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A note on the use of number of permanent incisor teeth for determining age in sheep

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ABSTRACT

The age at which permanent incisor teeth came into wear was recorded in 23 yearling flocks that differed in breed and management, and one mixed-age flock, of spring-born sheep. In female yearling flocks the first pair of incisors came into wear at a median age of 15 months, with a normal range of 13 to 17 months. Variation within flocks was seven times greater than between flocks. Teeth erupted 21 days earlier in male lambs than in half sib sisters. Time of eruption was not affected by lamb breed, date of birth or growth path.

Data from the yearling flocks identified a substantial pool of animals older than 12 months of age that did not have two incisors in wear. These animals could be given dispensation for grading as lamb after the normal cut-off date if incisor teeth in wear is accepted as the cut-off criterion. This would help overcome the shortfall in supply of lean, heavy carcasses that occurs each spring before new season's lambs reach suitable size.

In the mixed age female flock, the median ages when 2, 4, 6 and 8 incisors came into wear were 15, 23, 30 and 42 months. Later pairs of incisors came into wear earlier than commonly assumed and individuals with the same number of incisors varied in age by up to two years. These findings highlight substantial limitations to the use of number of incisors for determining age in sheep.

Keywords Sheep; age; incisor; teeth eruption

INTRODUCTION

It is widely assumed within the sheep industry that one pair of permanent incisor teeth has erupted by 1.5 years of age and that another pair erupts each year until 4.5 years of age. On this basis sheep are aged for trading on internal markets, for live export and for grading of lamb carcasses.

These assumptions are not supported by observations on sheep of known age. The evidence from overseas studies (eg Arrowsmith *et al.*, 1974; Purser *et al.*, 1982) is that incisors erupt earlier than commonly believed. In light of the application of the information to developing export opportunities the relationship between number of incisor teeth and age was examined in New Zealand flocks.

MATERIALS AND METHODS

Data on the age of eruption of the first pair of

permanent incisors were obtained from a survey of 23 commercial and research flocks of spring-born yearling sheep on a variety of summer-dry, summer-moist and irrigated properties within the plains area of Ashburton County, Canterbury, New Zealand. These flocks fell into the following categories:

(a) Five breeds of female born in 1981 and reared together.

(b) Coopworth females and males born in 1985 in a common breeding flock. At 2-3 weeks of age half of the males, selected at random, were castrated. From weaning entire and castrated males were run in a separate mob to the females.

(c) Females and males of four breeds born in 1986 on 11 different properties. This included flocks of females and entire males from a common breeding flock on each of four properties, with the two sexes run separately from weaning.

Each flock was inspected on an average of four

occasions between 11 and 18 months of age. At each inspection the number of permanent incisor teeth "in wear" (that is, had erupted above the level of adjacent deciduous teeth) was recorded for individual animals in a fresh random sample with an average size of 94. Live weights at first and last inspection were recorded for twelve of the flocks.

Data were also obtained on the date of eruption of all incisors from five cohorts, born spring 1982 to 1986, of a mixed-age breeding flock of Coopworth females and their yearling replacements. All individuals had age tags inserted at 2-3 weeks of age. Eighteen inspections were carried out between June 1986 and August 1988, using the above procedure to record tooth eruption.

Curves presented in the Results and Discussion section were obtained using the method of generalised linear models, with a probit transformation of the binomial data. The curves were constrained to be parallel between the yearling flocks, and between cohorts for each pair of incisors for the mixed-age flock. For each flock

or cohort, the median age of eruption of a pair of incisors was estimated from the midpoint of the curve. The 95% normal range for flock medians was estimated as the mean \pm standard deviation * t-value. The 95% normal range for individual sheep in an "average" flock was estimated as the range of ages between the 2.5% and 97.5% points on the average curve.

RESULTS AND DISCUSSION

Table 1 presents results for timing of tooth eruption in yearlings.

Differences between breeds reared in the same environment (born 1981) were not significant and there were no obvious breed effects among the remaining flocks. In Aitken and Meyer's (1982) study, the teeth of Southdown sired lambs erupted later than for other breeds. Breed differences were also noted in sheep by Arrowsmith *et al.* (1974). In cattle, differences were noted by Weiner and Forster (1982) but not by Brookes and Hodges (1979).

