

## Effect of altitude and season on dry matter intake, THI and growth rate in mithun

R K CHAURASIA<sup>1</sup>, A MECH<sup>2</sup>, A DHALI<sup>3</sup>, V K VIDYARTHI<sup>4</sup> and C RAJKHOWA<sup>5</sup>

National Research Centre on Mithun, Jharnapani, Nagaland 797 001 India

Received: 30 January 2014; Accepted: 25 February 2014

**Key words:** Mithun, altitude, THI, FCE, Growth, DMI

Mithuns (*Bos frontalis*) are animals of high hills and are quite adaptable in that range. Igono *et al.* (1992) reported critical values for minimum, mean and maximum THI as 64, 72 and 76, respectively in cattle, and Holter *et al.* (1997) reported a negative and significant correlation between THI and DMI in cows. The environmental temperature and relative humidity significantly influence the feeding behaviour in cow (Portugal *et al.* 2000). Prihar *et al.* (1992) reported that the daily weight gain is significantly higher in crossbred cattle calves in winter. Considering these points the present study was taken to find out the effect of altitude and season on dry matter intake, THI and growth rate in mithun.

**Mithuns, feeding and weighing:** Mithun calves (6) each were selected irrespective of sex and strains at National Research Centre on Mithun, Jharnapani (300 MSL) and at Porba farm which is situated at 2,100 MSL. The animals were kept in confined condition during pre-monsoon season (Mar.-Jun.) and winter (Nov.-Feb). The animals were

conditioned before conducting digestibility trials for 7 days during each season. During the digestibility trial, calculated amount of fresh fodders and concentrate mixtures was provided at 7.00 AM. A representative sample of fodder and concentrate feed was kept in previously labeled polythene bags. The animals were fed with the formulated ration based on their body weight as per NRC (2001).

**Analysis of feed and faeces samples:** Samples (100 g) of fodder and concentrate of the feed and residue were taken and dried at  $100 \pm 1^\circ\text{C}$  for estimation by proximate principles (AOAC 2005). Body weight of the animal was taken before feeding.

**Calculation of THI and analysis of data:** Thermo humidity index data were collected daily for minimum temperature (Min. Temp), maximum temperature (Max. Temp) and relative humidity (RH) using a digital thermo-hygrometer. All the statistical analyses were performed using the SPSS software package, version 10.0.1 and data are presented as mean  $\pm$  SE.

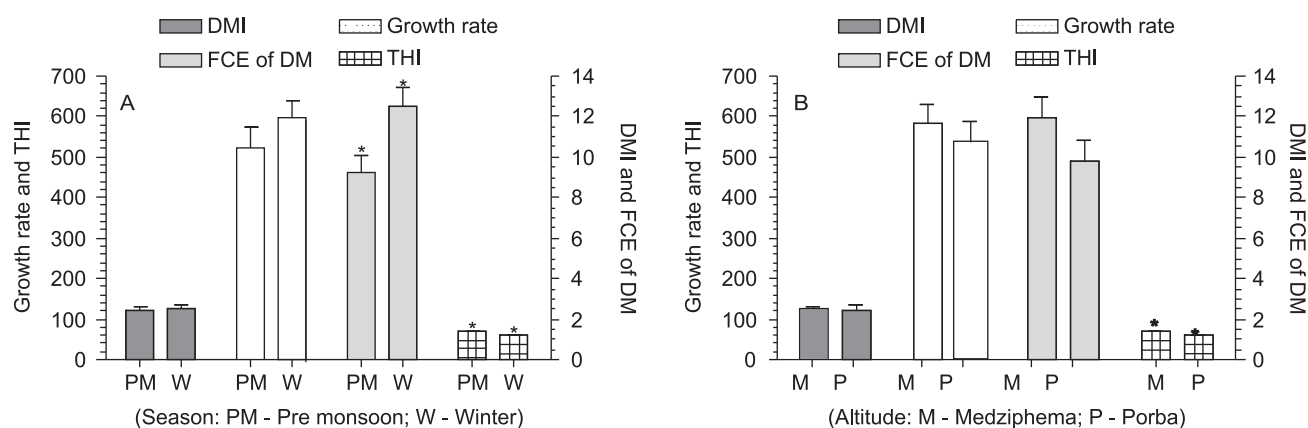


Fig 1. Overall effect of season (panel A) and altitude (panel B) on dry matter intake (DMI, % body weight), growth rate (g/day), feed conversion efficiency (FCE) of DM (kg intake/ kg weight gain) and temperature humidity index (THI) in mithun

