

## 1 RESEARCH ARTICLE

 2 Blood Biochemical Studies of Enrofloxacin in Yak  
 3 after Intravenous Administration Article Title

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## 8 ABSTRACT

9 The blood biochemical parameters were investigated in yak (*Bos grunniens* L) after intravenous admini-  
 10 stration of 5 mg/kg enrofloxacin. Blood samples were collected from the jugular vein daily for 5 days after  
 11 the initiation of drug administration. Heparinized blood samples were collected for determination of  
 12 mean corpuscular volume (MCV), erythrocyte sedimentation rate (ESR), hemoglobin (Hb) estimation and  
 13 serum was collected for estimation of total protein, albumin, globulin, urea and blood glucose. Results of  
 14 hematological and blood chemistry profile revealed that enrofloxacin did not change above mentioned  
 15 parameters significantly. Therefore, the drug might be used safely in the yaks.

16 **Keywords:** *Enrofloxacin, Yak, Blood chemistry, Hematology*

17 Enrofloxacin, a fluoroquinolone antimicrobial is ap- 44 clinically to evaluate health status and to rule out the  
 18 proved exclusively for veterinary use and has a broad 45 possibility of any diseases. They were housed in the  
 19 spectrum of antibacterial activity with MIC values rang- 46 animal shed with concrete floor and were maintained on  
 20 ing from 0.008 to 0.06µg/ml. It has wide spread distri- 47 green fodder, dry grass and concentrate. Water was pro-  
 21 bution to most tissues and body fluids with a potential 48 vided ad libitum.

23 Hence, it is effectively used in the treatment of septic- 49 *Experimental design*

24 mia, respiratory tract, urinary tract, skin, soft tissues, 50 The study was conducted in six clinically healthy  
 25 bone and joint infections. Yak (*Bos grunniens* L), being 51 male yaks. Blood samples (12 ml) were collected by  
 26 the most ecologically sustainable animal resource of 52 jugular vein puncture just before drug administration  
 27 Indian Himalayas, is the mainstay for highlanders, pro- 53 (normal/control), 30 minutes after drug administration  
 28 viding basic needs in terms of meat, milk, hair wool 54 and on 24 hours intervals for 5 days. 4 ml aliquots of  
 29 and transportation in hilly terrain. For safety of admini- 55 collected blood were transferred to vials containing  
 30 stration in various animals, biochemical properties of 56 heparin as anticoagulant in order to estimate haemoglo-  
 31 enrofloxacin have been carried out in cattle [1], buffalo 57 bin, PCV and ESR. Remaining 8ml of blood samples  
 32 [2] and goat [3]. However, available data are inade- 58 were kept in clean dry wide mouthed tubes in slanting  
 33 quate to warrant effective clinical use of enrofloxacin in 59 position at room temperature to separate serum for esti-  
 34 yak. In the light of the above reports, it was decided to 60 mation of total serum protein, albumin, globulin, urea,  
 35 study possible biochemical and hematological changes 61 and blood glucose.

## 37 MATERIALS AND METHODS

38 *Experimental animals*

39 The study was conducted in six male yaks (*Bos* 64 Standard procedures were followed for quantitative  
 40 *grunniens* L) reared in the National Research Centre on 65 determination of biochemical and hematological proper-  
 41 Yak, Nykmadung Farm, Dirang, Arunachal Pradesh, 66 ties. Haemoglobin was determined by acid hematin  
 42 India. The animals were weighing between 270-330 kg 67 method described by Barker et al in 1965 [4], PCV by  
 43 and 2 ½- 3 ½ years of age. The animals were examined 68 micro-haematocrit method as described by Prasad by  
 69 1992 [5], and ESR by standard Wintrobe method. Bio-  
 70 chemical analyses of samples were performed to meas-  
 71 ure glucose, total protein, albumin, blood urea nitrogen

Table 1. Mean (n = 5) hematological and biochemical parameters after i.v. administration of enrofloxacin (5mg/kg) in Yak