Differences between females and their half-sib

TABLE 1 Median ages, in months, at which two permanent incisors came into wear for the yearling flocks. For economy of space the median ages for the 1981-born Border Leicester, Cheviot and Dorset female flocks have been omitted; these ages were 14.3, 14.9 and 15.0 months respectively.

Birth year	Mean birth date	Coopworth		Corriedale		Romney		Border Corriedale
		Female	Male	Female	Male	Female	Male	Female
1981	20 Sep	-	-	14.9	-	15.3	-	-
1985	26 Sep	15.2	14.2	-	-	-	-	-
	26 Sep	-	14.2 ¹	-	-	-	-	-
1986	21 Aug	-	-	-	-	-	-	14.7
	26 Aug	15.6	-	-	-	-	-	-
	-	-	15.0	-	-	-	-	-
	31 Aug	15.0	-	-	-	-	-	-
	3 Sep	-	-	15.2	-	-	-	-
	15 Sep	-	-	15.2	14.1	-	-	-
	24 Sep	14.6	14.5	-	-	15.1	14.5	-
	26 Sep	14.9	-	-	-	-	-	-
	26 Sep	15.1	-	-	-	-	-	-
	26 Sep	15.2	-	-	-	-	-	-
2 Oct	-	-	-	-	15.0	-	-	

¹ Castrated.

brothers (whose live weights averaged 10-30 kg heavier) were variable, as shown in Table 1. On average, the entire males were 21 days younger when two incisors came into wear. This is comparable to the sex difference of 15 days reported by Wilson and Durkin (1984). Castration of males had no effect on the timing of tooth eruption in the 1985-born Coopworth lambs (Table 1).

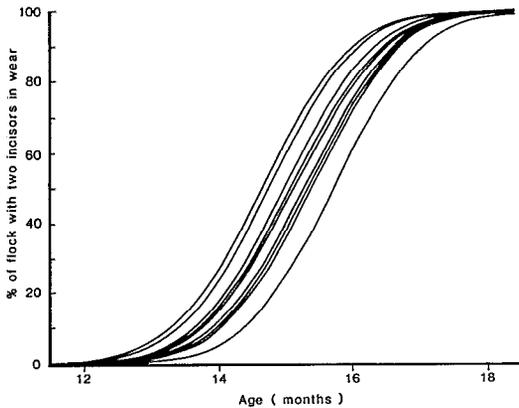


FIG. 1 Increase with age in proportions of female sheep with two permanent incisors in wear, in nine commercial flocks.

There was no obvious effect of year of birth, birth date or growth path on age at eruption. Such effects could have been obscured by confounding of variables between flocks or, as in the case of birth date, by the limited range of values. However it is surprising that growth path had no major effect, since mean live weights among nine female flocks ranged from 29 to 62kg at about 12 months of age and from 51 to 71kg at about 16 months of age, with mean liveweight gains over the intervening period of 2 to 22kg. Earlier tooth eruption was reported in better-fed sheep and cattle by Brookes and Hodges (1979), Arrowsmith *et al.* (1974) and Purser *et al.* (1982), although the reverse trend was noted by Wilson and Durkin (1984). Brookes and Hodges (1979) suggested that variations in nutrition early in life were more likely to affect timing of tooth eruption than later variations.

The common assumption that the first pair of

incisors has erupted by 1.5 years of age is supported by the data from the yearling flocks (Fig. 1 and Table 1). The mean median age in the nine commercial flocks of females born in 1986 was 15.0 months, with a normal range for flock medians of 15.0 ± 0.3 months. For individuals within the "average" flock, the normal range of ages was 15.0 ± 2.0 months. Similar values were obtained for the flocks born in 1981: the normal range between flock medians was 14.9 ± 0.3 months, and between individuals within flocks was 14.9 ± 2.1 months. In both sets of data, the band width for individuals was some seven times greater than for flock medians.

