

## BODY WEIGHT, BODY MEASUREMENTS AND PHYSIOLOGICAL RESPONSES OF YAK CALVES UNDER ARTIFICIAL REARING SYSTEMS\*

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### ABSTRACT

An investigation was carried out on 18 numbers of new born Yak calves of either sex to study the effect of raising the calves under three feeding systems on body weight, body measurements and physiological responses. The calves were divided into three groups and were placed under three rearing systems: Natural suckling (T<sub>1</sub>), Milk replacer with bottle feeding (T<sub>2</sub>) and whole milk with bottle feeding like foster mother (T<sub>3</sub>). A milk replacer was prepared with conventional feed ingredients containing 22 per cent CP and was offered to the calves under T<sub>2</sub> group. Calves under T<sub>1</sub> were allowed to suckle *ad lib.* mothers' milk two times a day and the calves under T<sub>3</sub> were offered yak whole milk as per body weight requirement. During three months of experimental period, no significant change in body weight, body measurements and physiological responses (pulse, respiration and rectal temperature) were observed among the groups. This study shows that yak calves can be reared under milk replacer feeding containing 22 per cent CP from birth to three months of age without affecting the growth, body measurements and physiological responses.

**Key words:** Milk replacer, Yak, Suckling, physiological response, Concentrate mixture.

Yak (*Bos grunniens*) is a unique multiuse mammalian species of high altitude. It is an integral part of the cultural and social life of yak herdsman living in high altitude. Yak is one of the sources of livelihood to the highlanders as it provides milk, meat, hair, wool, hide and transport. However, calf mortality is one of the most serious factors of reducing the yak population. It is due to the poor health condition of the mother surviving on sparse nutritional availability, harsh climatic condition for which mother is not being able to support required nutrients to the calf or some time due to death of yak cow. In this context, it is an

utmost important to formulate a suitable milk replacer for the well being of the yak calves. Milk replacer is an excellent source of nutrition for the calves that are feed prior to the weaning. It is also a routine practice in dairy calf development program in India and abroad as it ensures better economic gain. Besides, evaluation of physiological responses of yak under different geo-climatic condition and managemental systems is an essential pre-requisite in formulating suitable breeding plan. Considering the paucity of literature about the feeding of milk replacer to the yak calves, the present investigation was undertaken to evaluate an optimum level of protein in the milk replacer for proper growth of yak calves.

\* Part of MVSc Thesis of first author.

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## **MATERIALS AND METHODS**

Eighteen new born yak calves of either sex were procured from the farm of National Research Centre on Yak, Dirang, Arunachal Pradesh and were placed under three rearing systems: - Natural suckling ( $T_1$ ), Milk replacer with bottle feeding ( $T_2$ ) and Whole yak milk with bottle feeding like foster mother ( $T_3$ ). The calves were allowed to suckle mother's milk for a period of 8 days. A milk replacer was prepared with the conventional feed ingredients containing 22 per cent crude protein (Table-1) and was offered to the calves under  $T_2$  as per recommendation of the earlier worker<sup>2</sup> for dairy calf. The calves under  $T_1$  were allowed to suckle ad lib. mother's milk two times a day and the calves under  $T_3$  were offered whole yak milk which contained 4.25, 7.87, 0.87 and 18.77 per cent protein, fat, total ash and total solid respectively as per body weight requirement. The concentrate mixture containing 16.52 per cent crude protein (Table-2) and maize fodder containing 8.20 per cent crude protein were offered from the beginning of the experiment. During three months experiment period, weekly body weights, fortnightly body length and heart girth, daily respiration, pulse and rectal temperature of the calves were recorded. The statistical analysis of the data was carried out using ANOVA<sup>10</sup> in randomized block design. Least significant differences were calculated to compare the variations between the treatments showing significant difference.

## **RESULTS AND DISCUSSION**

The average initial, final and overall average body weights of the calves of different groups are presented in Table-3. The difference in the body weight did not vary significantly among the groups. This clearly indicates that there was no significant difference in assimilation of ingested feed in the three different treatment groups. It was also indicated that the quantity of milk replacer offered to the calves ( $T_2$ ) was optimum for growth. The present study was in agreement with earlier workers

<sup>1, 4, and 6</sup> who indicated that there was no significant difference in growth rate while feeding two different milk replacer in dairy calves.

The initial and final body lengths of the calves under the three treatments were 54.17+1.67, 54.50+0.80, 56.67+2.25 and 75.83+2.30, 80.17+2.55, 76.10+2.67 cm respectively (Table 3). The overall average values for the body length were 66.18+2.89, 66.70+1.59 and 66.23+2.75 cm in  $T_1$ ,  $T_2$  and  $T_3$  respectively. No significant difference was found in the body length of the calves under three treatments. Earlier worker<sup>11</sup> reported the body length of China yak at birth as 48.45 cm which was lesser than the present study. This might be due to differences in type of yak. The body lengths of the calves increased with the advancement of age which corroborates with the findings of the earlier researcher<sup>8</sup> in dairy calf.

The average initial, final and overall average values for the body length and heart girth are presented in Table -3. No significant difference was found in the body length and the heart girth of the calves under three treatments. However, these were increased with the advancement of age. Similar observation was also made by other worker<sup>8</sup> in dairy calves. The earlier researcher<sup>11</sup> reported that the heart girth of China yak at birth was 56.38 cm which is less than the present value. This might be due to the different type of yak. The body measurements of Brown Swiss calves as reported by earlier worker<sup>7</sup> were not affected by the feeding of milk replacer during pre and post weaning period of growth.

