



**CENTRES OF ADVANCED FACULTY TRAINING
DIVISION OF VETERINARY PHYSIOLOGY
INDIAN VETERINARY RESEARCH INSTITUTE
IZATNAGAR**

Introduction:

Division of Physiology, Pharmacology & Biochemistry was formally established in 1970. Later on Divisions of Pharmacology & Toxicology and Biochemistry were separated and the existing Division was renamed as Division of Physiology and Climatology. On the basis of achievements in Animal Physiology research and teaching, ICAR granted the status of Centre of Advanced Studies in Veterinary Physiology to this Division in 1995. The centre is having the responsibility of teaching and research with a mandate of training scientists and teachers of universities and research Institute. The name of Centre of Advanced Studies (CAS) was changed as Centre of Advanced Faculty Training (CAFT) by the Council in the year 2010.

Objective of CAFT:

The Indian Council of Agricultural Research, New Delhi has identified the Physiology & Climatology Division, IVRI, Izatnagar, as a **Centre of Advanced Faculty Training (CAFT)**. The CAFT is entrusted with the organization of specialized and advanced training courses, for the State Agricultural University teachers / ICAR scientists to update their knowledge and skill, with the objective of Human Resource Development in the discipline of Veterinary Physiology in the country. To accomplish this mandate, this Centre proposes to conduct two advanced training course of 21 days duration during every financial year. The courses are useful and interactive, infact CAFT undertakes improvement of faculty competence and development of human Resources thus supports Institutional Capacity Building.

Faculty: Name & Designation (as on 30.09.2011):

(1)	Dr. G. Taru Sharma	M.Sc., Ph.D.	Head & Director (CAFT)
(2)	Dr. Puneet Kumar	M.Sc., Ph.D.	Pr. Scientist
(3)	Dr. V. P. Maurya	M.Sc., Ph.D.	Sr. Scientist
(4)	Dr. S. Bag	M.Sc., Ph.D.	Sr. Scientist
(5)	Dr. M. Sarkar	M.Sc., Ph.D.	Sr. Scientist
(6)	Dr. B. C. Das	M.Sc., Ph.D.	Sr. Scientist
(7)	Dr. G. Singh	M.V.Sc., Ph.D.	Sr. Scientist
(8)	Dr. N.H. Mohan	M.V.Sc., Ph.D.	Sr. Scientist
(9)	Dr. Vikash Chandra	M.V.Sc., Ph.D.	Scientist

Human Resource Development:

Particulars of Short Courses / Training program for HRD conducted during XI plan period

S.N o.	Name of the Program	Period	No. of Participants		
			Internal	External	Total
1	Animal Behaviour & Welfare	27.09.2007-17.10.2007	-	20	20
2	Introduction to Stem Cell Technology	16.01.2008-05.02.2008	3	14	17
3	Recent Development in Animal Production & Reproduction	03.12.2008-23.12.2008	3	14	17
4	Recent Advances in Stem Cell Research	15.02.2010-07.03.2010	2	16	18
5	Recent advances in Endocrine Control of Livestock Production & Reproduction	25.02.2011-17.03.2011	1	15	16
6	Therapeutic Application of stem cells in Livestock	25.08.2011-14.09.2011	2	17	19

7	Livestock Production and Health under impending climate change	04-24 th Jan. 2012			15
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Infrastructure development (equipments etc.):

2007-08	2008-09	2009-10	2010-11
Sony Digital Camera (Model DSC W55)	Monitoring system	-	Fume Hood
Sony Digital Camcorder (Model DCR-SR 82E)	Computer	Computer Accessories	Up gradation of the CAFT library along with the furniture
UV Visible P C Base Spectrophotometer (Model No. UV 570455)	-	LCD Monitor	-
ELISA Reader	-	Sample storage device at 4°C	-
Automatic Micro Plate Washer	-	-	-
Ultra Sonography Machine	-	-	-
Slide projector	-	-	-

Renovation of Lecture Room/Laboratories:

- CAFT in the division of Physiology and Climatology was renovated completely including all the laboratories, reading room and CAFT Director's room.

Library upgraded:

- CAFT library has been strengthened through CAFT support.

