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**SCHOLARLY INTERESTS**

My research interests include population genetics, cytogenetics, and molecular genetics of domesticated animals. Presently I am holding the Research Management Position and coordinating all aspects of research on yak improvement. Therefore, my present domain of research interest includes nutrition, genetics, physiology, medicine, parasitology, livestock production & management, biotechnology and livestock products technology for overall development of yak.

**PROFESSIONAL EXPERIENCE**

1992-1997: Scientist, Indian Veterinary Research Institute, UP, India  
1997-2005: Senior Scientist, Indian Veterinary Research Institute, UP, India  
2005-2010: Principal Scientist & Head, Regional Station, Central Institute for Research on Buffaloes, Nabha, Punjab, India  
2010-2012: Principal Scientist & Head, Regional Station, Central Arid Zone Research Institute, Pali, Rajasthan, India  
2012-Present: Director, National Research Centre on Yak, Arunachal Pradesh, India

**RESEARCH AWARDS**

**As Principal Investigator**

1. *Project title:* Improvement of goats for pashmina production (1996-1998).
2. *Project title:* Studies on high resolution banding of Chromosomes of Bovidae (2000-03).
3. *Project title:* Characterization of Integrin genes in buffaloes (2003-04).
4. *Project (DBT funded) title:* Characterization and mapping of selected genes known to control immune response in water buffaloes (2004-07).
5. *Project title:* Genetic evaluation of Nili Ravi buffaloes (2005-10).
6. *Project title:* Network Project on Buffalo Improvement: Nili Ravi buffaloes (2005-10).

### As associate

1. *Project (DBT funded) title:* Isolation and molecular characterization of superior fibre degrading anaerobic fungus and development of protocol for their preservation and utilization for increasing digestibility of fibrous feed in buffaloes (2006-09).
2. Project (EU Funded) title: Integrated consortium on tick and tick borne diseases (2004-08).
3. *Project (NAIP funded) title:* Rumen microbial diversity in domesticated and wild ruminants and impact of additives on utilization of poor quality feeds (2008-2011).
4. *Project (AP Cess Fund) title:* Molecular studies on milk protein genes and its association with production traits in buffaloes (2002-2005).
5. *Project (Inter-institutional) title:* Assessment of current status and breed characteristics and genetic structure of Nili Ravi buffaloes in their breeding tract (2008-2010).
6. *Project (Inter-institutional) title:* DNA polymorphism of genes associated with growth performance in Mithun (*Bos frontalis*) (2003-2006).
7. *Project title:* Molecular analysis of interleukin locus in buffalo (2002-05).
8. *Project title:* DNA polymorphisms in NRAMP1 gene and its association with genetic resistance to bovine brucellosis (2001-2004).
9. *Project title:* Monitoring somatic cells in milk of Nili Ravi buffaloes (2006-09).

### RESEARCH ARTICLES

1. Anandan, S.; **Deb, S. M.** and Dey, A. 1998. Predicting wool yield from body weight in Pashmina goats. *Indian Veterinary Medical Journal*, **22**(6): 130.
2. Anandan, S.; Dey, A.; and **Deb, S. M.** 1998. Effect of zinc and copper supplementation on wool production in German angora rabbits. *Indian Journal of Animal Nutrition*, **15**(3): 216-217.
3. Anandan, S.; Dey, A. and **Deb, S. M.** 1999. Effect of curds as probiotic supplements on performance of Cheghu crossbred kids. *Small Ruminant Research*, **32**: 93-96.
4. Anabarasani, K.; Sharma, A. K.; Singh, R. K.; **Deb, S. M.** and Sharma, D. 2001. Genetic differentiation among goats using randomly amplified polymorphic DNA. *Journal of Applied Animal Research*, **20**(1): 83-88.
5. Anabarasani, K.; Sharma, A. K.; Singh, R. K.; **Deb, S. M.**; Sharma, D. and Mazumder, N. K. 2002. Genetic relatedness among descript and non-descript goats using Randomly Amplified Polymorphic DNA (RAPD). *Indian Journal of Animal Sciences*, **72**(1): 96-98.
6. Biswas, J. C.; Somvanshi, R.; **Deb, S. M.** and Sidhu, N. S. 1994. Angora strains of rabbits – certain studies of locally evolved ones. *Bioved*, Journal of Bioved Society, Allahabad. **5**(2): 133-138.
7. Das, K. S.; Singh, G.; Paul, S. S.; Malik, R.; Oberoi, P. S. and **Deb, S. M.** 2011. Physiological responses and performance of Nili-Ravi buffalo calves under different washing frequency during hot summer months in tropics. *Tropical Animal Health and Production*, **43**(1): 35-39.
8. **Deb, S. M.** 1998. Performance of Pashmina (*Cashmere*) goats on Kumaon Himalayas. *Indian Journal of Animal Sciences*, **68**(9): 954-956.
9. **Deb, S. M.**; Anandan, S. and Gaur, G. K. 1998. Factors affecting and estimation of body weight using conformation traits in Pashmina goats. *Indian Journal of Animal Sciences*, **68**(3): 263-264.