The average initial, final and overall respiration rate of the calves under the three treatments has been presented in Table -3. The overall average respiration rates of the calves were 30±0.77, 29±0.69 and 30±1.12 per minute in treatment  $T_1$ ,  $T_2$  and  $T_3$  respectively. The overall average pulse rates of the calves were

58±0.82, 59±0.46 and 60±0.43 in treatment in T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> respectively. The overall average temperatures of the calves were 101.7±0.09, 101.6±0.07 and 101.5±0.07 °C in treatment T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> respectively. The respiration, pulse and temperature of the calves were within the normal range and there was no significant difference among the treatments. This indicates that the treatment has no ill effect on the health of the calves. The earlier worker<sup>9</sup> reported the respiratory frequency/min, pulse rate/min. and rectal temperature in yak as 32.3–58.3 (42.5 ± 2.3), 63.1–78.2 (69.2 ± 1.6) per min and 101.8–103.5 (102.4 ± 0.1) °C respectively. These findings were in agreement with the present results. Kids can be

reared economically using milk replacer and when feeding and management is good, disease outbreak do not cause problem as reported by<sup>5</sup>. Normal growth and physiological condition in orphan foal were found by the earlier researcher<sup>3</sup> in feeding milk replacer. The present investigation, the first of its kind in our opinion, deals with the study of the growth and physiological responses of yak under different rearing systems. Thus, it can be concluded that the yak calves can be reared under milk replacer feeding containing 22 per cent CP from birth to three months of age without affecting the growth, body measurements and physiological responses.

**Table 1: Composition of milk replacer**

Ingredients	Parts
Wheat	35.00
Fish meal	10.00
Soya bean meal	20.00
Skim milk	13.50
Coconut oil	8.40
Molasses	8.00
Citric acid	1.50
Butyric acid	0.30
Mineral mixture	3.00
Antibiotic mixture	0.30
Rovimix	0.015
Total	100.015
<b>Composition (Per cent)</b>	
Dry matter	91.25
Crude protein	22.42
Total digestible nutrients	93.12

**Table 2: Composition of concentrate mixture**

Ingredients	Parts
Maize grain	35.00
Wheat bran	15.00
Rice bran	12.00
Soybean meal	10.00
GNC	10.00
MOC	15.00
Min.mixture	2.00
Common salt	1.00
<b>Composition (Per cent)</b>	
Dry matter	86.54
Crude protein	16.52
Total digestible nutrients	94.12

**Table 3 : Body weight, body measurements and physiological responses of Yak calves under three rearing systems.**

Parameters	Age	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
Body weight (Kg)	Initial	18.58±0.86	22.08±0.67	19.92±1.00
	Final	49.50±1.59	50.83±1.75	47.50±3.53
	Overall Av	36.79±5.05 <sup>a</sup>	36.57±2.60 <sup>a</sup>	35.01±2.74 <sup>a</sup>
Body length (cm)	Initial	54.17±1.67	54.50±0.81	56.67±2.26
	Final	75.83±2.30	80.17±2.55	76.17±2.67
	Overall Av.	66.18±2.89 <sup>a</sup>	66.70±1.59 <sup>a</sup>	66.23±2.75 <sup>a</sup>
Heart girth (cm)	Initial	67.00±1.69	70.33±1.64	69.83±1.77
	Final	89.50±1.88	91.17±1.73	92.17±1.03
	Overall Av.	80.50±3.05 <sup>a</sup>	80.71±2.77 <sup>a</sup>	80.76±1.67 <sup>a</sup>
Respiration (frequency per minute)	Initial	32±2.77	30±1.31	32±2.61
	Final	30±1.46	33±1.92	34±2.36
	Overall Av.	30±0.77 <sup>a</sup>	29±0.69 <sup>a</sup>	30±1.12 <sup>a</sup>
Pulse (rate per minute)	Initial	60±3.04	64±3.19	62±2.38
	Final	59±0.91	61±1.55	61±1.69
	Overall Av.	58±0.82 <sup>a</sup>	59±0.46 <sup>a</sup>	60±0.43 <sup>a</sup>
Rectal temperature (°C)	Initial	102.4±0.27	102.3±0.15	101.8±0.18
	Final	101.7±0.18	101.6±0.17	101.4±0.20
	Overall Av.	101.7±0.09 <sup>a</sup>	101.6±0.07 <sup>a</sup>	101.5±0.07 <sup>a</sup>

Values bearing same superscript in row did not differ significantly.

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#### REFERENCES

- Ackerman, R.A., Thomas, R.O., Thayne, W.V. and Butcher, D.F. 1969. Effect of once-a-day feeding of milk replacer on body weight gain of dairy calves. *J. Dairy Sci.* 11: 1869-1872.
- Arora, S.P. 1979. *Dairy Hand Book*, NDRI, Karnal. Pp-57.
- Cymbaluk, N.F., Smart, M.E., Bristol, F.M. and Pouteaux, V, A. 1993. Importance of milk replacer intake and composition in rearing orphan foals. *The Canadian Veterinary Journal.* 34(8): 479-86.
- Galton, D.M. and Brakel, W.J. 1976. Influence of feeding milk replacer once versus twice on growth, organ measurements and mineral content of tissues. *J. Dairy Sci.* 5: 944-948.
- Greenwood, P. 2000. *Artificial method of rearing goats*. 2<sup>nd</sup> Edn. Academic Press, London, U.K.