The yearling survey identified a large pool of sheep between 12 and 18 months of age that did not have two incisors in wear (Fig. 1). The significance of this pool arises from the use of number of incisors as one of the criteria for distinguishing between lambs and hoggets for meat export purposes. The New Zealand Meat Producers' Board grades young sheep as lamb until September 30 in the year following birth, that is, until spring-born sheep are about 12 months of age; after this date they are normally graded as hogget. However, for meat destined for markets that will accept meat from older lambs as lamb, the Board will provide dispensation to extend lamb grading after September 30 as long as two permanent incisors are not in wear. Carcass studies have shown that lambs at 12-15 months of age in spring can produce lean, heavyweight carcasses suitable for processing into specialised cuts (Bray and Taylor, 1987). This pool of lambs without two incisors in wear presents an opportunity to improve the continuity of supply of lean, heavyweight carcasses by overcoming the shortfall that occurs each spring before new season's lambs reach suitable size.

The median ages (and normal ranges for individuals) when 2, 4, 6 and 8 permanent incisors came into wear in the mixed-age Coopworth flock were $15 (\pm 2)$, $23 (\pm 4)$, $30 (\pm 6)$ and $42 (\pm 12)$ months, as shown in Fig. 2. These values are similar to those cited for European breeds (Getty, 1975; Aitken and Meyer, 1982) and for African and Asian sheep (Arrowsmith *et al.*, 1974; Wilson and Durkin, 1984; Saini and Singh, 1987).

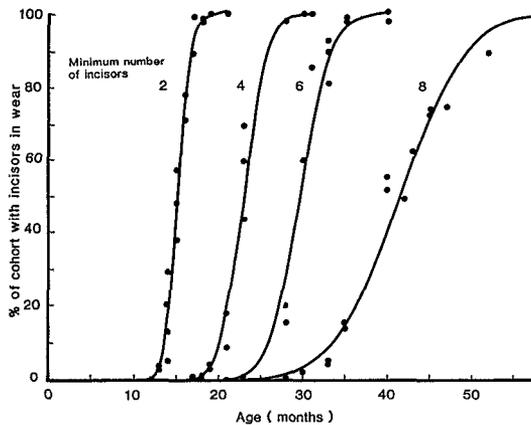


FIG. 2 Increase with age in proportions of female sheep with 2, 4, 6 and 8 permanent incisors in wear, in a mixed-age breeding flock and its yearling replacements. Each point represents the proportion of a cohort that had at least the stated number of incisors in wear on a particular inspection date.

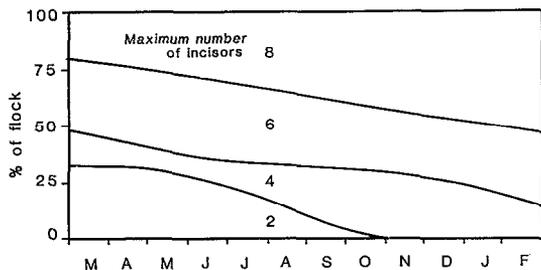


FIG. 3 Variations over a 12-month period in the composition of a mixed-age breeding flock of female sheep in each tooth eruption category. Each February, individuals aged 4.5 years were replaced by individuals aged 1.5 years. Changes in each category are due to differences between the number of animals entering it and the number for which another pair of incisors erupt and so graduate to the next category.

The intervals between eruption of successive pairs of incisors were 8, 7 and 12 months. Also, the range of eruption dates for each pair of incisors increased from 4 to 8 to 12 to 24 months. Because the second and third pairs erupted at intervals of less than 12 months, animals selected on the assumption that one pair of incisors erupts annually between 1.5 and 4.5 years of age would be younger than expected. Also, because of the overlap in age ranges between tooth eruption

categories, sheep with the same number of incisors can differ in age by one to two years. A further issue to note is that time of year influenced the proportion of the flock in each tooth eruption category (Fig. 3). Although these conclusions were reached from data collected from only one flock the results on which they were based are consistent with published findings from a range of breeds and environments so they are expected to have wide application. If so, they highlight significant limitations to the use of number of incisors for determining age in sheep. In particular they highlight major errors arising from the common assumption that all sheep gain a pair of incisors at annual intervals between 1.5 and 4.5 years of age.

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