2. Behaviour of lamb immediately after birth</u>		
Lay quietly	11	14
Shook head	55	71
Lively	12	15
<u>3. Behaviour of ewe towards newborn lamb</u>		
No interest in lamb	2	2
Slowly licked lamb	36	46
Vigorously licked lamb	41	52
<u>4. Time for lamb to stand</u>		
Less than 20 minutes	24	44
20 minutes - 30 minutes	16	29
More than 30 minutes	15	27
<u>5. Behaviour of ewe when lamb sought udder</u>		
Pushed lamb away	1	1
Backed away	17	23
Stood still	18	24
Stood and nuzzled lamb's tail	39	52
<u>6. Time for lamb to suckle</u>		
Less than 20 minutes	9	17
20 - 40 minutes	23	43
More than 40 minutes	22	41
<u>7. Behaviour of ewe when lamb was weighed</u>		
Moved away from weighing place	105	33
Stood quietly	31	10
Greatly concerned about lamb	180	57
<u>8. Behaviour of ewe when lamb was carried to lambing pen</u>		
Did not follow lamb	21	7
Followed timidly	118	37
Readily followed lamb	178	56
<u>9. Behaviour of ewe when person approached lambing pen</u>		
Stood quietly	176	58
Slightly afraid	106	35
Very afraid	5	2
Angry and stamped foot	14	5

Behaviour of lamb

Immediately after birth most lambs lay on the ground and shook their heads (variable 2). Some (14%) lay quietly without movement, and 15% which energetically struggled to stand were categorised as lively. The movement of the newborn lamb is thought to contribute to its attractiveness to the ewe (Lynch et al, 1992).

The observations of variable 4 show that almost half the lambs were standing within 20 minutes of birth. The data from June and July showed that no lambs stood before 10 minutes had elapsed. A few lambs managed to suckle within 20 minutes of birth (variable 6), but most took much longer.

For Java Thin-tail lambs, Sutama and Inounu (1993) reported mean times to stand and to suckle of about 22 minutes and 42 minutes, respectively.

Fraser and Broom (1990) stated that most lambs are able to stand within the first half-hour following birth and nearly all are able to stand within the first two hours. Also that within about one hour of birth approximately 60% of newborn lambs have begun to suck. In a cold climate, Slee and Springbett (1986) found that mean time to stand for 3 minutes ranged from 17 to 54 minutes, and mean time to reach the udder was 24 to 95 minutes, for 10 breeds of temperate sheep.

Several stimuli are involved in the orientation of the lamb towards the udder and the beginning of suckling. These include touch, the smell of the wax secreted by the inguinal gland of the ewe, and the temperature of the udder (Vince, 1983).

Behaviour of ewe towards newborn lamb

Almost all ewes expressed interest in their newborn lambs (variable 3) and licked them. McGlone and Stobart (1986) commented that ewes licked their lambs following a specific pattern, usually starting at the front of the body.

When the lamb first stood and tried to reach the udder (variable 5) some ewes (23%) backed away, which is an unhelpful negative action. Some (24%) merely stood still, while the majority (52%) nuzzled the lamb's tail and presented the udder. Similar observations of ewe behaviour were made by McGlone and Stobart (1986). In our study only one ewe actively deterred her lamb from trying to suckle.

Factors affecting behaviour

The data were analysed using the Chi-square test to determine the effects of age of ewe, litter size and breed type within age category on each of the behaviour variables. A total of 36 interactions were examined; only the statistically significant effects are presented here.

Age of ewe. Chi-square tests showed that age (primiparous or multiparous) had significant effects on variables 1, 5, 7, 8 and 9, but not on the other variables. The statistically significant effects of age on ewe behaviour are shown in Table 5.

Births were quicker in multiparous ewes than in primiparous ewes (variable 1). Sixty-one per cent of multiparous ewes lambed within 20 minutes, but only 18% of primiparous ewes. This effect of age or parity on duration of lambing is generally recognised (e.g. Alexander, 1960; Lynch et al, 1992).

Two-thirds of multiparous ewes nuzzled the lamb's tail (the most helpful response) when it was trying to suckle (variable 5), but even for primiparous ewes 44% of observations were in this category.

Primiparous ewes were more likely to move away while the lamb was being weighed (variable 7) than primiparous ewes; older ewes have previous experience of their lambs being handled and waited until the lamb was returned. However, when the lamb was weighed older ewes showed more concern by vocalising and trying to sniff the lamb.