10. **Deb, S. M.** and Biswas, J. C. 1994. Preliminary cytogenetic studies on golden hamster (*Mesocricetus auratus*). *Indian Journal of Heredity*, **8-12**(2&3): 101-104.
11. **Deb, S. M.** and Biswas, J. C. 1995. Chromosome complements of Pashmina (Cashmere) goats. *Indian Journal of Animal Sciences*, **65**(4): 472-473.
12. **Deb, S. M.** and Biswas, J. C.; Putan Singh and Joshi, L. M. 1995. Performance of angora rabbits for wool production in temperate hills. *Wool and Woolens of India*, **32**(2): 23-25.
13. **Deb, S. M.** and Goswami, S. L. 1990. Cytogenetic analysis of goat oocyte cultured *in vitro*. *International Journal of Animal Science*, **5**(1): 137-143.
14. **Deb, S. M.** and Gaur, G. K. 1996. Performance of broiler rabbits in sub-temperate hills. *Indian Veterinary and Medical Journal*, **20**(3): 184-189.
15. **Deb, S. M.** and Gurnani, M. 1994. Correlation between test day milk yields under field conditions. *International Journal of Animal Science*, **9**(2): 139-140.
16. **Deb, S. M.** and Gurnani, M. 1994. Relationship between total lactation milk yield and individual test day records in the field. *International Journal of Animal Science*, **9**(2): 297-298.
17. **Deb, S. M.**; Gurnani, M. and Chacko, C. T. 1994. Reducing cost of field recording for milk yield. *Indian Journal of Dairy Science*, **47**(12): 1022-1026.
18. **Deb, S. M.**; Gurnani, M. and Chacko, C. T. 1998. Comparison of sire evaluation methods under field conditions. *Indian Journal of Dairy Science*, **51**(4): 210-215.
19. **Deb, S. M.** and Nandi, S. 1996. Chromosome complements of BHK21 cell line. *Indian Veterinary and Medical Journal*, **20**: 136-137.
20. Ganguly, I.; Sharma, A.; Singh, R.; **Deb S. M.**; Singh, D. K.; Mitra, A. 2008. Association of microsatellite (GT)<sub>n</sub> polymorphism at 3'UTR of NRAMP1 with the macrophage function following challenge with Brucella LPS in buffalo (*Bubalus bubalis*). *Veterinary Microbiology*, **129**(1-2): 188-196.
21. Goswami, S. L.; **Deb, S.M.** and Manik, R. S. 1992. Status of goat oocytes collected from slaughterhouse and cytogenetic analysis of goat oocyte cultured *in vitro*. In: *V International Conference on Goats*, March, New Delhi, pp. 1279-1283.
22. John, B.; Kumar, S.; **Deb, S.M.**; Mitra, A.; Niranjan, S. K.; Naskar, S. and Sharma, A. 2006. Genetic variability of integrin Beta-1 (ITGB1) gene of buffaloes. *Journal of Applied Animal Research*, **30**(2): 149-152.
23. John, B.; Kumar, S.; **Deb, S.M.**; Mitra, A.; Niranjan, S. K.; Naskar, S. and Sharma, A. 2007. Characterization of partial integrin beta-1 (ITGB1) gene of buffalo. *Indian Journal of Animal sciences*, **77**(3): 255-256.
24. Kumar, N.; Mitra, A.; Ganguly, I.; Singh, R.; **Deb, S. M.**; Sivastava, S. K. and Sharma, A. 2005. Lack of association of Brucellosis-resistance with (GT)<sub>13</sub> microsatellite allele at 3' UTR of NRAMP1 gene in *Bos indicus* and crossbred (*Bos indicus* X *Bos Taurus*) cattle. *Veterinary Microbiology*, **111**(1-2): 139-143.
25. Kumar, N.; Ganguly, I.; Singh, R.; **Deb, S. M.**; Kumar, S.; Sharma, A. and Mitra, A. 2011. DNA polymorphism in SLC11A1 gene and its association with brucellosis resistance in Indian zebu (*Bos indicus*) and crossbred (*Bos indicus* X *Bos taurus*) cattle. *Asian-Australasian Journal of Animal Sciences*, **24**(7):898-904.
26. Kumar, S.; Manohar, V. R. P.; **Deb, S. M.**; Mitra, A.; John, B.; Sharma, A. and Bujarbaruah, K. M. 2008. Molecular variability of somatotrophin releasing hormone (SRH) gene in Mithun (*Bos frontalis*). *Journal of Applied Animal Research*, **33**(2): 205-207.

27. Kumar, S. Gupta, S.; Dhali, A.; Manohar, R. P.V.; **Deb, S. M.**; Mitra, A.; Sharma, A.; Chaudhary, H. and Rajkhowa, C. 2009. Polymorphism of partial growth hormone (GH) gene in mithun (*Bos frontalis*). *Indian Journal of Animal Sciences*, **79**(2): 212-214.
28. Kumar, S. Gupta, S.; Dhali, A.; Manohar, R. P.V.; **Deb, S. M.**; Mitra, A.; Sharma, A. and Bujarbaruah, K. M. 2009. Nucleotide variability of partial somatotrophin hormone (STH) gene in mithun (*Bos frontalis*). *Journal of Applied Animal Research*, **35**(2): 165-168.
29. Mahmood, S.; Biswas, J. C. and **Deb, S. M.** 1994. Results of routine treatment of anoestrus cattle under farm conditions. *Indian Veterinary and Medical Journal*, **18**(11): 202-203.
30. Manohar, R.M.; Kumar S.; Dhali, A.; **Deb, S. M.**; Mitra, A.; Sharma, A.; Chowdhary, H. and Rajkhowa, C. 2008. Polymorphism of growth hormone releasing hormone (GHRH) gene in Mithun. *Indian Journal of Animal Sciences*, **78**(8): 891-893.
31. Naskar, S. **Deb, S. M.**; Niranjana, S. K.; Sakaram, D.; Sharma, D.; Kumar. S. and Sharma, A. 2013. Molecular characterization of MHC-DRB gene exon-2 in riverine buffalo (*Bubalus bubalis*) (IJBT/Auth/2013/2429), *Indian Journal of Biotechnology*, **13**(11): 532-535.
32. Naskar, S. **Deb, S. M.**; Niranjana, S. K. Kumar. S.; Sharma, D.; Sakaram, D. and Sharma, A. (2012). Molecular characterization of MHC-DRB gene in buffalo (*Bubalus bubalis*). *Genetics and Molecular Biology*, **35**(1): 95-98.
33. Niranjana, S. K.; **Deb, S. M.**, Sharma, A.; Mitra, A. and Kumar, S. 2009. Isolation of two cDNAs encoding MHC-DQA1 and DQA2 from the water buffalo, *Bubalus bubalis*. *Veterinary Immunology and Immunopathology*, **130**(3-4): 268-271.
34. Niranjana, S. K.; **Deb, S. M.**; Kumar, S.; Mitra, A.; Sharma, A.; Sakaram, D.; Naskar, S.; Sharma, D. and Sharma, S. R. 2010. Allelic diversity at MHC class II DQ loci in buffalo (*Bubalus bubalis*): Evidence for duplication. *Veterinary Immunology and Immunopathology*, **138**(3):206-212.
35. Niranjana, S. K.; **Deb S. M.**; Abhijit Mitra; Deepak Sharma; Sharma, A. K. and Sharma, A. 2005. Partial genomic sequence of buffalo (*Bubalus Bubalis*) ITGB2 gene. *Journal of Applied Animal Research*, **28**(1): 41-43.
36. Paul, S.S.; **Deb, S. M.**; Punia, B.S.; Singh, D. and Kumar, R. 2010. Fibrolytic potential of anaerobic fungi (*Piromyces* Sp.) isolated from wild cattle and wild blue bull in pure culture and effect of their addition on *in vitro* fermentation of wheat straw and methane emission by rumen fluid of buffaloes. *Journal of the Science of Food and Agriculture*, **90** (7):1218-1226.
37. Paul, S. S.; **Deb, S. M.** and Singh, D. 2011. Isolation and Characterization of Novel sulphate-reducing Fusobacterium sp. and their Effects on *in Vitro* Methane Emission and Digestion of Wheat Straw by Rumen Fluid from Indian Riverine Buffaloes. *Animal Feed Science and Technology*, **166-167**(6):132-140.
38. Paul, S. S.; **Deb, S. M.** ; Punia, B. S.; Das, K. S.; Singh, G.; Ashar, M. and Kumar, R. 2011. Effect of Feeding Isolates of Anaerobic Fungus Neocallimastix Sp. CF 17 on Growth Rate and Fibre Digestion in Buffalo Calves. *Archives of Animal Nutrition*, **65**(3): 215-228.
39. Panigrahi, M; Kumar, S.; **Deb, S. M.**; Mitra, A.; Sharma, A. and Bujarbaruah, K. M. 2009. Lack of polymorphism in partial insulin like growth factor 1 (IGF1) and insulin like growth factor binding protein 3 (IGFBP3) genes of Mithun. *Journal of Applied Animal Research*, **36**(1): 41-44.
40. Panigrahi, M; Kumar, S.; **Deb, S. M.**; Mitra, A.; Chowdhary, H. and Sharma, A. 2012. Polymorphism of insulin like growth factor binding protein 3 (IGFBP3) partial gene in Mithun. *Indian Journal of Animal Sciences*, **82**(12): 1584-1586.