Awards/Recognitions: Please see Annexure-I

Publication Please see Annexure-II

Financial Statement

Expenditure under CAFT during XI plan

Head	2007-08	2008-09	2009-10	2010-11
Operating cost of Training Programme	2,90,795.00	2,11,561.00	1,49,318.00	2,34,620.00
Recurring Contingency	2,00,000.00	2,00,000.00	1,34,108.00	1,97,445.00
Non Recurring Contingency	15,89,853.00	72,946.00	00.00	1,67,326.00
T.A.	1,00,000.00	00.00	11,200.00	6,252.00
Library	50,000.00	26804.00	00.00	29,855.00
Total Expenditure Rs.	22,30,648.00	5,11,311.00	2,94,626.00	6,35,498.00
Funds allotted Rs.	22,69,000.00	11,54,000.00	6,42,689.00	8,02,358.00

Annexure-II

Publications

(Internationatinal/Indian Journal, Books, Manuals etc. during XI Plan)

2007-2008

Published Research Papers

- 1) Kharche,SD; Majumdar,A. C.; Tyagi ,S K and Sharma, G. Taru (2008) asauperovulatory response and embryo production efficiency in goats following pretreatment with hCG and estradiol-17 β . Indian J Anim. Sci. 77(2):150-153.

- 2) G. Taru Sharma and K. Loganathasamy (2007) Effect of meiotic stages during in vitro maturation on the survival of vitrified- thawed buffalo oocytes. Veterinary Research Communication 31 (7) 881-893.
- 3) Korde, J.P. and Srivastava, R.S. (2007) Effect of Melatonin on metabolic enzyme activities in different brain regions of male albino rats. Indian Vet. J. 84:252-255
- 4) J. P. Korde, G. Singh, V. P. Varshney and D. C. Shukla (2007) Effect of long term heat exposure on adaptive mechanisms of blood acid-base in buffalo calves. Asian- Australasian Journal of Animal Sciences, 20(5): 742.
- 5) Siva Kumar, A. V. N., Varshney, V. P., Hoque, M., Singh, G. and Pathak, M. C. (2007) Follicular dynamics in antioxidant supplemented heat stressed goats. Indian Journal of Animal Sciences, 77(9) 831-836.
- 6) Vikash Chandra, O. K. Hooda, G. Singh and M. Hoque (2007) Effect of heat stress on follicular development and ovarian steroid hormones in Black Bengal goats. Indian Journal of Animal Sciences 77(2): 139-143.
- 7) Siva Kumar, AVN, Varshney, VP, Hoque, M, Singh, G and Pathak, MC (2007) Follicular dynamics in antioxidant supplemented heat stressed goats. Indian Journal of Animal Sciences, 77(9):42-47.

Popular publication:

1. Srivastava, R.S. (2006) {printed in 2008} Sahasrar granthi ek vaigyanik vishleshna. Gyan garima Sindhu. Vaigyanik evam takniki shabadavali ayog, Manav Sansadhan Mantrayala, Bharat Sarkar. 11-12: 44-50
2. Sharma G.Taru, Pawan K.Dubey and Manjinder Sharma (2008).Vansh Kosikaye, amarta ka sopan. "Pashupalan avum Pashuchikitsa Vigyan: Navintam Anusandhan avum Kissan" Rashtriya Sangosthi on 25-26 March at IVRI, Izatnagar.

Technical articles:

1. Sharma G.Taru, Singh G., Meur, S.K and G.SaiKumar (2007). Buffalo preantral follicles also express follicle stimulating hormone (FSH) receptor. IVRI news letter 29 (2) 2.
2. Sharma G.Taru and K.Raja Rajan (2007). Fetal Behavior & Welfare. "Animal behavior and Welfare"; 119-124.

