Psychological Effects of Early Gentling on the Subsequent Ease of Handling in Lambs

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Abstract Four lamb twin sets were divided into two treatment groups for 7 days of handling at the age of 4 days. Gentled lambs were handled for 10 min in the suckling pen during morning routines. Other lambs of their twins were ignored when they approached the handler. The ease of handling in each lamb was assessed once a week from 2 to 16 weeks of age using a five-scale score in five components of the weighing procedures : chase, capture, haul, restraint and release. The synthetic obedient scores based upon those scores in the components were calculated ; the lower the score, the more obedient the animal. Occurrence of bleating during the procedures was counted. The synthetic obedient scores (Mean $\pm$ SD) of gentled and ignored lambs were 4.4 ± 3.0 and 9.6 ± 4.4 ($P<0.01$), respectively. This result confirmed that a brief gentling of the lambs for the first 10 days after birth can improve their subsequent ease of handling. It was also indicated that the ease of handling could be emotionally improved by reducing a lamb's fear of humans and/or aversion to isolation. Gentling at age 4-10 days had, on the other hand, no apparent effect on body weight gain and the number of bleats reflecting the expression of a high level of fear.

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Some studies on sheep, goats and cattle, as reviewed by Le Neindre⁸⁾, have shown that a lack of human contact at a young age leads to the animals being fearful and sometimes even aggressive towards their caretakers. Previous studies have shown that gentling is a pleasant procedure which improves subsequent human-sheep interactions^{2-4,11)}. In these studies, physiological³⁾, biochemical^{2,4)} and behavioral^{3,4,11)} parameters are measured as indicators of an aversion or stress of the sheep to human interactions. Of these parameters, behavioral responses are often the most obvious indicator that an animal is experiencing difficulty in coping with a problem such as environmental change¹⁾.

Recent research concerning sheep¹⁰⁾ and cattle^{6,7)} have indicated a sensitive period of early cognition of newborn lambs and calves in the first 3 days after birth. In the sheep industries, natural delivery and

nursing by ewes is widely accepted, and early handling procedures of lambs such as fixing an ear tag or cutting a tail is usually performed after letting them drink colostrum in the first 2 or 3 days after birth¹⁴⁾.

In this study, gentling at age 4-10 days was investigated as a possible method of improving subsequent ease of handling. The psychological effects of early gentling were also analyzed.

Materials and Methods

For the first 10 days after birth, four twins Suffolk lambs were separately reared with their dams in suckling pens. The four lamb twin sets were divided into two treatment groups for 7 days of handling at the age of 4 days. One group of 4 animals was exposed daily for 10 min to gentle handling in the pens, while the other group of 4, used as a control, was exposed to no handling and was ignored even though they were in

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Table 1. Treatment, dam, subject number, sex, birth date and birth weight of lambs

Dam	Subject	Treatment	Sex	Birth date	Birth weight
A	L1	Gentled	Male	21 Feb. '99	4.8 kg
	L2	Non-gentled	Female		4.5
B	L3	Gentled	Male	23 Feb. '99	5.3
	L4	Non-gentled	Female		5.0
C	L5	Gentled	Castrated Male	26 Feb. '99	4.6
	L6	Non-gentled	Castrated Male		5.0
D	L7	Gentled	Castrated Male	3 Mar. '99	5.4
	L8	Non-gentled	Female		5.0

the same suckling pen with their twins. The gentle handling consisted of some physical contact, such as stroking or rubbing, on the neck and shoulders or quiet or soft vocalizations. The same experimenter who sat in the pens performed the handling. The daily routine management was performed in the same way for the two groups. The sex of the subjects was balanced between the groups (Table 1).

The body weight of the lambs was measured in random order once a week from 2 to 16 weeks of age (until weaning). The ease of handling in each lamb was assessed using a five-scale score: the lower the score, the more obedient the animal. Assessment was carried out in five contexts of measuring operations: chase, capture, haul, restraint and release. The contexts are listed below.