41. Panigrahi, M; Kumar, S.; **Deb, S. M.**; Mitra, A.; Sharma, A. and Bujarbaruah, K. M. 2012. Characterization of insulin like growth factor-1 (IGF-1) partial gene in mithun. *Indian Journal of Animal Sciences*, 82(1): 89-91.
42. Rajamurugan, J; Kumar, S.; Pandey, O. P.; **Deb, S. M.**; Mitra, A. and Sharma, A. 2007. Characterization of Growth Hormone Releasing Hormone (GHRH) partial gene in buffalo. *Indian Journal of animal Sciences*, 77(8): 749-751.
43. Rajaravindra, K. S.; Mitra, A., Sharma, A. K., **Deb, S. M.** and Sharma, A. 2006. Molecular characterization of interferon-tau gene of Mithun (*Bos frontalis*). *Zoological Science*, 23(7): 607-611.
44. Salim, P.B.; **Deb, S. M.** and Sharma, A. K. 2003. Test day yields for genetic evaluation of crossbred sires. *Indian Journal of animal Sciences*, 73(3): 323-325.
45. Salim, P.B.; **Deb, S. M.** and Sharma, A. K. 2003. Genetic evaluation of crossbred sires using test day yields. *Indian Veterinary Medical Journal*, 27(2): 97-99.
46. Sakaram, D.; **Deb, S. M.**; Sharma, A. K. and Arora, R. L. 2003. Comparative karyotype of local goats of Rohilkhand region (meat type) with Black Bengal goats. *Indian Veterinary and Medical Journal*, 27(3): 29-31.
47. Sakaram, D., Niranjana, S.K., Kumar, S., Naskar, S., **Deb, S.M.**, Mitra, A., Sharma, A. and Sharma, D. 2010. cDNA characterization and molecular analysis of buffalo MHC class II gene, DRA (Bubu-DRA). *Journal of Applied Animal Research*, 37(1): 73-76.
48. Sakaram, D., **Deb, S.M.**, Naskar, S., Niranjana, S.K., Mitra, A., Kumar, S. and Sharma, A. 2013. PCR-RFLP studies of Exon 2 and 3 of buffalo MHC class II (BuLA) DYA gene. *Indian Veterinary Journal*, 90(4): 80-82.
49. Sharma, D.; Niranjana, S. K.; Kumar, S.; **S. M. Deb**; Naskar, S.; Sharma, A. and Mitra, A. 2010. Molecular characterization of Bubaline Integrin  $\beta_2$  (ITGB2) cDNA. *Journal of Applied Animal Research*, 37(2): 217-220.
50. Sharma, D.; Sharma, A. K.; **Deb, S. M.**; Singh, R. K. and Bisht, G. S. 2006. Identification of species-specific marker(s) using Mini-/ Micro-Satellite Associated Sequence Amplification (MASA). *Indian Journal of Animal Sciences*, 76(3): 248-251.
51. Sharma, D.; Kumar, S.; **Deb, S. M.**, Mitra, A.; Niranjana, S. K.; Naskar, S.; Sharma, A. 2009. Identification of novel allelic variants of integrin beta 2 (ITGB2) gene and screening for Bubaline leukocyte adhesion deficiency syndrome in Indian water buffaloes (*Bubalus bubalis*). *Animal Biotechnology*, 20(3):156-160.
52. Singh, P.; Biswas, J. C.; Somvanshi, R.; Verma, A. K.; **Deb, S. M.** and Dey, R. A. 1996. Performance of Pashmina (Cashmere) goats fed on Oak (*Quercus semecaprifolia*) leaves. *Small Ruminant Research*, 22(2): 123-130.
53. Singh, N. P.; **Deb, S. M.** and Mehrotra, S. 1995. Performance of Holstein cattle in temperate hills in India. *Indian Journal of Dairy Science*, 50(1): 7-11.
54. Niranjana, S. K.; **Deb, S. M.** and Sharma, A. 2013. Characterization of New MHC (*Bubu*)-DQB Allele in Buffalo. *Journal of Animal Research*, 3(1): 95-97.
55. Niranjana, S. K.; **Deb, S. M.**; Kumar, S.; Abhijit Mitra; Naskar, S. and Sharma, A. 2011. Genetic characterization of buffalo MHC (*Bubu*)-DQB cDNA molecule. *Journal of Applied Animal Research*, 39(2): 136-138.
56. Mandal, S. K.; Jishi, H. C.; Mazumdar, A. C.; **Deb, S. M.**; Pandey, H. N.; Varshney, V. P. and Dutt, T. 2011. The male effect in indigenous Muzaffarnagari sheep. 1. Behavioural and ovarian responses of anoestrous ewes to male introduction. *Journal of Applied Animal Research*, 39(3): 275-278.