3. Sharma G.Taru and Ankit Jain (2008). Cord blood stem cells-Therapeutic applications. "Introduction to stem cell Technology"; 12-18.
4. Sharma G.Taru, Vikash Chandra and Pawan K.Dubey (2008). Buffalo oocytes harvesting, grading and in vitro maturation "Introduction to stem cell Technology"; 72-78.
5. Sharma G.Taru, S.Eswari and Vikash Chandra (2008). Sperm capacitation, in vitro fertilization and embryo culture in buffalo. "Introduction to stem cell Technology"; 79-83.
6. Sharma G.Taru, K.Raja Rajan and Ankit Jain (2008). Expression of GLUT in embryos and embryonic stem cells. "Introduction to stem cell Technology"; 94-96.
7. Majumdar, AC (2007) Ethical aspect in cloning and transgenesis with respect to behavior. In, Animal Behavior and Welfare. pp41-44. Compendium, CAS in Veterinary Physiology, Division of Physiology & Climatology, IVRI, Izatnagar.
8. Majumdar, AC (2008) Overview of stem cell research. In, Introduction to stem cell Research. pp 1-3. Compendium, CAS in Veterinary Physiology, Division of Physiology & Climatology, IVRI, Izatnagar.
9. Majumdar, AC; Singh, RK; and Anees, C. (2008) Totipotent stem cell for Advanced Breeding Technology. In, Introduction to stem cell Research. pp 49-54 – Ibid.
10. Majumdar, AC; Singh, RK; and Nath, NC. (2008) Stem cell research and ethics. In, Introduction to stem cell Research. pp 66-69 – Ibid.
11. Bag,S; Majumdar, AC; Nath, Nikhil Ch.; Singh, RK; Das, BC. (2008) Parthenogenetic stem cells. In, Introduction to stem cell Research. pp 32-35 – Ibid.
12. Bag, Sadhan; and Majumdar, AC. (2008) Characterisation of stem cells. In, Introduction to stem cell Research. pp 36-38 – Ibid.
13. Bag, S.; Anees, C.; and Majumdar, AC. (2008) Molecular control of Embryonic Stem Cell Pluripotency. In, Introduction to stem cell Research. pp 39-42 – Ibid.
14. Bag, S.; Singh, RK.; Anees, C.; and Majumdar, AC.(2008) Transgenic stem cells technology. In, Introduction to stem cell Research. pp 58-61 – Ibid.

15. Bag, S.; Das, BC.; and Majumdar, AC.(2008) recent advances in stem cell therapy. In, Introduction to stem cell Research. pp 62-65 – Ibid.
16. Gyanendra Singh (2008) Nutritional manipulation of heat stress amelioration. In: Compendium of CAS short course on “Animal Nutrition for better Health and Productivity” held from February, 13 to March, 04.pp-46-48.
17. Gyanendra Singh and B. C. Das (2007) Steriotypies. In: Compendium of CAS short course on “Animal behavior and welfare” held from September, 27 to October, 17.pp-204-207.
18. Gyanendra Singh and B. C. Das (2007) Self and environment directed abnormal behavior. In: Compendium of CAS short course on “Animal behavior and welfare” held from September, 27 to October, 17.pp-208-210.
19. B. C. Das and Gyanendra Singh (2007) Abnormal behavior: Addressed to other animals. In: Compendium of CAS short course on “Animal behavior and welfare” held from September, 27 to October, 17.pp-170-174.
20. B. C. Das and Gyanendra Singh (2007) Abnormal behavior: Failure of function. In: Compendium of CAS short course on “Animal behavior and welfare” held from September, 27 to October, 17.pp-184-188.
21. Mohan, N.H, Choudhury, H, Naskar, S. (2008). Effect of heat stress on milk production : In Training on Technologies for increasing milk production from 19-21st, January, 2008.
22. Naskar, S, Choudhury, H, Mohan, N.H, Das, A. (2008). Criteria for selection in dairy animals and suitable breeding strategies for increasing milk production. : In Training on Technologies for increasing milk production from 19-21st, January, 2008.
23. Choudhury, H, Choudhury, M.D, Naskar, S, Mohan, N.H, Das, A. (2008). Milk Production in Assam with reference to Goalpara district: In Training on Technologies for increasing milk production from 19-21st, January, 2008.
24. Naskar, S, Choudhury, H, Mohan, N.H. (2008). An outline of breeding strategy and conservation plan for mithun (*Bos Frontalis*). In: Brain storming session on Refining the research and developing an economic breeding policy suitable for Mithun, 29-30th March, 2008.

