

LAMB PLAY BEHAVIOUR: BEHAVIOURAL AND ECOLOGICAL INFLUENCES

By

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The results of two observational studies carried out in April 1992 and 1993 on the play behaviour of the Lundy Welsh Hill crossbred lambs are reported. The effect of lamb age and play group composition on play behaviour was investigated. It was found that lambs spend around a third of their time playing, although this decreases with age. Lamb age and play group composition was associated (Chi-squared=86.2, d.f.=12, p,0.005) in the 1992 single lambs. Lamb age and type of play behaviour (object play, social play, whole body play, sniffing and running) were associated in the single 1992 lambs (Chi-squared=107.1, d.f.=12, p,0.005) but not in the 1993 twin lambs. There was no difference in the amount of time spent playing by single lambs (6.7%) and twin lambs (6.8%). There was a dramatic decline in the overall amount of play behaviour exhibited by all lambs in 1993. This was related to first, modified pre-lambing ewe management, and second, the change in the ecology of Lundy with the dramatic decline of the rabbit population.

INTRODUCTION

Sheep were domesticated over 10,000 years ago in South West Asia (Hulet, Alexander, & Hafez, 1975) and were one of the first domestic species (Williams, 1988). The domestic sheep *Ovis aries* has proved to be very important to agriculture, partly because of its ability to exist in a wide range of environments. Sheep are found over a large range of altitudes and latitudes. Their comparatively small size also renders them relatively easy to transport - a very important factor for Islands such as Lundy!

Most British breeds of sheep have a clearly defined breeding season, falling in between late summer/autumn to mid winter. The onset of the breeding season is determined by photoperiod, that is day length. Ewes are generally 'flushed', i.e. put on good grazing in order to encourage good health and more specifically multiple ovulation. This occurs a few weeks before going to the ram sometime between mid September and early October. It is usually intended to lamb in late February/early March, when the weather begins to improve and the grass starts to grow again. Flocks of ewes are encouraged to lamb within a short period of time, in order to save both time and labour costs. This is especially important on Lundy where there are many other jobs to be done!

Sheep can be maintained entirely on grass (in the form of hay and silage in the winter months). However, concentrates are often fed in the latter stages of pregnancy and the very early stages of lactation (depending on the availability of the spring grass) in order to fulfill increased nutritional requirements (Williams, 1988).

Having presented a very brief look at husbandry aspects of sheep farming, the remainder of this introduction will examine the behaviour of the subjects. Sheep evolved to live in social groups (Kilgour & Dalton, 1984). Fortunately most sheep are kept and farmed in this way. The specific social behaviour to be considered in this paper is the play behaviour of lambs.

Play occurs in most mammals and is usually exhibited by the juveniles. However, this is not always the case. Mature cows have been seen to gambol around on being turned

out after overwintering indoors.

Psychologists have hypothesised many theories for play behaviour (Gross, 1992). Herbert Spencer postulated that play results from a surplus of energy. Others have attributed play with the role of boredom relief. It has been suggested that play activities result in stimulation which increases low levels of arousal, whilst learning theorists maintained that play is engaged in repetitively since it was rewarding in other situations. Drive theorists refer to special instincts for exploratory behaviour, manipulation and play. A recent paper by Wood-Gush & Vestergaard (1991) found that the presence of a novel object led conclusively to an increase in the amount of play behaviour of piglets. This, they suggested, functions to direct the attention of litter-mates towards the novel object and stimulate them to participate in the exploration.

Quite possibly the most useful theory was put forward in the nineteenth century by Karl Groos, who proposed that play is important for the learning of adjusting to other animals and in developing and perfecting skills for use later in life. This is inherent in the definition of play given by Fraser and Broom (1990) in their chapter entitled 'Play, Practice and Exercise'. Play is defined functionally as a mechanism by which young animals can learn about themselves, each other, communication, survival, assessment of social roles, acting appropriately and the acquisition of skills (p247). They also point out that play is commonly thought to facilitate motor development and has been referred to as a method by which sensory goals, such as tactile comfort, can be fulfilled.

Play behaviour can be broadly divided into social (for example mock fighting, advancing and retreating) and object (for example manipulation of objects) directed. It is clear that (in both instances) play differs from serious interaction owing to the lack of visible serious emotions such as anger and fear. Despite the confusion surrounding the play Fagen (1980) extracted six, commonly cited, benefits of play summarising the points made above.