57. Singh, T. P.; Singh, R.; Das, K. S. and **Deb, S. M.** 2011. Performance of production traits in Nili-Ravi buffaloes. *Indian Journal of Animal Sciences*, **81**(12): 1231-1238.
58. Biswas, J. C.; **Deb, S. M.** and Koul, G. L. 1995. Overview of performance of Indian Pashmina (*Cashmere*) goats. *International Journal of Animal Science*, **10**(1): 65-68.
59. Sakaram, D.; **Deb, S. M.**; Niranjana, S. K.; Naskar, S.; Mitra, A. Kumar, S. and Sharma, A. 2013. PCR-RFLP Studies on Exon 2 and 3 of MHC Class II DRA Gene in Murrah Buffalo. *Indian Veterinary Journal*, **90**(6): 49-51.
60. Naskar, S., **Deb, S. M.**, Kumar, S., Niranjana, S. K., Sharma, D., Sakaram, D., Sharma, A. (2014) Molecular Characterization of T Cell Receptor-Zeta Subunit (CD247) Gene in Buffalo (*Bubalus bubalis*). *Journal of Applied Animal Research*, 42(1): 38-43.
61. Sharma, D.; Kumar, S. and **Deb, S. M.** 2014. PCR–RFLP Analysis of CD18 Gene in Buffalo. *Journal of Animal Health and Production*. 2 (1): 5 – 7.
62. Biswas, S.; Mukherjee, R.; Mahto, R. P.; De, U. K.; Chakravarti, S.; Bera, A. K. and **Deb, S. M.** 2014. Antibacterial sensitivity and resistance pattern of yak inflammatory infection from Arunachal Pradesh, India. *Asian Journal of Animal and Veterinary Advances*, 9 (10): 683-689.
63. Chakravarty, P., Hussain, M., Chauhan, M. S., Manik, R. S., Baishya, D., Bhuyan, S., Soren, S., Deori, S., Paul, V., Das, P. J., Doley, J., Borah, B. K. D., Krishnan, G., Dutta, D. J., and **Deb, S. M.** (2014). *In vitro* yak embryo production through conventional and ovum pickup methods. *Reproduction, Fertility and Development*, **27** (1): 218-218.

#### **BOOK/ EXTENSION MANUAL/ LEAFLET**

1. Sharma, A.; **Deb, S. M.** and Mitra, A. 2005. Animal Genetics Division: Brief profile. Published by the Director, I.V.R.I., Izatnagar.
2. Sharma, R. K.; Dixit, V. B.; Bharadwaj, A.; Dahiya, S. S.; Sikka, P. **Deb, S. M.** and Singh, I. 2008. CIRB Research Highlights 1985-2008. Published by the Director, CIRB, Hisar.
3. Paul, S. S.; **Deb, S. M.**; Singh, G. and Malik, R. 2008. Farmers guide to scientific feeding of buffaloes. Published by the Director, CIRB, Hisar.
4. Das, K. S.; Singh, G. and **Deb, S. M.** 2010. Management for better reproduction in buffaloes. Published by the Director, CIRB, Hisar.
5. Bera, A. K.; Doley, J.; Maiti, S. Chatterjee, N.; Jeeva, K.; Ado, D.; Bhattacharya, D. and **Deb, S. M.** 2013. Hydatidosis, a cancer like disease: A concern to yak farmers. Published by Director, NRC on Yak, Dirang.
6. **Deb, S. M.** 2013. Improvement of yak husbandry and upliftment of socio-economic conditions of yak rearers in the country vis-à-vis strategy of NRCY. In: *Improvement of yak husbandry and upliftment of socio-economic conditions of yak rearers in the country*, pp 1-6 [Edited by Chakravarty, P and Published by Director, NRC on Yak, Dirang].
7. Bera, A. K.; Bam, J.; Samanta, A. K.; Maiti, S.; Medhi, D.; Doley, J.; Ado, D.; Jeeva, K.; Biswas, S.; Bhattacharya, D. and **Deb, S. M.** 2014. Tools for managing nematodes in yak: A 5 star worm plan, Published by Director, NRC on Yak, Dirang.
8. Maiti S, Paul V, Das PJ, Bera AK, Medhi D, Bhattacharya D and **Deb SM.** 2014. Promotion of yak husbandry for sustainable livelihood of yak farmers. Improving Yak Husbandry through Nutritional, Reproductive and Health Management, Compendium of Lectures cum Training Manual, National Research Centre on yak, (ICAR), Dirang-790101, West Kameng, Arunachal Pradesh, India Edited by Medhi D., Bera AK., Doley J, Maiti S and Das PJ. 2014. NRCY/TM/2014-15/1. Chapter-01, Pp.01-13.

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10. Das P P, **Deb S M** and Das PJ. 2014. Maintenance of Yak Genetic Resources. A Training Manual On Handling and Management of Yak, National Research Centre on yak, (ICAR), Dirang-790101, West Kameng, Arunachal Pradesh, India, Edited by Krishnan G, Hanah SS, Bam J, Maiti S, Medhi D, Paul V and Das PJ. 2014. NRCY/TM/2014-15/2. Chapter-05, Pp.37-43.
11. Technical Bulletin on Sanitation and Hygiene for promoting better environment under Swachh Bharat Abhiyan. 2015. Editors: Doley J, Medhi D, Das PJ, Hussain M, Maiti S, Bera AK, Bhattacharya D, Paul V, Bam J, Hanah SS, Krishnan G, Namje P, Pegu S, Das PP, Karthik S and **Deb SM**.
12. **Deb, S. M.** 2015. Importance of pastures and forages for temperate animals. In: *Eco-responsive Feeding and Nutrition: Linking livestock and livelihood*, Editors: Pattanaik, A. K.; Verma, A. K.; Jadhav, S. E.; Dutta, N. and Saikia, B. N. ISBN 978-81-908621-6-5, Proc. ANA Conf. 22-24 January 2015, pp: 57-62 (total size 354 pages).