Multiparous ewes more readily followed their lambs when they were carried (variable 8); 83% of multiparous ewes readily followed their lambs, but only 37% of primiparous ewes. However, there was a small proportion of both primiparous and multiparous ewes which did not follow their lambs at all. Some ewes are known to be "awkward" and do not cooperate in the regular post-lambing routine management; this appears to be unrelated to age.

The reaction of the ewe in the lambing pen to the approach of a person (variable 9) again shows that multiparous ewes were less disturbed by the normal procedures following lambing. Primiparous ewes were more nervous and backed away indicating that they were more concerned about the human presence than about caring for the lamb; a total of 47% of primiparous ewes appeared to be afraid, compared with only 23% of multiparous ewes. In each age category, a few ewes appeared to be angry when a person approached, and stamped their foot.

Table 5. Effect of age on behaviour at lambing.

	<u>Primiparous</u> <u>ewes</u>	<u>Multiparous</u> <u>ewes</u>
<u>1. Duration of lambing</u>		
n = 56, P<0.01		
Less than 20 minutes	7 (18%)	11 (61%)
20 - 40 minutes	21 (55%)	4 (22%)
More than 40 minutes	10 (26%)	3 (17%)
<u>5. Behaviour of ewe when lamb sought udder</u>		
n = 75, P<0.05		
Pushed lamb away	1 (2%)	0 (0%)
Backed away	16 (33%)	1 (4%)
Stood still	10 (21%)	8 (30%)
Stood and nuzzled lamb's tail	21 (44%)	18 (67%)
<u>7. Behaviour of ewe when lamb was weighed</u>		
n = 316, P<0.01.		
Moved away from weighing place	88 (48%)	17 (13%)
Stood quietly	18 (10%)	13 (10%)
Greatly concerned about lamb	78 (42%)	102 (77%)
<u>8. Behaviour of ewe when lamb was carried to lambing pen</u>		
n = 317, P<0.01.		
Did not follow lamb	14 (8%)	7 (5%)
Followed timidly	102 (55%)	16 (12%)
Readily followed lamb	69 (37%)	109 (83%)
<u>9. Behaviour of ewe when person approached lambing pen</u>		
n = 301, P<0.01		
Stood quietly	89 (51%)	87 (70%)
Slightly afraid	80 (45%)	26 (21%)
Very afraid	3 (2%)	2 (2%)
Angry and stamped foot	4 (2%)	10 (8%)

Litter size. There were no statistically significant effects of litter size (single vs multiple litters) on any of the behaviour variables. According to classical texts (e.g. Hulet et al, 1975) when a ewe gives birth to a multiple litter the birth process tends to be shorter than for a single lamb because the lambs are smaller. Sutama and Inounu (1993) reported a slightly shorter mean duration of birth for twin Java Thin-tail lambs than for singles, but longer to stand and suckle.

Breed type. As age of ewe had a significant effect on behaviour and the age categories were not evenly represented within each breed group, the results for each age group were analysed separately. There were only few statistically significant effects of breed on behaviour.

Analysis of variable 7 for multiparous ewes (Table 6) showed that H ewes were less concerned while their lambs were being weighed than S, H1 and HC ewes ($P < 0.01$); only 38% of H ewes were scored "c" compared with 88, 85 and 64% for the other three breed types, respectively. Thirty-eight per cent of H ewes stood quietly while their lambs were being weighed, compared with 6-8% for the other three breed types. However, this breed difference is based on only small numbers of animals and is not backed up by data from the primiparous ewes.

Table 6. Effect of breed type on behaviour of ewe when lamb was weighed (variable 7). Observations for multiparous ewes only. $\text{Chi}^2 = 25.3$.

Behaviour of ewe	Breed			
	S	H1	HC	H
Moved away	3 (5%)	3 (9%)	7 (28%)	3 (23%)
Stood still	4 (7%)	2 (6%)	2 (8%)	5 (38%)
Greatly concerned	53 (88%)	28 (85%)	16 (64%)	5 (38%)

There was also a significant effect ($P < 0.05$) of breed type on the behaviour of primiparous ewes when the lambs were carried (variable 8). Table 7 shows that the percentage of ewes classified as easy to move was highest for B1 (58%), followed by HC and H1 (both 47%). E1, H and S ewes had percentages of 20-26%. Seventeen per cent of the S ewes did not follow their lambs, compared with 11% or less for the other breed types. Thus these data suggest that the B1 ewes were the most amenable, and the S ewes the most difficult to move.

Table 7. Effect of breed type on behaviour of ewe when lambs were carried (variable 8). Observations for primiparous ewes only. $\text{Chi}^2 = 20.8$.