1. Play develops physical strength, endurance and skill.
2. Play promotes and regulates developmental rates.
3. Play experience yields specific information.
4. Play develops cognitive skills necessary for behavioural adaptability, flexibility, inventiveness and versatility.
5. Play is a set of behavioural tactics used in intraspecific competition.
6. Play establishes or strengthens social bonds in a pair or social cohesion in a group.

Since lambs are born in an advanced stage of physical and behavioural development (Fraser & Broom 1991, 240), it is expected that behaviours such as social activity occur at an early age. It is well documented that one month old lambs spend the majority of their time (at least two thirds) with their peers (Bonney 1993, 91). Fraser and Broom (1991, 241) refer to lamb play behaviour as 'well developed', consisting of a wide variety of 'locomotor-rotational' and 'contact activity' motor patterns. These include gambolling, upward leaps, little dances and group chasing. Hulet *et al.* (1975) considered play in sheep to follow one of four characteristic patterns: sexual (mounting), agonistic (playful butting), allelomimetic (running and gambolling together) and game playing (jumping off objects together). More recently Lynch, Hinch, and Adams (1992) refer to play as 'apparently pointless behaviours such as trotting, galloping, head tossing, rearing and bucking' involved in the establishment of motor patterns for social and sexual interactions later in life.

Many attempts have been made to characterise play by the actual activities engaged in. The following categorisation of types of play activity has been often used for lambs.

1. *Superfluous activity* - typified by prancing, leaping, gambolling, generally exaggerated movements.

2. *Aimless exploration, manipulation and object play* - occurs when novel objects elicit approach, touching, sniffing, mouthing and other manipulations.
3. *Practice play* - involves the repetition and elaboration of newly acquired actions/skills.
4. *Responses to the wrong object* - these are often incorrect, innate, stereotyped movements directed towards inappropriate objects.
5. *Social play* - most typically play behaviour between peers, and less so between young and parent, important in the establishment of social relationships.
6. *Pretend play* - exemplified by 'attacks' accompanied by 'friendly' signals.

The studies reported in this paper examined the influence of age and play group composition on play behaviour, how the different types of play behaviour were influenced by lamb age and the difference between the play behaviour of single and twin lambs.

METHOD

a. SUBJECTS

There were sixteen Welsh Hill lambs involved in the 1992 study all of which were singles. These fell into four categories as follows: 'Tiny' aged one week, 'Small' aged two weeks, 'Medium' aged three weeks and 'Large' aged six weeks.

Twenty four Welsh Hill cross (either Welsh Hill x Border Leicester or Welsh Hill x Suffolk) lambs were involved in the follow up study in 1993. There were four pairs of twins in each of the 'Small' (two weeks), 'Medium' (three weeks) and 'Large' (six weeks) categories. (No one week old 'Tiny' lambs were available.)

A further twelve single lambs (four in each age group) were selected for comparison with the twin lambs in 1993.

In both years there were an equal number of males and females in each group.

b. STUDY SITE AND MANAGEMENT

The location of the lambs during the two studies, was as follows: "Tinys" 1992 : Bull's Paradise; Small, Medium and Large 1992 : Airfield; Small, Medium and Large 1993 : Brick Field.

The management of the lambing was improved slightly in 1993 as the pregnant ewes were given more feeding in the latter stages of pregnancy than in the previous year.

c. APPARATUS

A stop watch was used to time the observation periods. All observations were made by hand.

d. PROCEDURE

The 1992 study was carried out between 4th and 11th April (inclusive) and the 1993 study between 17th and 23rd April (inclusive).

1. Preliminary study

As Fraser and Broom (1990, 241) stress, there is some difficulty with the definition and interpretation of play behaviour. In order to ease this problem, in both years the observers carried out a six hour preliminary observation period. The 1992 experimenters used this time to identify and categorise the different types of lamb play behaviours and group size and content. Five common play group compositions were identified. These were 'none', 'with mother', 'two', 'three to five' and 'six to ten'. Twelve play behaviours were distinguished and assembled into five categories as follows: 'Whole Body Play' (leaping, jumping and bucking), Social Play (butting, chasing, mounting, licking and pawing), 'Object Play' (object climbing and object curiosity), 'Running' and

'Sniffing'. The 1993 experimenters became familiar with the types of play behaviour used in the previous year during their preliminary study. This period also allowed the identification of subjects and provided an opportunity for the lambs to become accustomed to being observed by humans.