#### POPULAR SCIENCE (LAYMAN) ARTICLES

1. **Deb, S. M.** 1993. Co-operative breeding: A toll for successful cattle improvement in West Bengal. *The Technical Bulletin*, WBVA, Kolkata. **11**(3): 9-12.
2. **Deb, S. M.** and Mahesh Chander 1995. Rabbit rearing: A tool for uplifting economy of hill farmers. *ENVIS Bulletin: Himalayan ecology and Development*, **31**(1&2): 4-5.
3. Das, K. S.; Singh, G.; Paul, S. S.; Malik, R. and **Deb, S. M.** 2010. Management tips to produce replacement buffalo heifers. *Dairy Planner*, **6**(4): 12-14.
4. Malik, R.; Singh, G.; Das, K. S. and **Deb, S. M.** (2009). Hatchery prabandhan; *Setter ebom Hatcher ka Sanchalan. Poultry World*, April **3** (9):12-13
5. Malik, R.; Singh, G.; Das, K. S.; Paul, S. S. and **Deb S M** 2009. *Swachha dudh utpadon. Modern Kheti* , May: 35-39
6. Malik, R.; Obroi, P. S.; Singh, G.; Paul, S. S. and **Deb, S. M.** 2009. On spot evaluation of feed ingredients. *Poultry Word*, August: 32-33.
7. Paul, S. S.; Singh, G. and **Deb, S M.** 2007. "Thata (Mineral) Di Ghat de Lachan ate Sarote" In *Punjabi, Kheti Duniyan*, 25(7): 17<sup>th</sup> Feb.
8. **Deb, S.M.**; Singh, G. and Paul, S. S. 2007. "Maj di Nasal Nili-Ravi" in *Punjabi, Modern Kheti*. January: p 52-54.

#### CONFERENCE ABSTRACTS

1. Biswas, J. C.; Somvanshi, R.; **Deb, S. M.** and Sidhu, N. S. 1994. Angora strain of rabbits-certain studies on locally evolved ones. In: *Proceedings of National Symposium on Advances in Veterinary Sciences and their impact on animal health and production*, IVRI, Izatnagar, pp. 21.
2. **Deb, S. M.** 1999. Synchronization of somatic cell. In: *Compendium national training programme on introduction to nuclear cloning*, IVRI, Izatnagar, March 5-25.

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4. **Deb, S. M.** 2000. Cytogenetic techniques for identification of infertility and sterility in farm animals. In: *Compendium of National training programme on Infertility control and fertility management in farm animals*, IVRI, August 28.
5. **Deb, S.M.** 2002. Selection of breeds, crossbreeding and AI programme In: *Compendium of training programme*, KVK, IVRI March 20-23.
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7. **Deb, S. M.** and Gurnani, M. 1993. Reducing cost of field recording of milk yield. In: *Compendium of Recent Advances in Veterinary Sciences and animal Production*, IVRI, Mukteswar. December 2-3.
8. **Deb, S. M.**; Gurnani, M. and Chacko, C. T. 1993. Factors affecting milk yield of cows at farmers' door. In: *Compendium of Recent Advances in Veterinary Sciences and animal Production*, IVRI, Mukteswar. December 2-3.
9. Gurnani, M.; Ranvir Singh and **Deb, S. M.** 1994. Effectiveness of field recording system for improvement of farmer's animals In: *Compendium of All India Dairy Husbandry Officers Workshop*, NDRI, Karnal, November 29-30, pp. 17-20.
10. Kumar, N., Ganguly, I., **Deb, S. M.**, Sharma, A., Singh, R., Srivastava, S. K. and Mitra, A. 2003. DNA polymorphism in bovine NARMP1 locus, a candidate gene that confers resistance to brucellosis. In: *Proc. XIX Annual Convention and National Symposium on Reproductive Technologies for improvement of livestock production in India*. Indian Society for Study of Animal reproduction, Kolkata, West Bengal, Aug. 22-24, 2003, pp 76.
11. Murugesan, P.; **Deb, S. M.**; Verma, R. P.; Bhattacharyya, T. K. and Bisht, G. S. 2002. Karyotypic studies of reproductive disorders in farm animals. In: *Proc. XVIII Annual Convention and National Symposium on Reproductive technologies for augmentation of fertility in livestock*. 14-16, November, 2002, IVRI, Izatnagar.
12. Niranjana, S. K.; **Deb, S. M.**; Mitra, A. and Sharma, A. 2003. DNA polymorphism of  $\beta 2$  sub-unit of integrin (ITGB2) gene in buffaloes. In: *Proc. IV Asian Buffalo Cong. On Buffalo for Food Security and Rural employment*, Vol-2, 25-28, February, 2003, New Delhi. pp 82.
13. Sharma Deepak, Sharma, A. K. and **Deb, S. M.** 2003. Genetic relatedness among livestock species detected by MASA markers. In: *Proc. X Annual Conf. of IAAVR and Natl. Sym. on Challenges and Strategies for Sustainable animal production in Mountains and IV Indian Vety. Cong.*, Palampur, India, 14-15, April, 2003, p6.8.
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15. Ravindra, K. S.; Nishant Kumar; Indrajit Ganguly; Mitra, A.; Arjava Sharma; **Deb, S. M.**; Sharma, A. and Kumar, S. 2004. DNA Polymorphism of Butyrophilin gene of crossbred cattle and buffaloes. In: *National symposium on Livestock Biodiversity vis-à-vis resource exploitation: Introspection*, held at NBAGR, Karnal, February 11-12, 2004.
16. Sharma D, Sharma A K and **Deb S M.** 2003. Genetic relatedness among Livestock species detected by MASA markers. In: *Xth Annual conference of Indian Association for Advancement of Veterinary Research (IAAVR) and National Symposium on challenges and*



