Indian Journal of Animal Sciences **85** (5): 446–450, May 2015/Article

A retrospective analysis on yak mortality with special emphasis on neonatal mortality

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Received: 15 September 2014; Accepted: 19 November 2014

ABSTRACT

The study was conducted to find out the mortality pattern of yak and yak calf under semi-intensive management system of rearing in different seasons. Our investigation was carried out based on clinical history, treatment record and post mortem findings of yaks maintained at the institute. Analysis of data for 11 years revealed that total herd strength varies from 87 to 209 numbers. Overall mortality of yak was highest in 2003 (23.15%) and lowest (3.23%) in 2006. Further, calf mortality was highest (21.62%) in 2009 followed by 2008 (20.4%), 2002 (16.67%), 2010 (16.28%) and 2003 (16%). Within the 11-year tenure total numbers of calf death from the farm was 54, which includes 46.3% male and 53.7% female. Out of which 37.03% mortality was observed within first month of age followed by 33.33% in 1–3 months of age. Season-wise mortality pattern was also recorded in the study. The highest mortality in respect to both overall yak mortality (47.16%) and calf mortality (48.15%) was in summer (June- August) followed by autumn (September- November) i.e. 32.95 and 38.89%, respectively. The higher rate of mortality may be one of the major reasons behind the reduced population of yak in India. Seasonal influence also has role on occurrence of yak diseases and mortality.

Key words: Age, Calf, Mortality, Organized herd, Season, Yak

Success of livestock industry depends on the good health of the livestock that helps to increase the productivity (Bangar *et al*. 2013). Survivability and morbidity of calf reflects the clinical health of an organized herd. Various studies were made using both retrospective and prospective data (Wymann *et al.* 2006, Wudu *et al.* 2008, Chenyambuga and Mseleko 2009) of the calves along with morbidity and mortality rate. Disease of the new born calf and subsequent neonatal calf mortality are the major causes of economic losses in livestock production. It is roughly estimated that a calf mortality of 20% may reduce net profit to 40% (Blood and Radostits 1989). It is well known fact that mortality of calves as well as adult directly reflects livestock economics.

Etiological factors for calf mortality involves several disease condition like diarrhoea and respiratory disorder (Shimizu and Nagatoma 1978, Bellows *et al*. 1987, Peters 1986), dystocia (Collery *et al*. 1996), placental dysfunction and low birth weight leading to idiopathic still birth or weak calf syndrome (Berglund *et al*. 2003), milk indigestion (Sharma *et al*. 1984, Simensen 1982). Season is also a crucial point in calf mortality along with herd mortality (Fink 1980, McGuirk *et al.* 1999). Patil *et al*. (1992) reported that in Surti buffalo calves mortality rate was highest in winter (38.29%) in comparison to other season, which is an indicative of seasonal influence on calf mortality.

Yak (*Poephagus grunniens* L.) a unique multipurpose bovid, is reared mostly by the poor and marginal, tribal farmers of rural and remote hilly regions at an altitude of 3000–4500 m and even at 5000 m in people Republic of China, Mongolia, Bhutan, Nepal, Russia and India (Weiner *et al*. 2003, Bandyopadhyay *et al*. 2007). This multipurpose bovid provides economic return through production of milk, meat and wool. About 90% of yak population of the world inhabits the Qinghai-Tibetan Plateau in China, where they are of economic importance to native herdsmen (Liu *et al*. 2008). In India, the yak (*Poephagus grunniens* L.) is the main livestock species in Arunachal Pradesh, Sikkim, Jammu and Kashmir. It is a unique mammalian species which is akin to cattle, and can thrive at –40°C temperature with scanty local feed resources. At 2000 m above the mean sea level (msl), yak served livelihood support to highlanders, although their production traits are inferior to those of improved cattle breeds (Zi *et al*. 2004). The yak population in India is decreasing due to various factors, like loss of resistance against diseases due to inbreeding, transit from

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one place to another, poor reproductive efficiency (Sarkar and Prakash 2005) and non-conception over 30% of reproductive female (Dorji 2006). Besides, morbidity and mortality due to different disease factors are supposed to have influence on reduction of the important bovid. Thus every death in yak causes greater economic loss of poor herdsmen. Infectious diseases like bacteria, viruses, protozoa and other non-infectious causes of death in yak are still not properly reported worldwide. Very few data are available to highlight different etiological factors behind yak and yak calf mortality. Keeping this view the present study investigated various factors behind the yak mortality in a semi-intensive farming system oriented semi-organised herd with special emphasis on yak calf mortality.