Behaviour of ewe	Breed					
	S	B1	E1	H1	HC	H
Did not follow	6 (17%)	0 (0%)	3 (7%)	2 (4%)	2 (11%)	1 (10%)
Followed timidly	22 (63%)	11 (42%)	28 (67%)	26 (49%)	8 (42%)	7 (70%)
Readily followed	7 (20%)	15 (58%)	11 (26%)	25 (47%)	9 (47%)	2 (20%)

In a study of Romanov, Prealpes du Sud and Ile-de-France ewes, Poindron et al (1984) found significant breed differences in maternal behaviour, particularly in the licking of the lamb. However, the authors commented that there were large differences between the behaviour of individual ewes within breeds.

Relations between variables

The relations between variables 1-9 were analysed using the Chi-square test. The statistically significant relations are described in the following Tables. Duration of birth (variable 1) was related to three subsequent variables, 2, 4 and 5. Table 8 shows that where birth was quick the lamb was more lively and stood more quickly.

Table 8. Observations classified according to duration of birth (variable 1).

	Duration of birth		
	<20 min	20-40 min	>40 min
<u>Behaviour of lamb immediately after birth.</u> $\text{Chi}^2 = 10.4$.			
Lay still	0 (0%)	2 (8%)	4 (31%)
Shook head	13 (72%)	18 (72%)	9 (69%)
Lively	5 (28%)	5 (20%)	0 (0%)
<u>Time to stand.</u> $\text{Chi}^2 = 9.2$.			
<20 min	10 (56%)	12 (48%)	2 (18%)
20-30 min	5 (28%)	8 (32%)	2 (18%)
>30 min	3 (17%)	5 (20%)	7 (64%)

Table 9 shows that time for lamb to suckle (variable 6) was related to variables 3, 4 and 5, namely behaviour of ewe towards newborn lamb, time for lamb to stand, and behaviour of ewe when lamb sought udder. The time for the lamb to suckle was shorter (i) when the lamb was vigorously licked by the ewe, (ii) when the lamb was quick to stand and (iii) when the lamb was helped to suckle by being nudged by the ewe or by the ewe merely standing still.

Table 9. Observations classified according to time for lamb to suckle (variable 6).

	Time to suckle		
	<20 min	20-40 min	>40 min
<u>Behaviour of ewe towards newborn lamb.</u> Chi ² = 5.1			
No interest or slowly licked lamb	1 (4%)	11 (46%)	12 (50%)
Vigorously licked lamb	8 (27%)	12 (40%)	10 (33%)
<u>Time for lamb to stand.</u> Chi ² = 18.0.			
<20 min	7 (30%)	10 (44%)	6 (26%)
20-30 min	1 (6%)	11 (69%)	4 (25%)
>30 min	1 (7%)	2 (13%)	12 (80%)
<u>Behaviour of ewe when lamb sought udder.</u> Chi ² = 4.9.			
Butted lamb or backed away	0 (0%)	6 (40%)	9 (60%)
Stood still or helped lamb	8 (21%)	17 (45%)	13 (34%)

The emotional status of the ewe was assessed in variables 7, 8 and 9. More placid ewes which readily followed when their lambs were carried (variable 7, Table 10) did not move away when the lambs were weighed (variable 8), helped the lambs to suckle (variable 5) and had lambs which were able to stand quickly (variable 4).

Table 10. Observations classified according to behaviour of ewe when lambs were carried (variable 8).

	Behaviour of ewe	
	Did not follow lambs or followed timidly	Readily followed
<u>Behaviour of ewe when lamb was weighed.</u> $\text{Chi}^2 = 52.7.$		
Moved away	69 (50%)	36 (20%)
Stood still	22 (16%)	9 (5%)
Greatly concerned	47 (34%)	133 (75%)
<u>Behaviour of ewe when lamb sought udder.</u> $\text{Chi}^2 = 9.2.$		
Moved backwards	12 (44%)	6 (14%)
Stood still	6 (22%)	10 (23%)
Helped	9 (33%)	28 (64%)
<u>Time for lamb to stand.</u> $\text{Chi}^2 = 6.4.$		
<20 min	5 (24%)	17 (57%)
20-30 min	9 (43%)	5 (17%)
>30 min	7 (33%)	8 (27%)

Table 11 shows that a similar relation was observed between placidity of the ewe in the lambing pen (variable 9) and time for lamb to stand (variable 4). According to Lynch et al (1992) there is a general relationship between emotivity (i.e. reaction of ewe to external stimulus) and maternal behaviour. More placid ewes are better mothers.