2008-2009

1. Aithal, H. P., Amarpal, Kinjavdekar, P, Pawde, A. M., Varshney, V. P. and Setia, H. C. (2008). Nutritional secondary hyperparathyroidism in growing dogs: a study on the incidence, clinical-biochemical and radiographic features and therapeutic management. *Indian J. Anim. Nutrition*.
2. Bandyopadhyay S, Varshney JP, Ghosh MK and Sarkar M. (2008). Endocrinological and pathological profile of mice fed on lithogenic diet. *Indian Veterinary Journal* 85(7): 710-711.
3. Bhadane B K, Nikhil K, Maiti S , Das B C, Bag S and Majumdar A C (2009). An attempt to derive embryonic stem cells in rabbits. In proc International conference on germ cell development function and ISSRF19th annual meeting, held at Bangalore from Jan 22-24,2009,pp71
4. B.C. Saravanan, S. Bandyopadhyay, R. Pourouchottamane, M.A. Katakataware, K.P. Ramesha and M. Sarkar (2008). Incidence of Ixodid ticks infesting on yak (*Poephagus grunniens* L.) and its hybrids in Arunachal Pradesh and Sikkim. *Indian Journal of Animal Sciences* 78(2): 159-160.
5. Bandyopadhyay S., Sasmal D., Ghosh MK., Bora M., Biswas TK., Sarkar M. (2008). Antibacterial efficacy of neem (*Azadirachta indica*) against *Moraxella bovis* and *Neisseria*. *Indian Journal of Animal Science*. 78 (10): 1105-1107.
6. Bandyopadhyay S., Sasmal D., Bora M., Ghosh MK., Sarkar M. (2008). Antibacterial profile of *Rubus idaeus* (Raspberry): An in vitro study. *Indian Journal of Animal Science*. 78 (11): 1247-1249.
7. Bandyopadhyay S., Sasmal D., Ghosh MK., Bora B.D., Sarkar M., Bora M. and Bhattacharya, M. (2009). *In vitro* antimicrobial susceptibility of *Mannheimia Haemolytica* recovered in yaks. *Indian Veterinary Journal* 86 (2), 201-202.

8. D. N. Das, R. Basumatary, A. Phukan and M. Sarkar. (2008). Chromosomal profile in F1 yak hybrids. *Indian Veterinary Journal* 85: 164-166.
9. Dass, R. S., Bhadane, K. P., Varshney, V. P. and Chaturvedi, V. K. (2008). Effect of vitamin E supplementation on growth, nutrient utilization, blood metabolic profile and immunity in male Murrah buffalo (*Bubalus bubalis*) calves. *J. Anim. Feed Science*.
10. Dimri, U., Sharma, M. C., Varshney, V. P., and Kataria, M. (2008). Effect of vitamin E and selenium supplementation on oxidative stress indices and cortisol level in blood in water buffaloes during pregnancy and early postpartum period.
11. Ghosh M K, Konwar P, Bandopadhyay S, Das H K, Sarkar M, Ahmed F A and Bhattacharya M. (2009). Microminerals and tocopherol profile during gestation and post partum in yak. *Indian Veterinary Journal* 86 (3): 265-267.
12. Imam, S., Ansari, M. R., Kumar, R. S., Mudgal, V., Varshney, V. P. and Dass, R. S. (2008). Effect of inorganic and organic zinc supplementation on semen quality in Murrah buffalo (*Bubalus bubalis*) bulls. *Indian J. Anim. Reprod*; 29(1): 42-49.
13. Krishnan, G; Singh, G. and Shukla, D.C (2009). The effect of electrolyte supplementation on Physiological Response in Heat Stressed Male Buffalo Calves. *Indian Journal of Animal Sciences*, 79 (1): 34-37
14. Kataktaalware, M. A., Pourouchottamane, R., Borah, B.K.D., Saikia, P., Borah, S., Deka, B.C. and Sarkar, M. (2008). Sexual Behaviour of Yak Bulls. *Indian Veterinary Journal*. 85(1): 95-96.
15. Kataktaalware, M.A., Pourouchottamane, R., J. Rajkhoa,, B.K.D. Borah, S. Borah, Saravanan, B.C and Sarkar, M. (2008). Physiological performance of yak under varying load carrying condition. *Indian Journal of Animal Science* 78(2): 231-233.

