

Distribution of births within a day in Anatolian Merino Sheep

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In general, all activities of a living being during its lifetime are defined as behaviour. The actions affecting behaviour could come from inside the living being (intrinsic) or from the outside (extrinsic). Behaviour has always been ignored when compared to qualities and quantities of animals' yields such as meat, milk, egg, hair and power. To obtain the maximum efficiency from animals, it is important to improve their environmental conditions and it is crucial to know the features of behaviour that result from environmental effects (Özçalık 2010). Behaviour is a significant criterion for the evaluation of animal well-being; and it is also necessary to understand their different behaviours for the improvement of well-being and efficiency (Yakan *et al.* 2007).

This research was conducted to investigate the relevance of lamb sex, birth type and birth rate on birth distribution within the 24 h daily cycle in Anatolian Merino Sheep. The aim is to find solutions to any problem that could arise in this subject.

The Anatolian Merino sheep (genotype 20% Akkaraman sheep, 80% German Mutton Merino) raised in a private business in Karapınar, Konya were used for the study. Data on 981 births occurring in the business over 2 years were used, in particular birth type (twin or single birth rate), lamb sex, and the distribution of births during the day.

Animals were mated in September and October and the births took place in February and April. The day was divided into 4 equal periods to evaluate the distribution throughout the day; the periods were 22: 01–04: 00 = 1; 04: 01–10: 00 = 2; 10: 01–16: 00 = 3; and 16: 01–22: 00 = 4. The sex of the lambs was coded as 1= female, 2= male. Similarly, birth type was coded as single '1' and twins '2' for the analysis. At the time of birth, the sex of the lambs, birth type and time of birth were determined and recorded. χ^2 was used for the statistical analysis of the data with the Minitab (14) software (Anonymous 1995).

Birth type and sex distribution within years: The average twin birth rate was 19.78%. Female and male birth rate was observed as 56.47% and 43.53%, and 52.44% and 47.56% in 2010 and 2011, respectively. The average female

and male birth rate was 54.54 and 45.46%. The average value of twin rate in our study is 19.78%, which is less than the findings of Karabacak *et al.* (2011) and more than those of Özçalık (2010). The twin rate is an important species characteristic. The twin rate for the current breeds is about 20%.

According to Karabacak *et al.* (2011) the percentage of females in Akkaraman sheep is 44.54%; according to Özçalık (2010) the percentage in the Akkaraman breed is 50%. The percentage of females (54.54%) in the current study was higher than in the above mentioned studies. Theoretically the sex distribution should be 50%. However, in some years the rate might differ. This deviance could depend on parental effects or nutrition (Trivers and Willard 1973).

Time of birth within years: Time of births within years is given in Table 1. On an average, births mostly took place between 04: 01 and 10: 00. In contrast to the findings in the current study, Karabacak *et al.* (2011) stated that Akkaraman sheep usually give birth between 10: 01 and 16: 00 (30.25%). In general, animals prefer to give birth during quiet periods of the day and in places where they will not be disturbed. In this current study, we found that 50% of the sheep gave birth at night.

Distribution of time of birth according to birth order: The distribution of birth times according to birth order is given in Table 2. According to Özçalık's study (2010) the first birth is most often between 10: 00 and 16: 00, the second and thirds birth are between 16: 00 and 22: 00 and the fourth, fifth and sixth births are mostly between 04: 00

Table 1. Number of birth at different time of birth within years

Time of birth	2010		2011		Total (2010–2011)	
	n	%	n	%	n	%
1	130	25.49	125	26.54	255	25.99
2	171	33.53	117	24.84	288	29.36
3	122	23.92	119	25.27	241	24.57
4	87	17.06	110	23.35	197	20.08
Total	510	100.00	471	100.00	981	100.00

χ^2 : 11.413; df, 3; P, 0.010.