(1) Chase

The lamb was chased through a yard and a shed by the experimenter.

(2) Capture

The lamb was caught and its movement was restricted for a moment.

(3) Haul

The lamb was hauled to the weighing scale situated at the end of the side race in the shed.

(4) Restraint

The lamb was confined on the weighing scale during measuring.

(5) Release

The lamb was released to the flock after measuring. The synthetic obedient score was calculated for

each lamb by summing up all the scores in the five contexts to compare the overall level of easiness of the subjects.

The daily gain (DG) of each lamb was calculated from 2 to 15 weeks of age. The number of times each lamb bleated was counted during each time of measuring.

Repeated-measures analysis of variance (ANOVA)¹⁵⁾ was performed with a model including 2 between-subject effects of Dam and Treatment and 1 within-subject effect of Age on the synthetic obedient score. As for the number of bleats and the DG, the same repeated ANOVA model was applied.

A factor analysis¹⁵⁾ was used to find out the psychological factors that potentially cause difficulty in handling lambs. Initial factors were extracted by principal component analysis with prior communality estimates set to 1.0. The number of common factors was determined according to the scree criterion that considers the difference between successive eigenvalues. The rotated factor pattern was calculated with orthogonal varimax rotation. Factor scores were estimated for each lamb.

Results

While there was no apparent Dam and Age effect, the effect of the Treatment was significant ($P < 0.01$) for the synthetic obedient score (Table 2). Neither the Dam $\times$ Age nor Treatment $\times$ Age interaction was significant. The mean synthetic obedient scores ($\pm$ SD) of the gentled and control lambs were $4.4 \pm$

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Table 2. Analysis of variance for the synthetic obedient score

Effect	df	MS	Pr > F
Between subjects	7		
Dam	3	130.333	0.09
Treatment	1	811.200	0.01
Subject	3	22.956	
Within subject	112		
Age	14	18.169	0.06
Dam × Age	42	9.392	0.56
Treatment × Age	14	9.700	0.48
Error	42	9.860	

R²=0.832.Mean synthetic obedient score ($\pm$ SE)=7.03 $\pm$ 3.14.

Table 3. Analysis of variance for daily gain

Effect	Df	MS	Pr > F
Between subjects	7		
Dam	3	0.003	0.60
Treatment	1	0.013	0.21
Subject	3	0.005	
Within subject	112		
Age	14	0.059	0.01
Dam × Age	42	0.007	0.53
Treatment × Age	14	0.003	0.97
Error	42	0.007	

R²=0.795.Mean daily gain (kg/day, $\pm$ SE)=0.19 $\pm$ 0.09.

3.0 and 9.6 $\pm$ 4.4, respectively. This result showed that gentling at age 4–10 days can improve subsequent ease of handling.

On the other hand, the effect of the Treatment was not significant for the DG (Table 3) and the number of bleats (Table 4). The Age effect was significant ($P < 0.01$) for the DG and there was a significant ($P < 0.05$) difference between 2 (Mean $\pm$ SD, 0.33 $\pm$ 0.08 kg/day) and 8 (0.10 $\pm$ 0.07), and 6 (0.32 $\pm$ 0.06) and 8 weeks of age.

The scree plot that bent at the third eigenvalue showed two factors present (Table 5). The scores for chase, capture, haul and release had large loadings

Table 4. Analysis of variance for the number of bleats

Effect	df	MS	Pr > F
Between subjects	7		
Dam	3	5.344	0.55
Treatment	1	0.300	0.84
Subject	3	6.278	
Within subject	112		
Age	14	1.133	0.17
Dam × Age	42	1.178	0.09
Treatment × Age	14	0.657	0.62
Error	42	0.778	

R²=0.771.Mean number of bleats (times, $\pm$ SE)=0.72 $\pm$ 0.88.