Day	Hb (g%)	ESR (mm/24 h)	PCV (%)	Protein (g %)	Albumin (g/dl)	Globulin (g/dl)	Glucose (mg/dl)	Urea (mg/dl)
Normal	12.17±0.55 <sup>a</sup>	6.97±0.35 <sup>a</sup>	46.50±0.64 <sup>a</sup>	5.03±0.06 <sup>a</sup>	2.69±0.14 <sup>a</sup>	2.14±0.09 <sup>a</sup>	42.82±1.01 <sup>a</sup>	30.24±2.02 <sup>a</sup>
1 <sup>st</sup>	12.05±0.45 <sup>a</sup>	6.67±0.57 <sup>a</sup>	46.37±1.79 <sup>a</sup>	5.79±0.39 <sup>a</sup>	3.20±0.11 <sup>a</sup>	2.59±0.10 <sup>a</sup>	124.60±3.01 <sup>b</sup>	49.01±2.46 <sup>b</sup>
2 <sup>nd</sup>	12.57±0.42 <sup>a</sup>	7.08±0.56 <sup>a</sup>	43.90±1.49 <sup>a</sup>	5.63±0.34 <sup>a</sup>	3.15±0.11 <sup>a</sup>	2.44±0.09 <sup>a</sup>	78.91±1.71 <sup>c</sup>	89.04±3.11 <sup>c</sup>
3 <sup>rd</sup>	12.03±0.47 <sup>a</sup>	6.75±0.50 <sup>a</sup>	45.00±1.42 <sup>a</sup>	5.17±0.34 <sup>a</sup>	2.91±0.14 <sup>a</sup>	2.27±0.16 <sup>a</sup>	57.97±2.43 <sup>b</sup>	60.36±2.99 <sup>b</sup>
4 <sup>th</sup>	12.66±0.46 <sup>a</sup>	6.25±0.40 <sup>a</sup>	46.66±2.13 <sup>a</sup>	5.27±0.42 <sup>a</sup>	2.87±0.13 <sup>a</sup>	2.39±0.14 <sup>a</sup>	51.32±2.35 <sup>a</sup>	47.39±4.68 <sup>a</sup>
5 <sup>th</sup>	13.46±0.40 <sup>a</sup>	7.42±0.40 <sup>a</sup>	40.71±1.11 <sup>a</sup>	5.63±0.38 <sup>a</sup>	3.01±0.13 <sup>a</sup>	2.62±0.12 <sup>a</sup>	45.12±2.02 <sup>a</sup>	38.00±3.96 <sup>a</sup>

Having same superscripts no significant difference ( $p < 0.05$ )

Having different superscripts significant difference ( $p < 0.05$ )

72 and globulin as described in literature supplied with the 113tion of enrofloxacin. The mean level of protein, albu-  
73 kits. For estimation of blood glucose, albumin, total 114min, and globulin in present study did not show signifi-  
74 serum protein and blood urea nitrogen, a UV spectro- 115cant difference and was consistent with data reported by  
75 photometer (Systronic) was used at wavelength 630, 116Nath et al., 2000 [9].

76 555 and 480 nm respectively in accordance with pro- 117 The present study suggests that administration of en-  
77 vided instructions. Results were calculated according to 118rofloxacin intravenously at a rate of 5 mg/kg body  
78 the formula provided in kit. 119weight in yak does not change the hematology and bio-  
79 120chemical profile of the animal; hence it is suggested for  
121 clinical use.

#### 80 Statistical analysis

81 Analysis of variance was used to detect differences 122  
82 between means for hematological and biochemical pa- 123  
83 rameters.  $p$  values  $< 0.05$  were considered to be statisti- 124  
84 cally significant. 125

#### 85 RESULTS

86 The results obtained in the study are presented in the 130  
87 Table 1. 131

#### 88 DISCUSSION

89 Mean (n=5) hematological and biochemical results 132  
90 after intravenous administration of enrofloxacin 133  
91 (5mg/kg) in yak are presented in Table 1. In the present 134  
92 study, it is observed that blood glucose level increases 135  
93 after intravenous injection of enrofloxacin in yak. This 136  
94 might be due to stress which is developed due to re- 137  
95 peated puncture of the jugular vein which in turn trig- 138  
96 gers the release of epinephrine from adrenal medulla, 139  
97 stimulating glycogen breakdown and also inhibits gly- 140  
98 cogen synthesis in the liver, thus directing all available 141  
99 glucose residue and precursors into the production of 142  
100 free blood glucose [6]. It was observed that blood urea 143  
101 level increased significantly. This was probably due to 144  
102 intravenous administration of enrofloxacin, which inhib- 145  
103 its the growth of enteric organisms that synthesize en- 146  
104 zyme urease responsible for breakdown of urea to am- 147  
105 monia in the G.I. tract. As a result, urea passes from 148  
106 intestine to blood and elevates the blood urea level [7]. 149

107 The normal level of Hb, ESR and PCV of adult yak 150  
108 are 12.8 g/dl, 6-10 mm/24 h and 36.0% respectively as 151  
109 reported by Nivasarkar et al., 1998 [8]. In the present 152  
110 study Hb, ESR and PCV values are consistent with the 153  
111 previous report and there was no significance effect on 154  
112 Hb, ESR and PCV values after intravenous administra- 155

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