2. Percentage of play

In both years the proportion of the lambs total behaviour accounted for by play was established. This was achieved by observing each subject for 20 minutes, throughout the day, and recording whether it was engaged in 'play' or 'non-play'.

3. Observation protocol

In both years, the observation periods occurred before feeding (between 7.30 am and 9.00 am), after feeding (between 10.30 am and 12 noon) and in the afternoon (between 3.00 pm and 4.30 pm). Each lamb was observed for ten minute periods equally distributed across the observation periods throughout the week. For each individual the frequency of each of the different types of play behaviour engaged in were noted, along with the play group composition.

An additional study was carried out in 1993 to assess the play behaviour of single lambs, using the same observation procedure.

RESULTS

a. PERCENTAGE OF PLAY

1. 1992 single lambs

Figure 1 shows the percentage play engaged in by the different aged lambs in 1992. The average taken across all four age groups was 36.1%; and excluding the 'Tiny' category was 29%.

2. 1993 twin lambs

The percentage play engaged in by the 'Small', 'Medium' and 'Large' twin lambs in 1993 are also shown in figure 1. The average proportion of total time spent playing by the twin lambs in 1993 was only 6.8%.

3. 1993 single lambs

Single lambs in 1993 spent an average of 6.7% of their time engaged in play behaviour.

b. THE INTERACTION OF AGE GROUP AND PLAY GROUP COMPOSITION

The frequencies of total play behaviour (regardless of type) engaged in by different aged single lambs observed in 1992 in each of the different play group compositions are illustrated in figure 2. The Chi-squared test applied to assess the association between lamb age and type of play group yielded a Chi-square of 86.2 (d.f.=12, $p < 0.005$).

c. THE INTERACTION OF AGE GROUP AND TYPE OF PLAY

The total number of times lambs were observed engaging in the five different categories of play, for each age group are shown in figure 3a for the 1992 single lambs and in figure 3b for the 1993 twin lambs. The Chi-square was 107.1 (d.f.=12, $p < 0.001$) for the 1992 singles and 10.2 (d.f.=8, non sig.) for the 1993 twins.

d. SINGLE LAMBS VERSUS TWIN LAMBS

The percentages (of the total play behaviour observed) for the different types of play behaviour and different lamb age (observed in 1993) are shown in table 1, for first single and second, twin lambs. Of the total behaviour observed in single lambs, 6.7% was accounted for by play. This was very similar to the 6.8% shown by twin lambs.

Fig 1: Percentage of Play Behaviour (1992 and 1993)

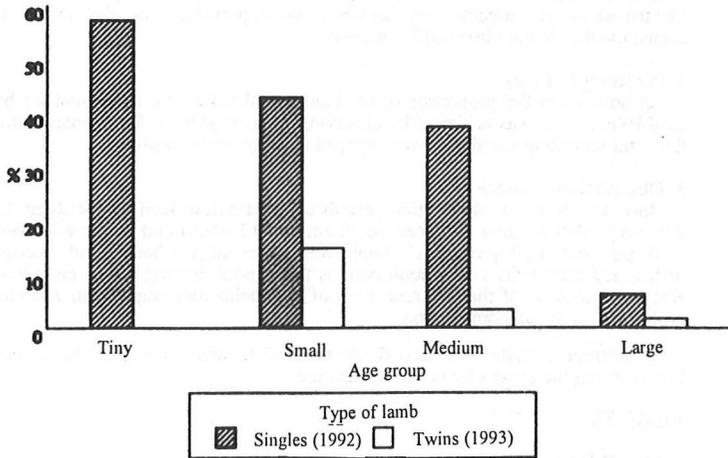


Fig 2: Age and Play Group Composition (1992 singles)