Table 5. Factor analysis for the ease of handling in the measuring operations of body weight

Context	Loading		
	1st Factor	2nd Factor	Commu ^a .
Chase	0.96	0.27	0.99
Capture	0.92	0.37	0.98
Haul	0.89	0.43	0.97
Release	0.89	0.45	1.00
Restraint	0.36	0.93	0.99
Eigenvalue	3.46	1.47	
Proportion	0.69	0.29	
Cumulative	0.69	0.99	

^a Commu. = communality.

on the first factor so that the first factor was interpreted as “fear of humans”. The score for restraint had a large loading on the second factor so that the second factor was interpreted as “aversion to isolation”. The proportion of variation represented by the first and second factor was 0.69 and 0.29, respectively, and the cumulative proportion of variation was 0.99 (Table 5). The final communality estimates of the 5 contexts were all more than 0.98 (Table 5), showing that the ease of handling in each context was well explained by these two factors.

Comparison of the factor scores between the gentled lambs and their control twins demonstrated

Fig. 1. Plot of factor scores in each lamb. Arrow lines are drawn from control lambs to their gentled twins.

three influencing patterns of gentling, that reduce "fear of humans", "aversion to isolation" and both of them (Fig. 1). This result suggested that the psychological effects of early gentling would differ between individuals.

Discussion

Although Markowitz *et al.*¹⁰⁾ reported that human contact at age 1–3 days reduces a lamb's timidity to people rather than at age 3–9 days, the result of this study indicated that gentling even at age 4–10 days can improve subsequent ease of handling. Concerning industrial implication, interacting with lambs from the first to second week of age would be more practical from the standard point that ordinary management practices, such as fixing an ear tag and cutting a tail, are usually performed within that period of time¹⁴⁾.

Kosako and Imura⁷⁾ reported that early handling for 3 days after birth reduces the excitability of cattle captured by caretakers. In this study, it is interpreted that a lamb's ease of handling in the context of measuring body weight is dependent on two prime factors, "fear of humans" and "aversion to isolation". Isolation from conspecifics, physical restraint, surprise and the presence of a human is well introduced as experimental situations to induce fear in sheep^{13,16)}.

It is indicated that the number of high-pitch bleats is one of the parameters reflecting the expression of a high level of fear¹²⁾, but most lambs in this study hardly bleated all through the experiment (Mean

number of bleats $\pm$ SE, 0.72 ± 0.88 times). This suggests that the level of fear in this experiment was not so high even in the non-gentled lambs. It is recommended for practicality that sheep should be moved through yards and sheds in the same direction and via the same route for management operations⁵⁾. Thus, habituation to the routine measuring procedure is another possibility. The mild stress in this experiment could explain why the difference in the number of bleats and body weight gain was not significant between the gentled lambs and their control twins.

The growth of lambs is dependent upon not only artificial management procedures but also the maternal performance¹⁴⁾. It was of no concern to the dams that their lambs had ever been gentled or not by humans. The twin lambs were equally fed during daily management so that no differences in the growth rate seemed quite natural.

In the present experiment, five limited contexts of human-sheep contacts were investigated. So more extensive studies are required to determine the psychological effects of gentling on the full range of human-sheep interactions. Rushen¹³⁾ reported that sheep show ordinal preference for treatments of routine handling operations, in order of decreasing preference: human contact, physical restraint in the presence of sheep, isolation, capture in isolation, and inversion in isolation, for example.

The results of this study suggest that psychological effects of early gentling could differ between individuals. In order to understand the cause of individual differences in the temperament of domestic animals, the studies of behavioral genetics and development has been carried out (well reviewed by Manteca and Deag⁹⁾). Innate sensitiveness or readiness to early experiences would be particularly relevant to the development of individual differences.

In conclusion, gentling at age 4–10 days can improve the subsequent ease of handling by reducing the fear of humans and/or aversion to isolation, but does not have significant effects on the body weight gain of lambs.

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