MATERIALS AND METHODS

A retrospective year-wise data on yak mortality were collected from a semi-organized farm situated at Nyukmadung (2,750 m above msl), ICAR-National Research Centre on Yak, Arunachal Pradesh, India for 11 years (2002–2012). The points considered during data collection were: total herd strength for the year; year-wise total birth of calf and sex; total yak death; death of yak in respect to age and sex; and systemic disorder responsible for death based on clinical history, treatment record and postmortem diagnosis.

Seasons were classified into winter (Dec to Feb), spring (Mar to May), rainy (June to Aug) and autumn (Sep to Nov) based on environmental diversity i.e. rainfall, humidity, temperature and wind velocity. The data were analyzed by using arithmetic mean and expressed in percentage for graphical representation.

RESULTS AND DISCUSSION

Analysis of data for a period of 11 years revealed that total herd strength varied from 87 to 209 numbers. Overall mortality of yak was highest in 2003 (23.15%) and lowest (3.23%) in 2006 (Fig. 1). Further, calf mortality was highest (21.62%) in the year 2009 followed by 2008 (20.4%), 2002 (16.67%), 2010 (16.28%) and 2003 (16%) (Fig.1). It is a well known fact that mortality of calves as well as adult directly reflects livestock economics. Specially, disease of the new born calf and neonatal calf mortality are the major causes of economic losses in livestock production. It is roughly estimated that a calf mortality of 20% may reduce net profit to 40% (Blood and Radostits 1989). Considering the year-wise mortality rate, the present investigation showed that the maximum (23.15%) mortality of yak occurred in the year 2003 followed by 16.22, 14.94, 12.04% during 2004, 2002 and 2009 respectively. The mortality rate was minimum (3.23%) during the year 2006; but, in yak calf the highest (21.62%) mortality was in 2009 followed by 16.67, 16.28, 16.0% in 2002, 2010 and 2003. Variation of mortality in different years may be due to fluctuation in weather condition, which influences various systemic disorder of yak and yak calves (Islam *et al.* 2005).

Within the 11-year tenure total number of calf death from the farm was 54, which includes 57.41% male and 42.59%

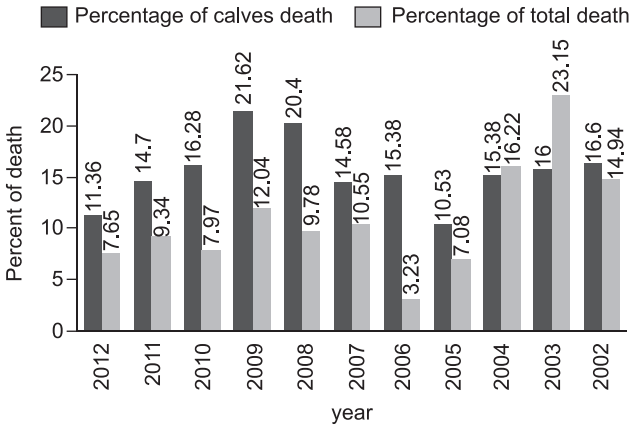

Fig. 1. Year wise mortality pattern in yak and yak calf.

female (Fig. 2). In the present investigation a higher percentage of male yak calves (57.41%) died than female yak calves (42.59%). Reason for this higher mortality of male calves might be due to lower serum immunoglobulins, which is required for the protection from different diseases during neonatal life (Singh *et al*. 2009). Sangwan *et al.* (1985) reported that the absorption of immunoglobulin is less in male (20.69 mg/ml) than female (25.12 mg/ml) calves. Competition between microorganisms and immunoglobulins for a common intestinal receptor does occur in early few hours of life (Staley and Bush 1985), due to this competition male calf become more immune-deficient than female calves. However, after weaning the preference was given to female calves as future herd replacement while male calves were usually sold out for beef purposes. Though Khan and Khan (1995) reported that the sex had no effect on the rate of mortality in young buffalo calves, but our result corroborated with the result of Islam *et al.* (2005).

Fig. 2. Sex wise neonatal mortality in yak.

Results revealed that 37.03% of calf mortality was observed within first month of age followed by 33.33% in 1–3 months of age, 18% in calves above 6 months and 11.11% in calves of 3–6 months age (Fig. 3). Similar

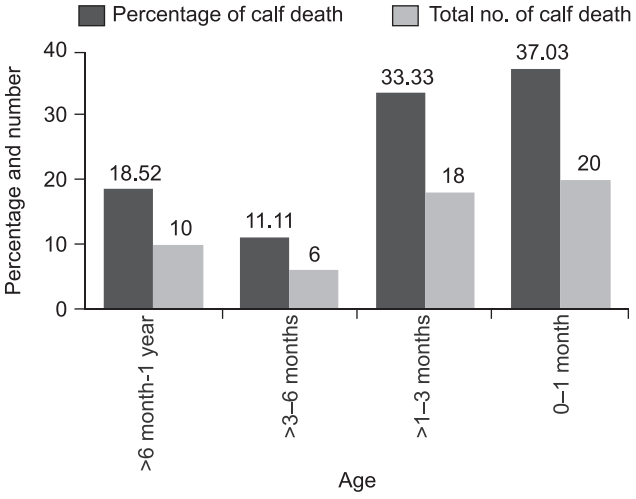

Fig. 3. Age wise yak calf mortality.