16. Kataktaaware, M.A., Pourouchottamane, R., Ramesha, K.P., Saravanan, B.C., Borah, B.K.D., Saikia, P., Sarkar, M., Deka, B.C. and Bhattacharya, M. (2008). Influence of age on semen characteristics of yak bulls. *Indian Veterinary Journal*.85(5): 558-559.
17. Kharche S.D, Majumdar A.C, Agarwal S.K and Sharma G.Taru (2008) Ovarian and endocrine response following pretreatment with human chorionic gonadotrophin and estradiol valerate in PMSG treated crossbred cows. *Indian Journal of Animal Sciences* 78(5) 449-452.
18. Kharche S.D., Majumdar A.C., Tyagi S.K. and Sharma G. Taru (2008) Superovulatory response and embryo production efficiency in goats following pre-treatment with hCG and Estradiol- 17B. *Indian Journal of Animal Sciences* 77 (2) 150-153.
19. Kalleshwarappa G. M., D. Malakar, M. S. Chauhan and A. C. Majumdar (2006) Identification of immunogenic secretory proteins of IVM oocyte, IVF embryos, blood circulation of estrus and pregnant goat and buffalo for early pregnancy diagnosis. International symposium on emerging trends in genomic and proteomic sciences 15 to 18 October 2006, at National Institute for Research in Reproductive Health Jehangir Merwanji Street, Parel, Mumbai, India. Proceedings page P13-P14 (Poster presentation)
20. Kalleshwarappa G. M., Malakar D., Chauhan M. S. And Majumdar, A. C. (2007). Recovery, in vitro maturation rate of buffalo oocytes and identification of their secretory proteins. *Indian J. Dairy sci.* 60 (6)31-38.
21. Mondal, G. P., Dass, R. S., Garg, A. K., Varshney, V. P. and Mondal. A. B. (2008). Effect of zinc supplementation from inorganic and organic sources on growth and blood biochemical profile in crossbred calves. *J. Anim. Nutr. And Feed Science*; 17:147-156.

22. Majumdar, A C, S Bag, C Anees C and N C Nath (2009), Embryonic Stem Cell Research for Advanced Breeding Technology Compendium XVIII Annual conference of the society of animal Physiologists of India. Feb 26-28 Bangalore pp107
23. Mudgal, Vishal, Garg, A.K., Dass, Ram Sharan and Varshney Vijay Prakash (2008) Effect of Selenium and Cooper Supplementation on Blood Metabolic Profile in Male Buffalo (Bubalus Bubalis) Calves . Biological Trace Elementary Research. 121:31-38
24. M.K. Ghosh, P. Konwar, R. Basumatary, S. Bandopadhaya, M. Sarkar and M. Bhattacharya. (2008). Mineral profile of local tree fodders and grasses of Meghalaya. *Indian Veterinary Journal* 85: 105-106.
25. M. Bora, F.A. Ahmed, S. Bandyopadhyay, M. Sarkar, P. Mohan, H.N. Khanikor, C. Rajkhowa, M.K. Ghosh and M. Bhattacharya. (2008). Pharmacokinetic studies of Enrofloxacin in Mithuns. *Indian Veterinary Journal* 85 (12): 1272-1274.
26. M.A. Kataktaaware, B.K.D. Borah, R. Pourouchottamane, B.C. Saravanan, M. Sarkar and K.P. Ramesha. (2008). Morphometric analysis of yak (*Poephagus grunniens* L.) spermatozoa. . *Indian Veterinary Journal* 85 (8): 891 -892.
27. Puri G, Das B C Majumdar A C, and Sadhan Bag, (2009) Generation of parthenogenetic embryos by ethanol activation in buffalo Compendium XVIII Annual conference of the society of animal Physiologists of India. Feb 26-28 Bangalore 118
28. Patra, M. K., Kumar, H., Yadav, M. C., Varshney, V. P., Mohmood, S. and Tomar, A. K. S. (2008). Biostimulatory effect of bull urine on estrus induction in crossbred heifers.
29. R. Mahanta, M. Sarkar, R. Pourouchottamane, S Bandyopadhyay, M. Kataktaaware, B.C. Sarvanan and K.P. Ramesha. (2008). Estrus

behaviour of yaks reared in semi range system of management. *Indian Veterinary Journal* 85(6): 666.