Present address: <sup>1</sup>Programme Coordinator (rchaurasia\_2004@yahoo.co.in), KVK, Nagaland University, Lumami, Nagaland. <sup>2,3</sup>Senior Scientist, Department of APD, NIANP, Aduogodi, Bengaluru. <sup>4</sup>Associate Professor, Department of APM, Nagaland University; <sup>5</sup>Director.

The dry matter intake (DMI percent body weight) during pre-monsoon and winter (Table 1) at Medziphema farm differed significantly ( $P < 0.05$ ) however, the values for DMI varied significantly ( $P < 0.05$ ) during winter at both the

Table 1. Variations in dry matter intake (DMI), growth rate, feed conversion efficiency (FCE) of DM and temperature humidity index (THI) in mithun during different seasons (pre-monsoon: Mar-Jun; winter: Nov-Feb) at different altitudes (Medziphema, 300 m MSL; Porba, 2,100 m MSL).

| Particulars        | DMI<br>(% body weight) | Growth rate<br>(g/day) | FCE of DM (kg intake/<br>kg weight gain) | THI                    |
|--------------------|------------------------|------------------------|------------------------------------------|------------------------|
| <i>Pre-monsoon</i> |                        |                        |                                          |                        |
| Medziphema         | 2.2±0.1 <sup>a</sup>   | 521±71                 | 10.1±1.1                                 | 74.3±1.1 <sup>*a</sup> |
| Porba              | 2.6±0.5                | 524±80                 | 8.3±1.3                                  | 65.6±1.1 <sup>*a</sup> |
| <i>Winter</i>      |                        |                        |                                          |                        |
| Medziphema         | 2.8±0.1 <sup>*b</sup>  | 643±61                 | 13.8±1.5                                 | 62.4±1.6 <sup>*b</sup> |
| Porba              | 2.2±0.3 <sup>*</sup>   | 548±68                 | 11.2±1.1                                 | 55.1±0.7 <sup>*b</sup> |

\* indicates values differ significantly (P<0.05) between the altitudes within a season; <sup>a,b</sup> indicates values differ significantly (P<0.05) between seasons within a altitude.

farms. Similar DMI (% body weight) were reported by Baruah *et al.* (1995), Pal and Bujarbaruah (2002), Das *et al.* (2010) and (Pal *et al.* 2002a) in mithuns when fed with different feeding regimes. THI differed significantly (P<0.05) between the altitudes within a season and between seasons within the altitude. However, no significant difference was observed in the growth rate of mithuns during the seasons and between the altitudes. Earlier studies in cattle indicated that the birth weight and growth pattern of mithun calves did not differ significantly during summer and winter (Singh *et al.* 2003). Higher growth rate of 643 g/day was obtained during winter at Medziphema farm, which is well in agreement to the findings of earlier workers (Prihar *et al.* 1992). Prakash *et al.* (2008) reported a weight gain of 353–548 g /day in mithun calves fed different feeding regimes. Das *et al.* (2007) found that average daily gain of Mithun was 577.2 g and 681.8 g, respectively, when fed with and without bakers yeast (*Sacharomyces cerevisiae*).

The values of FCE of DM (kg intake/kg weight gain) did not differ significantly irrespective of altitudes and seasons and is well in agreement with the values of FCE for DM obtained by Prakash *et al.* (2005, 2008, 2008a) in mithuns.

From the present study, it was found that the DMI (% body weight) and THI differed significantly but the parameters such as body weight and feed conversion efficiency of mithuns were not affected. In this context, it is presumed that mithuns can be reared at any altitude between 300 m MSL to 2,100 m MSL without any effect on its feed conversion efficiency of dry matter and body weight gain.