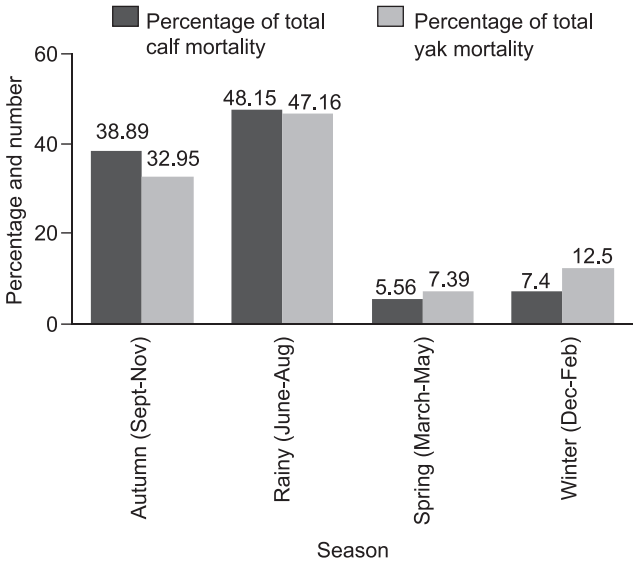

Fig. 4. Season wise yak and yak calf mortality.

observations were recorded by Jenny *et al.* (1981) and Islam *et al.* (2005) who reported that maximum calf mortality occurred during first months of age and mortality percentage reduced as the age increased. Sharma *et al.* (1975) also observed the maximum losses during the first month of life and declined thereafter. Khatun *et al.* (2009) reported the same findings is buffalo calves. The neonate calves are generally known to have lower immunity and vulnerable to a variety of infection especially if they do not ingest adequate colostrum at the right time soon after birth (Radostitis 2005). Higher calf mortality within age of 3 months may be due to lowered immunity, other management-related and environmental factors, which may lead to stress on these calves that exacerbates the occurrence of various infections and subsequently death as reported in earlier studies (Gitau *et al.* 1994, Gitau *et al.* 1999, Wymann *et al.* 2006, Wudu *et al.* 2008).

Season-wise mortality pattern was also recorded in the study. The highest mortality in respect to both overall yak mortality (47.16%) and calf mortality (48.15%) was in rainy or summer season (June-Aug) followed by autumn (Sep-Nov) and winter (Dec-Mar) i.e. 32.95% and 38.89%, respectively (Fig. 4). This might be due to the hot and humid weather of the region during the period which aggravates respiratory infection and digestive disorder and subsequently death of animals (Islam *et al.* 2005). The average comfortable zone of temperature and humidity for yak are 10°C and 60% respectively (Zhang 2000, Cai and Grerald 2003). Temperature and relative humidity in Dec to Feb, Mar to May, June to Aug and Sep to Nov were 3–5°C and 71–77%, 7–11°C and 77–89%, 14–15°C and 83–94% and 6–13°C and 80–88%, respectively, in those areas (Krishnan *et al*. 2009). During May to Sep temperature and humidity remain at far higher level than comfortable zone and Brokpa pastoral nomads are forced to migrate to the higher altitude in search of congenial environment for yaks (Maiti *et al*. 2014). This finding proved that monsoon has a great influence in both adult and calf mortality in yak. which is probably a favorable condition for flaring up of several virulent pathogens affecting the livestock health (Islam *et al.* 2005). Fink (1980) reported that season had a significant effect on the absorption of immunoglobulin in neonatal calves and mortality. Although, Khan *et al.* (2007) reported that calf mortality in buffalo is not influenced by the season but Patil *et al*. (1992) reported that mortality in buffalo calf was highest in winter (38.29%). This variation in findings might be due to different diseases from species to species of livestock.