- strategies for sustainable Animal production in mountains*, College of veterinary and Animal Sciences, CSKHP Krishi Vishwavidyalaya, Palampur (India), April, 14-15.
17. Sharma, D.; **Deb, S. M.**; Mitra, A.; Kumar, S. and Sharma A. 2005. Characterization of Integrin Beta-2 (ITGB2) gene in *Bubalus bubalis*. In: *National Symposium on Domestic animal diversity: Status, opportunities and challenges*, NBAGR, Karnal, February 10-11, 2005, pp 188.
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  19. Pippal, R. S.; Patil, N. V.; Singh, G. and **Deb, S. M.** 2006. Reproduction performance of buffalo heifers subject to protection measures during summer months. Proceedings of national symposium on "Conservation and improvement of animal genetic resources under low input system: Challenges and opportunities", NBAGR, Karnal, February 9-10, 2006.
  20. Pippal, R. S. Patil, N. V., Singh, G. and **Deb, S. M.** 2006. Effect of Wallowing and splashing water on Performance of Nili –Ravi Buffalo Heifers during summer months. Presented at "National Symposium on Buffalo for rural Upliftment" and annual convention of Indian Society for Buffalo Development, held at Bombay Veterinary College, Parel, Mumbai. 27<sup>th</sup> – 30<sup>th</sup> May 2006. p 163.
  21. Paul, S. S.; Singh, G.; Patil, N. V. and **Deb, S. M.** 2007. Determination of nutrient requirements of Nili Ravi buffaloes for pregnancy. In: *Proc. of International Tropical Animal Conference*, Animal Nutrition Society (India), NDRI, Karnal, 4-7 October 2007 p2.
  22. Paul, S. S.; Singh, G.; Patil, N. V. and **Deb, S. M.** 2007. Evaluation of maximum growth potential of growing Nili Ravi buffalo heifers. In: *Proc. of International Tropical Animal Conference*, Animal Nutrition Society (India), NDRI, Karnal, 4-7 October 2007, pp 276.
  23. Naskar, S.; **Deb, S.M.**; Sharma, A.; Kumar, S.; Sharma, D.; Sakaram, D. and Niranjana, S.K. 2010. High diversity observed in peptide binding sites (PBS) of MHC-DRB3 gene of riverine buffaloes (*Bubalus bubalis*). International Buffalo Conference, 1-4<sup>th</sup> February 2010, New Delhi.
  24. Paul, S.S.: **Deb, S. M.** and Singh, D. 2010. Effect of administration of novel sulphate reducing bacteria on in vitro methane emission and digestion of wheat straw by rumen fluid microbes of buffaloes. In: *Greenhouse gases and animal agriculture Conference, Session-4: Mitigation strategies for enteric methane*, October 3-8, 2010, Banff, Canada.
  25. Paul, S.S.: **Deb, S. M.**; Punia, B. S.; Singh, D. and Kumar, R. 2010. Fibrolytic potential of anaerobic fungi (*Piromyces* sp.) isolated from wild cattle and wild blue bull in pure culture and effect of their addition on in vitro fermentation of wheat straw and methane emission by rumen fluid of buffaloes. In: *Greenhouse gases and animal agriculture Conference, Session-4: Mitigation strategies for enteric methane*, October 3-8, 2010, Banff, Canada.
  26. Chakravarty, P.; **Deb, S. M.**; Das, P. J.; Deori, S.; Bora, B. K. D.; Krishnan, G.; Doley, J. and Hussan, M. 2013. Reproductive biotechnology for conservation of threatened animal resources with special reference to yak. In: *National Seminar on Recent trends in bio-resource management and Biodiversity conservation*, Rajiv Gandhi University, Itanagar, Arunachal Pradesh 17-19 October 2013.
  27. **Deb, S. M.** 2013. Improvement of yak husbandry and upliftment of socio-economic conditions of yak rearers in the country vis-à-vis strategy of NRCY. In: *Proc. II Interface*

- Meeting on Improvement of yak husbandry and upliftment of socio-economic conditions of yak rearers in the country*, ICAR-NRCY, Dirang, Arunachal Pradesh 8 November 2013. Pp 1-6.
28. Niranjana, S. K.; Biswas, T. K.; Jayakumar, S.; Behl, J.; **Deb, S. M.**; Sharma, A. and Kataria, R.S. 2014. Allelic diversity of major histocompatibility complex class II genes in indigenous Yak (*Bos grunniens*). In: XIth National Symposium on “*Harmonizing Phenomics and Genomics for Sustainable Management of Livestock for Upliftment of Rural Masses*” organized by SOCDAB at NBAGR, Karnal on 6-7 February, 2014.
  29. Das, P. P.; Doley, J.; Krishnan, G.; Biswas, T. K.; Deb, S. M. and Das, P. J. 2014. Functional profiling of fertility related miRNA in Yak. In: *Proceedings of V<sup>th</sup> Workshop on Biotechnology Research in North east India: Present and Future*, AAU, Jorhat, Assam, 18-20 September 2014, pp-38.
  30. Doley, J.; Karthik, S.; Bora, D. P.; Dutta, B.; Deka, D.; Shome, R.; Das, P. P.; Hussain, M.; Bera, A. K.; Bhattacharya, D.; Deb, S. M. and Das, P. J. 2014. Diagnosis of Bovine Herpes Virus-1 in yak by molecular and serological approach. In: *Proceedings of International Conference on Disease biology and Therapeutics*, 3-5 December 2014, pp-255.
  31. Das, P. P.; Krishnan, G.; Doley, J.; Biswas, T. K.; Medhi, D.; Chakravarty, P.; Deb, S. M. and Das, P. J. 2014. Discovery of MSY (Male specific region of Y chromosome) genes and their expression profiling to address the male sub-fertility in yak. In: *Proceedings of International Conference on Disease biology and Therapeutics*, 3-5 December 2014, pp-256.
  32. Chakravarty, P.; Hussain, M.; Chauhan, M.S.; Manik, R.S.; Baishya, D.; Bhuyan, S.; Soren, S.; Deori, S.; Paul, V.; Das, P.J.; Doley, J.; Borah, B.K.D.; Krishnan, G.; Dutta, D.J. and Deb, S.M. 2015. *In vitro* yak embryo production through conventional and OPU methods (Abstract). In: *Proc. 41<sup>st</sup> Annual Conference of IETS*, Versailles, France, 10-13 January 2015.
  33. **Deb, S. M.** 2015. Importance of pastures and forages for temperate animals. In: Proc. ANA Conf. at CVSc, Khanapara, Guwahati, 22-24 January 2015, pp: 57-62.
  34. **Deb, S. M.** 2015. ICAR-NRCY for improving livelihood of tribal pastoral communities on NER hills. In Proc. National Symposium on *Livestock Production Practices for Small Farms of Marginalized groups and communities in India*, CVSc, CAU, Aizwal, 28-30 January 2015.
  35. **Deb, S. M.** 2015. Promoting sustainable livelihood through enabling small farmers in NER. In: *Proc. Agricultural Science Congress*, NDRI, Karnal, 3-6 February 2015.
  36. Bera. A. K.; Manna, B.; Maiti, S.; Pan, D.; Das, S.; Rana, T.; Bam, J.; Doley, J.; Bhattacharya, D. and **Deb, S. M.** 2015. Effect of mushroom polysaccharides in preventing sub-clinical coccidiosis in broiler chicken. In: *Proc. International Conference on Agriculture, Veterinary and life Sciences*, School of Studies of Zoology and Biotechnology, Vikram University, Andhra Pradesh 30-31 January 2015, pp: 15.