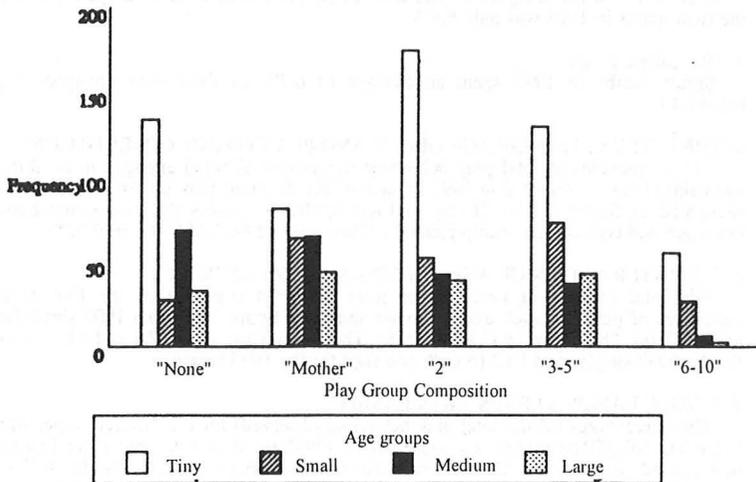


Fig 3: Age Group and Type of Play: Singles in 1992.

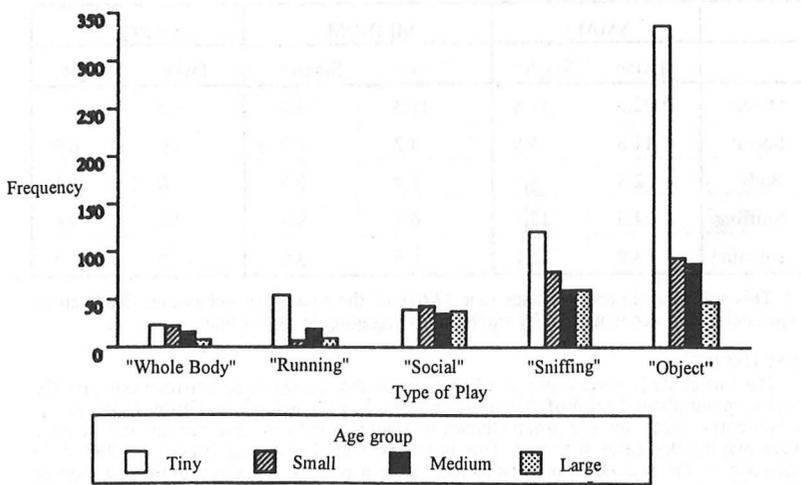


Fig 3b: Age Group and Type of Play: Twins in 1993

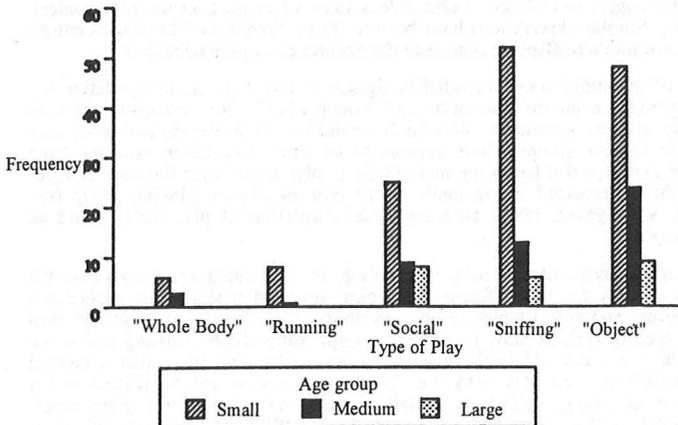


Table 1. Percentage of total behaviour accounted for by the different types of play behaviour and different age groups of lambs.

| | SMALL | | MEDIUM | | LARGE | |
|----------|--------|---------|--------|---------|-------|---------|
| | Twins | Singles | Twins | Singles | Twins | Singles |
| Object | * 22.6 | 14.8 | 11.3 | 14.0 | 4.2 | 7.5 |
| Social | 11.8 | 6.8 | 4.2 | 5.7 | 3.9 | 6.0 |
| Body | 2.8 | 3.5 | 1.4 | 2.7 | 0 | 1.3 |
| Sniffing | 24.5 | 12.7 | 6.1 | 9.7 | 2.8 | 9.6 |
| Running | 3.9 | 1.1 | 0.5 | 3.2 | 0 | 1.4 |

* This value of 22.6% indicates that 22.6% of the total play behaviour, observed in twin lambs, was accounted for by small lambs engaging in object play.