Analysis of data in respect to involvement in yak mortality of systemic disorder revealed that highest (35.18%) mortality of yak calf was recorded due to respiratory problem followed by digestive disorder (22.22%), calf scour (14.81%), parasitic infestation (12.96) and poisoning (3.71%) (Fig. 5). Calf scour is a clinically defined diarrhoea of calf generally occurs due to concomitant bacterial and viral infections. Other digestive problems like indigestion, impaction, anorexia, diarrhoea and dysentery were recorded separately. However, in whole herd, highest mortality (27.84%) was due to digestive disorder followed by respiratory problem (18.75%), parasitic infection (9.09%), chronic debility and weakness (8.52%) and septicemia (7.95%) (Fig.6). Earlier reports also suggested that digestive problems are primary causes of mortality in cattle (Mockeliunas *et al*. 2005, Megersa *et al*. 2009, Malik *et al*. 2012). The highest mortality in digestive disorder and respiratory problems may be due to highest rainfall and increase temperature in this period. Finding of Mahmood *et al.* (1995) supported our findings who recorded that the mortality in calves were 28.15% due to pneumonia followed by enteritis (21.98%). These are the 2 major diseases reported mainly in young calves of less than 3 months as causes of calf mortality worldwide (Radostitis

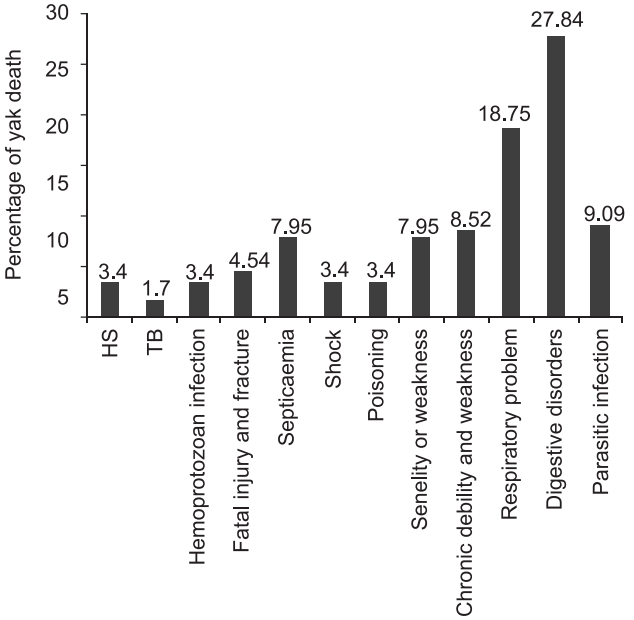

Fig. 5. Systemic disorders and etiological factors involved in yak calf death.

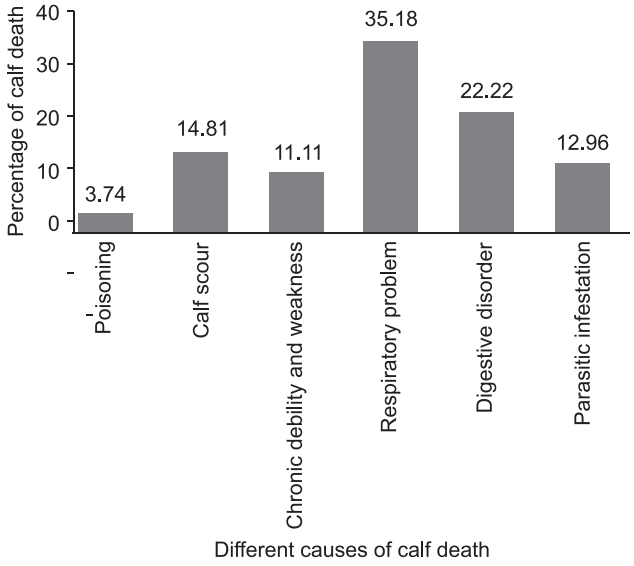

Fig. 6. Systemic disorders and etiological factors contributing to yak death.

2005). Management of yak in captive during the rainy season may cause environmental stress, thus calf scour, parasitic infection, debility and weakness become the major cause of mortality. Further lack of immunity and environmental factors may result to stress on young animals which exacerbate various infections and ultimately lead to deaths reported in earlier studies (Gitau *et al.* 1994, Gitau *et al.* 1999, Wymann *et al.* 2006, Wudu *et al.* 2008).

It has been concluded from the study that various infectious and non-infectious factors like breed, age, sex, herd size, seasons etc. are responsible for adult and yak calf mortality that affect economic return of farmer. These conditions can be controlled with significant reduction in calf mortality by good management practice that include adequate colostrums feeding soon after birth, vaccination, deworming, proper feeding after weaning, good housing and well managed healthy breeding stock. Thus scientific yak husbandry and proper preventive health care in organized herd and field condition will help to reduce the semi domesticated important animal wealth of highlanders.

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