## TRAINING/ WORKSHOP/CONFERENCE

### As resource person

1. National training programme on *Introduction to nuclear cloning*, IVRI, Izatnagar, 5-25 March 1999 (Topic: *Cell synchronization and karyotype of synchronized cells*).
2. National training programme on *recent development in embryo transfer technology*, IVRI, Izatnagar, 1999 (Topic: *Embryo sexing in farm animals*).

3. National training programme on *Infertility control and fertility management in farm animals*, IVRI, 28, August, 2002 (Topic: *Cytogenetic techniques for diagnosis of infertility and sterility in farm animals*).
4. National training programme on *Ovum pick up technology for in vitro production of embryo from elite farm animals*. IVRI, Izatnagar, 23, January to 12, February, 2003 (Topic: *Chromosomal studies for improving production in farm animals*).
5. National Symposium on *Priorities and prospects of Goat Rearing in West Bengal*, West Bengal University of Animal and Fisheries Sciences, Kolkata, 18 April, 2003.
6. Short term training course on *Molecular Biology and Biotechnology Techniques in Animal Research (DBT-MBBTAR 2003)* at IVRI, Izatnagar, 30<sup>th</sup> August to Sept 27<sup>th</sup>, 2003 (Topic: *Techniques of genome analysis in farm animals*).
7. National training programme on *Genome analysis of farm animal* at National Biotechnology centre, IVRI, Izatnagar, Sept. 8 - 29, 2003 (Topic: *PCR screening for BLAD allele in buffaloes*).
8. Short term training course on *Molecular Biology and Biotechnology Techniques in Animal Research (DBT-MBBTAR 2004) and TCS Colombo Plan* at IVRI, Izatnagar, 1<sup>st</sup> to 22<sup>nd</sup> February, 2004 (Topic: *Techniques of genome analysis in farm animals*).
9. Delivered a field talk on “Importance of Barbari goat for improving income of farmers” at Village Rithoura, Bareilly March 29, 2004.
10. Short term training course on *Molecular Biology and Biotechnology Techniques in Animal Research (DBT-MBBTAR 2004)* at IVRI, Izatnagar, 27<sup>th</sup> Oct to Nov 25<sup>th</sup>, 2004 (Topic: *Techniques of genome analysis in farm animals*)

#### **As coordinator**

1. Summer training to two students (Anurag Kumar & Abhishek Kumar of Bundelkhand University) w.e.f. 08/06/04 to 04/08/04.
2. Training to foreign delegate from Nepal w.e.f. 16/11/04 to 29/11/04.
3. Convener of Food & Refreshment Committee and Rapporteur, National Seminar on *Field progeny testing in dairy animals: Methodology, constraints and solution*, IVRI, Izatnagar, 24-25<sup>th</sup> February 2005.
4. Summer training to Satish Gangwar, M. Sc. (Biotech) students of CCS University, Meerut in the area of Molecular Biology w. e. f. 1<sup>st</sup> to 31<sup>st</sup> July 2005.
5. Member of the Food Committee, National workshop on *Organic Animal Husbandry Standards*, IVRI, Izatnagar, 26-27<sup>th</sup> November 2002.
6. Member of Exhibition Committee, National seminar on *Panchagavya evam Ashadiya Padap sampada- Mahatva eham sambhavanaye*, IVRI, Izatnagar, 25<sup>th</sup> November, 2003.
7. Member of organizing committee, National Symposium on Livestock Genomics in
8. *Productivity Enhancement for Food Security*, New Delhi, 3-6<sup>th</sup> July 2008.
9. Member of organizing committee, International Buffalo Conference on “Optimizing
10. Buffalo Productivity through Conventional and Novel technologies”, New Delhi, 1-4<sup>th</sup> February 2010.

#### **As participant**

1. *Recent Advances in Veterinary Sciences and animal Production*, IVRI, Mukteswar. 2-3<sup>rd</sup> December 1994.
2. 82<sup>nd</sup> session of Indian Science Congress Association, Kolkata, 3 –8<sup>th</sup> January 1995.