### SUMMARY

A comparative study on effect of altitude and season on dry matter intake, THI and growth rate on growth performance and nutrient utilization in mithun calves was carried out at Medziphema farm (300 MSL) and Porba farm (2,100 MSL), Nagaland, India. The mithuns of either sex were selected and fed in confined condition. DM intake differed significantly during the seasons and between the altitudes. Growth rate of 521 g/day and 524 g/day were

obtained during the experiment during pre- monsoon season which were nonsignificant. Growth rate of 643 g/ day and 548 g/day were obtained during winter at Medziphema and Porba farms, which were showing nonsignificant difference between body weights and at both altitudes. Feed conversion efficiency were nonsignificant between the altitudes and seasons. THI values differed significantly between the altitude and seasons. It was concluded that mithuns can be reared at both the altitudes without any significant difference in body weight

### REFERENCES

- AOAC.2005.*Official Methods of Analysis*. 18th edn. Association of Official Analytical Chemist, Suite 500481, North Frederick, Maryland, USA.
- Baruah K K, Sakia, B N, Bhattacharya, M and Sharma K. 1995. The nutritive value of Para grass for mithun (*Bos frontalis*). *Indian Veterinary Journal* **72**: 333–35.
- Das K C, Prakash B, Dutta P and Rajkhowa C. 2010. Performance of male and female mithun (*Bos frontalis*) reared in captivity and fed mixed tree leaves and straw based ration *Animal Nutrition and Feed Technology* **10**: 75–80.
- Holter J B, West J W and McGilliard M L. 1997. Predicting ad libitum dry matter intake and yield of Holstein cows. *Journal of Dairy Science* **80**: 2188–99.
- Igono M O, Bjotvedt G and Sanford-Crane H T. 1992. Environmental profile and critical temperature effects on milk production of Holstein cows in desert climate. *International Journal of Biometeorology* **36**: 77–87.
- NRC. 2001. *Nutrient Requirements of Dairy Cattle*. 7th revised edn. National Academy Press, Washington, DC, USA.
- Pal D T and Bujarbaruah K M. 2002. Comparative studies in production potential of natural and cultivated grasses and their nutrient utilization in mithun. *Indian Journal of Animal Sciences* **72**(11): 1001–07.
- Pal D T, Singh A S, Mondal S K and Bujarbaruah K M. 2002a. Effect of rice bran supplementation on feed intake and nutrient utilization in mithun. *Indian Journal of Animal Nutrition* **19**(2): 166–70.
- Portugal J A B, Pires M F A and Duraes M C. 2000. Effect of air temperature and humidity on frequency of feeding, water ingestion and rumination in Holstein cows. *Arquivo-Brasileiro-de-Medicina-Veterinaria-e-Zootecnia* **52**: 154–59.
- Prihar A S, Jain P K, Singh H S and Singh N P. 1992. Seasonal variation in physiological response of crossbred calves under

- different housing systems. *Indian Journal of Animal Sciences* **62**: 686–88.
- Prakash B, Mondal M, Rajkhowa S and Rajkhowa C. 2005. Nutritional evaluation of tree lopping based total mixed ration. *Indian Journal of Animal Nutrition* **22**: 166–69.
- Prakash B, Dhali A, Das K C, Rathore S S, Hazarika H and Rajkhowa C. 2008. Nutrient composition and *In Situ* degradability of forest foliages consumed by Mithun (*Bos frontalis*). *Animal Nutrition and Feed Technology* **8**: 175–83.
- Prakash B, Dhali A, Mondal M, Sangtam M, Khate K, Rathore S S and Rajkhowa C. 2008a. Effect of feeding *Lagerstroemia speciosa* and conventional fodder based rations on nutrient utilization, ruminal metabolites and body weight gain in mithun (*Bos frontalis*). *Journal of Animal Physiology and Animal Nutrition* **92**(5): 591–96.
- Singh A S, Meitei A S and Pal D T. 2003. Seasonal variations on birth weight and growth rate in mithun calves raised at semi captive environment. *Environment and Ecology* **21**: 918–21.