Table 11. Observations classified according to behaviour of ewe when approached in lambing pen (variable 9) and time for lamb to stand (variable 4). $\text{Chi}^2 = 10.8.$

Behaviour of ewe in lambing pen	Time to stand		
	<20 min	20-30 min	>30 min
Stood quietly	18 (60%)	7 (23%)	5 (17%)
Afraid or angry	3 (15%)	7 (35%)	10 (50%)

Behaviour score

In order to amalgamate the behaviour variables into one measure of desirable traits, each variable was allocated a numerical score. The least favourable behaviour category for each variable was scored 0, and higher scores allocated to more favourable behaviour. For instance if variable 1 (duration of birth) was less than 20 minutes a score of 2 was given; if 20-40 minutes a score of 1; and if more than 40 minutes, a score of 0. A summary of the scores allocated for each category of behaviour is given in Table 12.

Table 12. Scores of behaviour. See Table 4 for details of variables and categories of behaviour

<u>Variable</u>	<u>Scores</u>			
1, duration of lambing	2	1	0	
2, lamb behaviour after birth	0	1	2	
3, ewe behaviour after birth	0	1	2	
4, time to stand	2	1	0	
5, ewe behaviour when lamb suckles	0	1	2	3
6, time to suckle	2	1	0	
7, ewe behaviour when lamb weighed	0	2	2	
8, ewe behaviour when lamb carried	0	1	2	
9, ewe behaviour when person approaches	2	1	0	1

Some scientists criticise the use of this type of composite score because each variable is given an equal weighting, and more than one variable may be measuring the same trait so that any differences that may be present are exaggerated. Nevertheless we consider that this method of scoring gives a simple and useful single measure of lambing behaviour.

Scores were totalled for (i) lambings in which all variables were recorded, and (ii) lambings in which variables 7, 8 and 9 were recorded. These total scores are denoted ScoreALL and Score789, respectively. Both ScoreALL and Score789 showed a reasonable approximation to normal distributions. ScoreALL ranged from 6 to 19 and Score789 from 0 to 6.

Analyses of variance were conducted using the GLM procedure of SAS to determine if breed of ewe, age of ewe and litter size affected behaviour. A summary of the analyses is presented in Table 13.

Table 13. Effects of breed, age and litter size on behaviour

	<u>ScoreALL</u>	<u>Score789</u>
Number of births	46	300
<u>Age</u>	P<0.01	P<0.01
Primiparous	10.9±0.5	3.8±0.1
Multiparous	14.1±0.8	5.2±0.1
<u>Litter size</u>	ns	ns
<u>Breed</u>	ns	P<0.05
S	13.2±0.8	4.4±0.1 ^{ab}
B1	13.7±1.2	4.9±0.3 ^{bc}
E1	10.1±1.4	4.3±0.2 ^a
H1	14.1±0.8	4.8±0.1 ^c
HC	12.3±1.0	4.2±0.2 ^a
H	11.4±1.3	4.4±0.3 ^{ac}

Table 13 confirms that behaviour was significantly affected by age of ewe but not by litter size. Breed of ewe had a significant effect on Score789 but not ScoreALL because there were 300 observations for Score789 but only 46 for ScoreALL.

Age of ewe. Multiparous ewes had more favourable behaviour characteristics than primiparous ewes. The difference was substantial, 37% of the score of primiparous ewes.

Breed type. The breed types with the highest values of Score789 were B1 and H1. The other four breed types had lower scores. The difference between the highest (B1) and lowest (HC) scores was 17%. This trend was repeated for ScoreALL though the differences were not statistically significant. Thus B1 and H1 sheep had slightly better lambing behaviour characteristics than the other breed types.

Effect of behaviour on lamb survival to two weeks

The survival of each lamb born alive was classed as 1 if it survived to two weeks of age, and 0 if it died. The CATMOD procedure of SAS was used to study the correlation between behaviour scores (ScoreALL and Score789) and survival. Simple models and those including litter size, age of ewe and breed of ewe and birth weight all showed no statistically significant effects of behaviour score on survival.

However, behaviour does appear to have some effect on lamb survival as shown in Figure 1. Ewes which have good maternal instincts give reduced lamb mortality.

