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## THE TIMING OF PARTURITION AND SEX RATIO IN YAKS UNDER FARM CONDITION

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ABSTRACT

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The yak is a multipurpose species and is believed to be indispensable for the highlanders of central Asian countries. Study was designed to investigate the hourly distribution of time of parturition and sex ratio in yak managed under farm conditions in eastern Himalayas. 268 calving data were recorded from 2001 to 2010 of yaks that ranged from 3 to 8 years of age and managed under uniform conditions. The maximum calving occurred between 00.00 – 06.00 hours and least calving were recorded between 18.00 – 24.00 hours. Overall, in comparison to day time (06.00 – 18.00 hours) more calving were seen during night time (18.00 – 06.00 hours). When calving times were examined with respect of sex of the calf a similar pattern of the hourly distribution were found in both sexes. The overall secondary sex ratio was found to be 51.1% male and 48.9% female. Maximum calving occurred between May to October in yaks. During these period highest percentage of female birth was seen during the August and male birth in the month of May.

Key words: Distribution, Parturition, Calving, Sex ratio, Yak

Yak (*Poepagus grunniens*) is an unique bovid species of economical importance in high hills and snow bound areas. This multi-utility bovid is a major source of livelihood for the highlanders providing all the basic necessities in the form of nutritive food, clothing, fuel and much needed transport. Yaks are reared under free-range system and are found in alpine and sub-alpine regions, usually between 3000 – 4500 m above msl with a cold, semi-humid climate. In India, yaks are distributed throughout the 3000 km length of the great Himalayas.

Study of diurnal distribution of parturition is an important parameter which may contribute to optimize the time for checking the herd throughout the day as well as to decrease the required manpower during the calving time. In a study Edwards (1979) noticed age related differences in diurnal distribution of calving in dairy cows. Alexander *et al.* (2003) pointed out that the distribution of birth in the field has been related to

topographic and other environmental factors, which together with the circadian rhythms appeared to influence the onset of parturition in sheep. Yaks are considered to be seasonal breeders. The onset and termination of the breeding season are affected by climate, grass availability and location. In India, the breeding season in yak reaches its peak in July and August when the grass growth is at its best and lasts up to November (Sarkar *et al.*, 2008). Most of the rhythmic activities in yaks including calving, manifestations of estrus and breeding occur during summer, a favourable period of their pastoral life (Nivsarkar *et al.*, 1997). Sex ratio and the various factors affecting it have received the attention of many workers, and as a result considerable information on the subject in respect to man and animals is available in world literature. However, such report in yaks is meager. Therefore, the aim of this study was to explore the hourly distribution of spontaneous live births in yak round the clock and the sex ratio under farm conditions.

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The study was carried out at the National Research Centre on Yak, Indian Council of Agricultural Research,

Dirang, Arunachal Pradesh, India. The yak farm is located at 2750 m above sea level (91°40'E longitude and 27°0'N latitude) in the Nyukmadung area of the West Kameng district of Arunachal Pradesh in India. The animals in the farm were managed under uniform system of management in semi-intensive system. They were allowed to graze during day time and fed a concentrate mixture composed of maize grain, wheat bran, mustard cake, mineral mixture and salt as per the body weight. All the animals had free access to water through out the day.

The study was based on calvings from 2001 to 2010 of yaks that ranged from 3 to 8 years of age. A total of 268 spontaneous calvings were recorded during the period. Herdsmen were on duty 24 hour a day throughout the calving season. Immediately on completion of the calving the time and sex of the calves were recorded. The Secondary sex ratio (SSR) was calculated as per Mora *et al.* (2010). SSR is  $(A/C)*100$ :  $(B/C)*100$ . That is, it was defined as the number of males divided by the total number of individuals (male+female). Where,

A: The number of male calves

B: The number of female calves

C: The number of total calves (A+B)

The data from 268 calvings were collected from natural and spontaneous live births only and the yak that needed help during the delivery were excluded from the observation. The frequency of calving was calculated for four six hours periods related to the time of day. The data obtained witness the existence of a trend in the incidence of spontaneous births. One peak distribution pattern was found. The maximum calving occurred between 00.00 – 06.00 hours i.e. 34.3% of total births compared to the other times. The lowest percentage of birth (19.8%) was observed between 18.00 – 24.00 hours. However, between 06.00-12.00 and 12.00 – 18.00 hours almost a consistent percentage calving was recorded. Edwards (1979) studied time of parturition in 522 Friesian cows and found that calvings were evenly distributed through out the 24 hours with no bias towards

day or night calvings. Bosc *et al.* (1988) found an unimodal distribution of births in goats fed two times daily with the lowest number around mid night and highest number of births around mid-day. About 90% of all births have been observed between 06.00 and 20.00 h. In an another study, Stevenson (1989) reported more calvings occurred from 0601 to 1800 h than 1801 to 0600 h (56 versus 44%) in 924 calvings of Holstein cows and heifers. In yak almost all births take place during the day and only very few at night, when the yak cows are normally at the herder's camp site (Li and Wiener, 1995). In contrary to this, in the present investigation maximum calvings were recorded during night time (18.00 – 06.00 hours) in comparison to day time (06.00 – 18.00 hours) (54.1 versus 45.9 %). This may be because in the present investigation the animals were maintained under farm conditions and during night time there is least human interference.

When calving times were examined with respect of sex of the newborn the similar patterns of the hourly distribution were found in both sexes. Aleksiev (2007) also reported that type of birth and sex of lambs did not have any noticeable effect on birth distribution. The results of this study indicate no influence of the sex of the fetus on the time of parturition. However, Baccari *et al.* (1978) suggest that significantly more female calves may be born at night. It is doubtful whether sex per se would be a strong determining factor of parturition time (Yarney *et al.*, 1982).

Probability theory indicates that the secondary sex ratio (SSR), the ratio of male to female offspring at birth, should be 50:50 in respect of evolutionary equilibrium (Roche *et al.*, 2006). Some authors reported that breed, sire, season, parity and year may be effective factors on sex ratio (Singh *et al.*, 2004; Kaygisiz and Vanli, 2008). In the present study covering birth data of 10 years in an organized farm the overall secondary sex ratio was found to be 51.1% male and 48.9% female in yaks.

A similar calf sex ratio of 52.4% male and 47.8% female for singleton calves in Iranian Holstein herd is reported by Hossein-Zadeh *et al.* (2008). From the

present study it is found that maximum calving occurred between May to October in yak under farm conditions in the eastern Himalayas. About 90.6% of calving was recorded during these periods. During this period the highest percentage of female birth was seen during August (58.33) and male birth in the month of May (60.00). However, from the present study it is found that overall percentages of calving was better during May to October and during this period the sex ratio of yak calves did not deviated to far from the expected 50:50 ratio.

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