3. National Symposium on *Diagnosis and control of viral diseases of animal and poultry employing molecular biological techniques*, IVRI, Mukteswar, 3-5, December, 1995.
4. National workshop on *Network project on buffaloes*, CIRB, Hissar, 1998.
5. National conference on *Indian dairy industry in the world scenario*, IDA, NDRI, Karnal, 28-29<sup>th</sup> November 1998.
6. National training programme on *Computer application in animal breeding*, NDRI, Karnal, 26 March to 10<sup>th</sup> April 1997.
7. National training programme on *Application of linear models in animal breeding*, NDRI, Karnal, 27, August to 12<sup>th</sup> September 1997.
8. National training programme on *Introduction to MS Project*, IASRI, New Delhi, 12-17<sup>th</sup> October 1998.
9. National training programme on *Advances in genetic techniques for improving farm animal productivity*, NDRI, Karnal, 19<sup>th</sup> November to 9<sup>th</sup> December 1998.
10. National training programme on *PCR and related techniques in disease diagnosis*, IVRI, Izatnagar, February 12 to 5<sup>th</sup> April 2001.
11. XVIII Annual convention of ISSAR and National Symposium on *Reproductive technologies for Augmentation of fertility in Livestock*, IVRI, Izatnagar, 14-16, November, 2002.
12. National workshop on *Organic Animal Husbandry Standards*, IVRI, Izatnagar, 26-27, November 2002.
13. *Buffalo for food security and rural development IV Asian Buffalo Congress*, New Delhi, 25-28 Feb 2003.
14. National Symposium on *Conservation and propagation of indigenous breeds of cattle and buffaloes*, GBPUAT, Pantnagar, February 26-28, 2004.
15. National Symposium on *Domestic animal diversity: Status, opportunities and challenges*, NBAGR, Karnal, February 10-11, 2005.
16. National Seminar on *Field progeny testing in dairy animals: Methodology, constraints and solution*, IVRI, Izatnagar February 24-25, 2005.
17. National workshop on *Genetic improvement in cattle and buffalo*, Bombay Veterinary College, YASDA, Baner Road, Pune, July 16-17, 2005.
18. "Human Resource strategies for agricultural Research organization", NAARM, Hyderabad, December 13-23, 2005.
19. National symposium on "Conservation and improvement of animal genetic resources under low input system: Challenges and opportunities", NBAGR, Karnal, February 9-10, 2006.
20. National training on "Stress management strategies for organizational effectiveness", held at NAARM, Hyderabad, February 15-21, 2007.
21. Xth seminar cum workshop on "Managing radical performance improvement" by AWARENESS FORUM ON MANAGEMENT SKILL at Solan, HP on 28-30 April 2007.
22. National Symposium on *Livestock Biodiversity Conservation & Utilization: Lessons from Past and future perspectives*, NBAGR, Karnal, February 12-13, 2009.
23. Scientists' meet of "Network Project on Buffalo Improvement" on 5-6<sup>th</sup> March 2009 at JAU, Junagarh, Gujrat.
24. International Conference on "*Yak Husbandry: Challenges & Strategies*" on 20-22 April 2009 at NRCY, Dirang-790101, Arunachal Pradesh

25. National Symposium on *Conventional and new age breeding and biotechnology for the livestock centric growth and livelihood security*, Madras Veterinary College, Chennai, November 20-21, 2009.
26. International symposium on *Optimizing Buffalo Productivity through Conventional and Novel technologies*, New Delhi 1-4<sup>th</sup> February 2010.
27. *Management Development Programme on Leadership Development: a pre-RMP Programme*, NAARM, Hyderabad, 1-21 November 2011.
28. *Executive Development Programme*, NAARM, 25-29 June 2013.
29. *Senior Executive Fellows Program* at Harvard Kennedy School- Executive Education, Cambridge, Massachusetts, USA from 9<sup>th</sup> February to 7<sup>th</sup> March 2014.

## RESEARCH PROJECTS HANDLED:

### As Principal Investigator:

1. Improvement of goats for pashmina production (1996-1998).
2. Studies on high resolution banding of Chromosomes of Bovidae (2000-03).
3. Characterization of Integrin genes in buffaloes (2003-04).
4. **DBT (Govt. of India) funded project:** Characterization and mapping of selected genes known to control immune response in water buffaloes (2004-07).
5. Genetic evaluation of Nili Ravi buffaloes (2005-10).
6. Network Project on Buffalo Improvement: Nili Ravi buffaloes (2005-10).

### As associate:

1. **DBT funded project:** Isolation and molecular characterization of superior fibre degrading anaerobic fungus and development of protocol for their preservation and utilization for increasing digestibility of fibrous feed in buffaloes (2006-09; PI: S S Paul).
2. **EU Funded project:** Integrated consortium on tick and tick borne diseases (2004-08; National Co-PI: S Ghosh; Total budget 18, 42,000 Euro; Indian 15,840 Euro).
3. **NAIP funded project:** Rumen microbial diversity in domesticated and wild ruminants and impact of additives on utilization of poor quality feeds (2008-2011; PI: S S Paul).
4. **AP Cess Fund project:** Molecular studies on milk protein genes and its association with production traits in buffaloes (2002-2005; PI: T K Bhattacharya).
5. **Inter-institutional project CIRB & NBAGR):** Assessment of current status and breed characteristics and genetic structure of Nili Ravi buffaloes in their breeding tract (2008-2010; PI: G Singh).
6. **Inter-institutional project (IVRI & NRCM):** DNA polymorphism of genes associated with growth performance in Mithun (*Bos frontalis*) (2003-2006; PI: S Kumar).
7. **Institutional project (IVRI):** Molecular analysis of interleukin locus in buffalo (2002-05; PI: T K Bhattacharyya).
8. **Institutional project (IVRI):** DNA polymorphisms in NRAMP1 gene and its association with genetic resistance to bovine brucellosis (2001-2004; PI: A Mitra).
9. **Institutional project (CIRB):** Monitoring somatic cells in milk of Nili Ravi buffaloes (2006-09; PI: G Singh).

## STUDENTS GUIDED

### As chairman of Advisory Committee

**P.B. Salim, IAS:** MVSc; Genetic studies to evaluate crossbred sires using test day milk yields (1998).

**P. Murugesan, Vety. Surgeon, TN:** MVSc; Identification of cytogenetic marker for reproductive disorder using high resolution banding in farm animals (2000).

**Saket Kumar Niranjn, Scientist:** MVSc; DNA polymorphism of *beta-2* subunit of integrin gene in buffalo (2001).

**L. L. Prince, Scientist:** PhD; Genetic Polymorphism among cattle and goat populations using mini-/ micro-satellite primed-PCR (2002).

**Deepak Sharma, Asstt. Prof, Mathura Veterinary College:** PhD; Characterization of ITGB2 gene in *Bubalus bubalis* and its variability in bovine genome (2002).

**S. K. Niranjn, Scientist:** PhD; Cloning, characterization and identification of polymorphism of DQA and DQB genes in buffaloes (2003).

**Soumen Naskar, Scientist:** PhD; Cloning, characterization and identification of polymorphism of TCR and DRB genes in buffaloes (2004).

**D. Sakaram, Asstt. Prof., RRAPAU:** PhD; Cloning, characterization and identification of polymorphism of DRA and DYA genes in buffaloes (2001).

## LIFE MEMBERSHIP OF PROFESSIONAL BODIES

1. Society for conservation of domestic animal biodiversity, NBAGR, Karnal.
2. Laboratory animal science association of India, CDRI, Lucknow.
3. Genetic Association of India, Izatnagar.
4. Indian society of Animal genetics and Breeding, Noida, U.P.
5. Indian Society for Buffalo Development, Hisar.
6. Scientific Society of Advance Research and Social Change, Delhi.

**GENBANK ACCESSION NUMBER (NCBI):** More than 125