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Table 2. Distribution of time of births according to birth order within years

Time of birth	2010		2011		Total (2010–2011)	
	n	%	n	%	n	%
First birth						
1	30	25.64	25	28.09	55	26.70
2	38	32.48	18	20.22	56	27.18
3	28	23.93	23	25.84	51	24.76
4	21	17.95	23	25.84	44	21.36
Total	117	100.00	89	100.00	206	100.00
Second birth						
1	44	26.04	45	28.13	89	27.05
2	59	34.91	36	22.50	95	28.88
3	37	21.89	43	26.88	80	24.32
4	29	17.16	36	22.50	65	19.76
Total	169	100.00	160	100.00	329	100.00
Third birth						
1	29	22.14	34	26.77	63	24.42
2	46	35.11	36	28.35	82	31.78
3	33	25.19	30	23.62	63	24.42
4	23	17.56	27	21.26	50	19.38
Total	131	100.00	127	100.00	258	100.00
Fourth birth						
1	27	29.03	21	22.11	48	25.53
2	28	30.11	27	28.42	55	29.26
3	24	25.81	23	24.21	47	25.00
4	14	15.05	24	25.26	38	20.21
Total	93	100.00	95	100.00	188	100.00

χ^2 : 17.834; DF: 21; P: 0.659.

and 10: 00. Ozdemir and Altin (2010) pointed out that birth order has no effect on time of birth. Depending on birth order, the increase in maternal instinct might affect the time chosen by the sheep. Furthermore, young animals are shyer and older ones are used to the conditions of the place where they live; hence, we think this might have an effect on their choices for time of birth.

Sex and birth types distribution in different times of birth:

The highest female birth rate was observed between 22: 01 and 04: 00 in 2010 (29.25%), and between 04: 01 and 10: 00 in 2011 (26.32%). Also, the highest male birth rate was observed between 04: 01 and 10: 00 in 2010 (32.58%), and between 22: 01 and 04: 00 in 2011 (28.47%). The highest single birth rate was occurred between 04: 01 and 10: 00 in 2010 (38.78%), and between 10: 01 and 16: 00 in 2011 (28.35%). The highest twin birth rate was occurred between 22: 01 and 04: 01 in 2010 (46.61%) and, between 22: 01 and 10: 00 in 2011 (63.16%). Birth type distribution was statistically significant (χ^2 : 76.372; DF: 9; P: 0.000).

Karabacak *et al.* (2011), reported that Akkaraman sheep gave birth to 61.2% of males and 52.8% of females between 04: 01 and 16: 00; in total, 58% of sheep were born in the same period. Ozcalik (2010) stated that Akkaraman male (54.5%) and female (52%) lambs were born from 16: 01 to 04: 00, and in total 53.12% of the lambs were born from 16: 01 to 04: 00 of day.

In the study, most of the twin births (46.61% and 31.58%) took place between 22: 01 and 04: 00. Karabacak *et al.* (2011) indicated in their study that most twin births took place in the third or fourth time period. According to the

same researchers, birth type plays an important role in time of birth. This finding is compatible with the findings of the current study. However, some researches signified that birth type has no effect on time of birth (Ozcalik 2010, Akoz *et al.* 2011). The findings of the current study are incompatible with that claim. The effect of birth order and time of birth on the distribution of birth type, sex and birth type distributions were statistically significant ($P < 0.01$).

Most births take place during dark times of the day or at night. To prevent the death of lambs during birth, particularly in sheep giving multiple births, animals should be kept under control at these times of the day and necessary precautions should be taken. When the necessary measures are taken, deaths can be decreased dramatically and this could contribute to the profitability of the business.

SUMMARY

This research was conducted to investigate the relevance of lamb sex, birth type and birth rate on birth distribution within the 24 h daily cycle in Anatolian Merino sheep. The aim is to find solutions to problems that could arise in this subject. Birth records from 981 ewes and their 1,175 lambs from 2010–2011 were used for the study. The twin birth rate was 19.78% and the females were 54.54% and males 45.46%. The percentage of lambs born between 22: 01 and 04: 00, 04: 01 and 10: 00, 10: 01 and 16: 00, and 16: 01 and 22: 00 was 25.99%, 29.36%, 25.57% and 20.08% respectively. For sheep giving birth for the first time, the highest birth rate (27.18%) was between 04: 01 and 10: 00, while for sheep giving birth for the second, third or fourth time the percentages were 28.88, 31.78 and 29.26%, respectively, and the births occurred at the same time. In the study, 53.93% of births took place during daylight hours while 46.07% of births took place at night. The percentage of births between 22: 00 and 04: 00 was 25.99%.

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