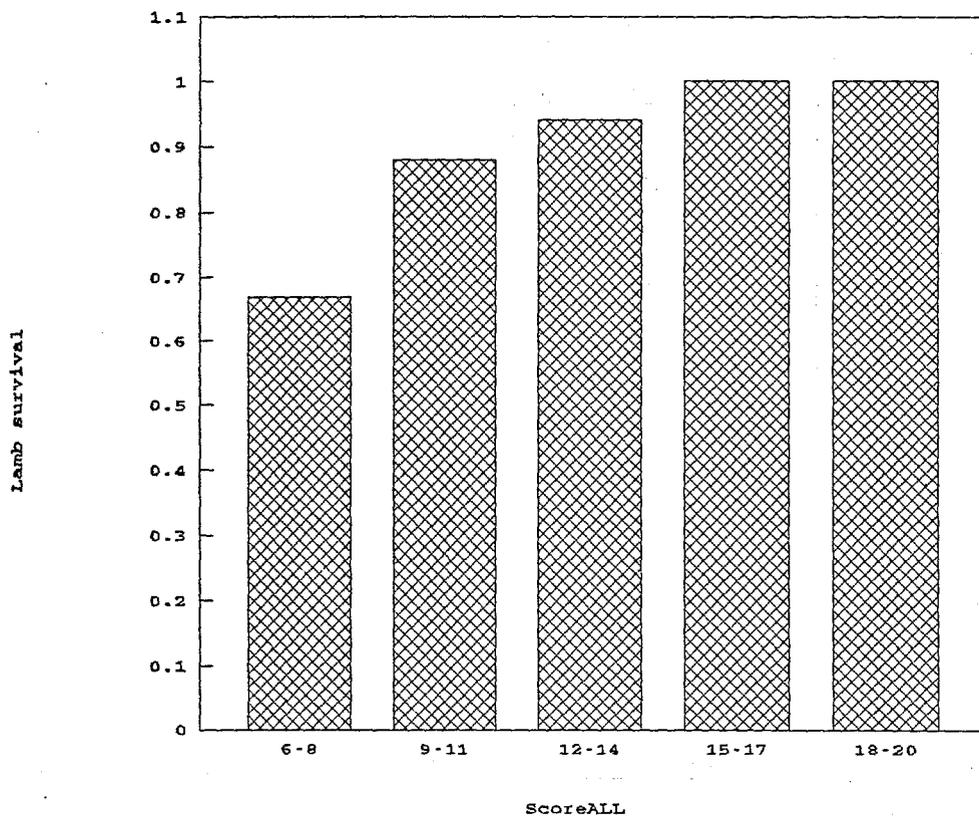


Figure 1. Effect of behaviour at lambing (ScoreALL) on survival of lamb at two weeks of age.

GENERAL DISCUSSION

The lambing behaviour of all the breed types studied here was generally good, though there was considerable variation between individuals. Lambs born to ewes with good behaviour scores had a slightly higher chance of survival to two weeks of age than those born to ewes with low behaviour scores. In New Zealand it has been shown (O'Connor et al, 1985) that there is a positive correlation between the maternal behaviour of ewes and their productivity in terms of weight of lambs weaned per year. The correlation is stronger within higher litter sizes, suggesting that good maternal behaviour is more critical for multiple births.

Age of ewe had a significant effect on behaviour at lambing. Experienced ewes were less nervous of routine management procedures than primiparous ewes, and were generally easier to manage. In contrast breed differences in lambing behaviour were small and in favour of the introduced genotypes.

According to Haughey (1984) and Lindsay et al (1991) there is some evidence that maternal behaviour is repeatable and heritable. However in Australian Merino ewes estimates of heritability average only about 0.10. For a heterogeneous population of ewes, such as we have in Sumatra, differences in maternal behaviour and mothering ability may be capable of being exploited by selection.

Time for the lamb to suckle is likely to have a direct effect on lamb survival. The newborn lambs most likely to die are those which suffered dystocia and those with very low birth weights. During the first hour after birth these high risk lambs tend to be inactive, slow to stand and slow to suckle. Assistance with suckling in these cases is beneficial to ensure the intake of colostrum (Theriez and Villette, 1986). If the lamb is strong enough to suck and its own dam has milk, the lamb can be held to the udder. Otherwise it can be fed from a syringe or spoon with colostrum extracted from its own dam or another recently-lambed ewe.

Almost all ewes licked their lambs immediately after birth. Licking dries the lamb and facilitates maternal recognition of the lamb by the time it suckles (Lynch et al, 1992). If it is necessary for the ewe to foster a lamb born to another ewe, fostering is most easily performed immediately after birth when the ewe is receptive to a new lamb.

Maternal behaviour is better if there is not interference from other ewes and lambs (Gonyou and Stookey, 1985) confirming that confining ewes and their newborn lambs in individual pens is advantageous, a practice which is followed in most intensive systems. This study confirms the benefits of habituating ewes to their shepherds as frequent contact of ewes with humans not only at lambing time helps to develop desirable behaviour characteristics.

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