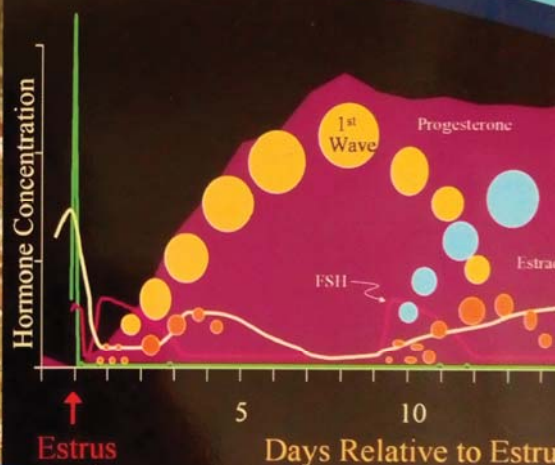
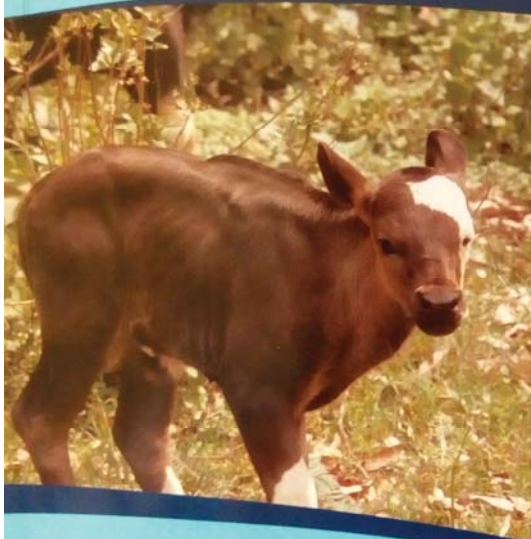


Development of Hormone Immunoassays and their Applications in Reproductive Endocrinology of Mithun



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FOREWORD

Mithun (*Bos frontalis*), "The Cattle of Mountains", is a rare species of bovine which is having limited geographical distribution and mainly found in the jungles of Northeastern Hills Region (NEHR) in India and also some parts of Bhutan, Myanmar, China and Bangladesh. It is a forest-loving animal, quite hardy and thrives well on the jungle under free-range condition at various altitudes between 1000 and 3000 meter above mean sea level. The population of mithun is around 0.26 million and the present growth rate of its population is of great concern to the conservation scientists.

This unique hill animal of NEHR has an important role in the economic, social, cultural, and religious life of the local tribal population. It is one of the underutilized animals but has got tremendous potential, especially for meat production. It is used as a draught or pack animal due to its surefootedness on the steep hilly slopes. Mithun is also used as a bridal gift and barter trade. It produces milk in less quantity (1-2 litre) but of high nutritive value containing more than butterfat and protein content than cattle. It also serves as a prestigious asset to the owner. Number of mithuns a farmer possesses indicates his social status in the society. Having been importance of mithun in the day-to-day life to local tribal populace and scrutinizing its declining trend of population growth over the decades, there is a need to introduce this prized hill animal for scientific rearing and thus exploiting the potentiality of this precious germplasm for economic upliftment for the cause of the poor farmers in this corner of the country.

Good reproductive performance is essential for efficient livestock production, so improvement programs should increase reproductive efficiency to the extent that this can be justified economically. The female calves must grow rapidly to attain sexual maturity, initiate estrous cycles, ovulate and be mated by fertile males or inseminated with viable semen at the proper time for any chance of conception. The basic goal of all production oriented animal reproduction techniques is to increase the proportion of high genetic merit females that have estrous cycles and get pregnant in a reasonable time. In this regard, mithuns suffer from inherent problems, like: (a) late maturity (b) poor estrus expressivity throughout the year and (c) long post partum calving intervals. No information was available on endocrine physiology of this important animal which could provide us cues to improve its fertility and hence productivity in terms of meat, milk and draughtability. Endocrine research in mithun is of great importance for understanding its growth and reproduction. The research on endocrinology is again dependent on the assay procedures already available for estimation of hormone principles. No immunoassays were available for mithun. The authors therefore developed a couple of enzymeimmunoassays for estimation of different physiologically important hormones which now made us enable to understand this species totally in endocrinological view point. These developed hormone assay procedures are of immense importance for further augmenting the productive and reproductive efficiencies of mithun in near future.

I hope this technical bulletin will be very useful for the scientists, students, conservation biologists, academicians and farmers and would attract wide readership. I sincerely appreciate the efforts of the authors for this bulletin which is based on extensive research and extraordinary application of their scientific pursuit.



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PREFACE

Mithun (*Bos frontalis*), which is today believed to be the descendent of wild gaur (*Bos gaurus gaurus*) of India and Myanmar, is an animal of special significance for the tribal people of North Eastern Hills region of India. This animal is also known as "Pride of Northeast" and "Cattle of Mountain." Mithun is basically used for beef purpose besides its use in barter trade, marriage gift etc. It also serves as a prestigious asset to the owner. The local tribal population in the northeastern hills region of the country symbolizes their old tradition of keeping this animal as pride of the society. Probably, mithun is the only ruminant that can browse on biomass most efficiently on difficult steep hill slopes under adverse climatic condition prevailing in the region. Mentioning the importance of mithun, International Union for Conservation of Nature said ".....For centuries owners have allowed them to run semi-wild in small herds, browsing the dense jungle. Their genetic potential is such that they could have wide spread impact up-grading other cattle in the world. (IUCN, 2002)." The population growth of this unique hill animal is decreasing due to various biotic and abiotic pressures.

The problems of late maturity, silent estrus and long postpartum estrus in addition to inbreeding and crossbreeding are the main hindrances for making the mithun husbandry as a sustainable livestock enterprise. In this context, there is need to understand the basics of Mithun reproduction and to develop technologies for augmenting the reproductive efficiency of this species. In this context, endocrine research is paramount for understanding growth and reproduction in mithun. The research in the field of endocrinology is dependent on the hormone assays available. As no assays for estimation of hormone principles in mithun blood plasma were available, we therefore developed and validated several enzymeimmunoassays specific for mithun and these hormone assays are now an important tool for better understanding of this magnificent species of animal. Most importantly, the developed assays were found to be several times cheaper than commercially available kits, besides they are simple, reliable and highly sensitive.

We hope that this technical bulletin will be of immense help for the scientists, students, academicians and farmers for making mithun husbandry a sustainable and economically viable livestock enterprise in the country.

Date: March 15, 2013

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