DISCUSSION

The initial study carried out in 1992 revealed that lambs aged between one and six weeks, spend about a third of their time engaged in play behaviour. Closer examination of the percentages, by age group, shown in figure 1, indicate that the amount of time spent playing decreases with age. This is in line with Fraser and Broom's (1990, 241) reference to the decline in play behaviour, after a peak at ten days, until four months when play is rare. The percentages displayed by the twin lambs observed in 1993 indicated that, whilst there was dramatically less play behaviour overall, the same trend existed with a decline from two to six weeks of age. This is true also for each of the five different types of play.

There was a significant association between lamb age and play group composition. It can be seen in figure 2 that, for the single lambs observed, there is an interaction of type of play and play group size. Younger lambs tend to play in larger groups whilst older lambs typically play in smaller groups.

All age groups appear to maintain a noticeable amount of contact, in the play context, with the mother. Similar observations have been made by French (1991) who examined the relationship of mother-offspring contact to the occurrence of play behaviour.

Integration of the information provided in figures 1 and 2 points to a relationship between play group size and the amount of play. Younger lambs clearly spend more time playing, in large groups. In contrast, older lambs spend less time playing and when they do they play in smaller groups. There appears to be some facilitation occurring from which it can be expected that lambs are more likely to play more when they are in larger groups. It might be expected that a lamb would join an already playing group (see Wood-Gush & Vestergaard, 1991), resulting in an escalation of play activity and an increase in group size.

Assessment of the partitioning of total play activity of the 1992 single lambs over the different types of play for the different age groups revealed a significant association between age group and type of play. Figure 3a shows that object play was the most frequently engaged in type of play, for all age groups, followed by sniffing and social play. Again, the one week old lambs engaged in most play and there was a general decline within each type of play with age. These observations can be related to the general curiosity of young animals, especially as the main behaviours were object directed and sniffing. This 'need' had presumably been fulfilled by six weeks of age. It is interesting to note that the amount of social play engaged in by the different aged lambs is more consistent than any of the other four categories of play. It therefore appears that the division of play behaviour into object- and social- orientated activity suggested earlier is appropriate. Finally, although similar trends were observed in the twins studied in 1993 (figure 3b), the association between age group and type of play activity failed to reach significance. This was probably because of the very low levels of play activity overall.

There was no difference, both overall and within each type of play, in the amount of activity engaged in by the 1993 single and twin lambs. Table 1 demonstrates that whether a lamb is a single or a twin has no significant effect on its play behaviour.

There was a clear discrepancy between the overall amounts of play behaviour exhibited by the 1992 singles and both the twin and single lambs observed in 1993 (see figures 1 and 3). In 1981 Bonney suggested that only fit and thriving individuals possess 'the urge and energy' to play. However, since all of the individuals were clearly in good health, this was an inadequate explanation for the apparent lack of play activity shown by the 1993 lambs. The low levels of play seen in the 1993 lambs may be related to an altered pre-lambing ewe feeding regime and the almost complete absence of rabbits. In 1993 the pregnant ewes were maintained on a higher plane of nutrition than in previous years, which resulted in them having larger and stronger lambs. In addition to this, the rabbit population, once thought to number in the region of 30,000 had all but disappeared because of myxomatosis. Given that six rabbits consume the same amount of grass as one adult sheep, it follows that grazing for up to five thousand sheep would become available! This has the obvious effect of increasing the availability of forage for both the ewe and her lamb(s). A well fed ewe will produce better milk and therefore stronger more satiated lambs. A satiated lamb may be lazy and sleepy and less inclined to engage in social activity such as play. In addition to this the availability of good quality and palatable roughage to the lamb, accelerates ruminal development, which in turn encourages earlier weaning (Williams, 1988). Since lambs embarking on the weaning process no longer obtain all of their nutrition in a series of short suckling bouts, they spend more time grazing. This leaves less time for other activities such as play.

CONCLUSION

Lamb play behaviour is influenced by age and the composition of the play group. Furthermore, different types of play behaviour are affected differently. The ecology of the lambs environment also influences play activity, both directly and indirectly through the ewe.

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