30. R. Mahanta, M. Sarkar, R. Pourouchottamane, S Bandyopadhyay, M. Kataktaaware, B.C. Sarvanan and K.P. Ramesha. (2008). Reproductive traits of yaks under semi range system of management. *Indian Veterinary Journal* 85(7): 781-782.
31. Ramesha K P., Kataktaaware M A, Das S, Pourochottamne R, Bandopadhyay S, Saravanan B C, Krishnan G, Sarkar M and Bhattacharya M. (2008). Performance and body measurements of yaks and their hybrids under field condition. *Indian Journal of Animal Sciences* 78 (9): 1034-1035.
32. Singh R K, Majumdar A C, Das B C and Sadhan Bag (2009) Effect of Higher culture temperature and different gaseous phase on in vitro maturation and embryo development in goat, Compendium XVIII Annual conference of the society of animal Physiologists of India. Feb 26-28 Bangalore 119
33. Sejian V, Srivastava R.S., Varshney V.P.(2008) Pineal-Adrenal-Thyroid Relationship under thermal stress: Effect of circulating levels of thyroid hormones in goats. *Indian J. Anim. Sci.* 78:11 Pp. 1263-64.
34. Sejian V, Srivastava R.S., Varshney V.P.(2008) Pineal-Adrenal relationship Modulation affects glucocorticoid on pineal function to ameliorate thermal stress in goats. *Asian-Australasian J. of Anim. Sci.* 22:7 Pp988-994.
35. Swain A K, Bag S Das B C and Majumdar A C (2009). Effect of different culture conditions on the development of stem cell like cells from early developing embryos in goat. In proc International conference on germ cell development function and ISSRF19th annual meeting, held at Bangalore from Jan 22-24,2009,pp68

36. Swain A K, Bag S Das B C and Majumdar A C (2009). Establishment of new method for embryo cloning using embryonic stem cells in goat. In proc International conference on germ cell development function and ISSRF19th annual meeting, held at Bangalore from Jan 22-24,2009,pp69
37. Sarvanan B.C., Kataktaaware, M.A., Pourochottamne, R., Ramesha K.P. and Sarkar, M. (2008). Traumatic myiasis in yaks reared under semi-range system of management. *Journal of Veterinary Parasitology* 22(1): 81-82.
38. Sasmal D, Bandyopadhyay S., Ghosh MK, Konwar P., Borah BD, Biswas TK., Sarkar M., (2008). Bacterial flora of yak (*Capra grunniens*). *Indian Journal of Animal Science*. 78 (10): 1103-1104.
39. Sejian, V., Srivastava, R.S. and Varshney,V.P.,(2008) Uchh Taap Par Sasrar-Adhibraka Sambandh : Sasraria Probhujino Ka Rasayanik Adhibraka-Balkut-Chhedit Bakrio Ki Bhakaniy Gatibidhiyo Par Prabhav . Rastriya Sangosthi: Pashu Utpadan Evam Swasthyay 24-25 March (2008) IVRI,Izatnagar .
40. Sejian,V., Srivastava, R.S., and Varshney ,V.P.(2008) Pineal- Adrenal –Immune system relationships under thermal-stress:Effect of pineal proteins on phagocystic activity in chemically adrenalectomized goats. XIV Annual Convention of Indian Society for Veterinary Immunology & biotechnology (ISVIB) and National Symposium on “Recent trends in immuno-biotechnology based biologicals & their commercialization” Pantnagar : 27-29 February ,2008
41. Srivastav, S. K., Varshney, V. P., Umashankar and Sahni, K.L. (2008) Progesterone profile during estrous cycle in different breeds of cows under tropical climate. *Indian J. Animal. Sci.*:78 (6) 580-583
42. Vijai K. Bharti. and Srivastava R.S. (2008) Pineal proteins upregulate specific antioxidant defense systems in the brain. *Oxidative Medicine and Cellular Longevity*. 2009; Vol. 2 Issue 2: 2:2, 1-5; April-June 2009

43. V.K. Paswan, R.K. Mahapatra, H.R. Meena and A. Sahoo (2008). Nutrient Composition and Phenolic Constituents in some Feed and Fodder Samples from temperate Regions of Kumaon Himalaya. *Indian J. Anim. Sci.* 25: 19-24.
44. Mohan, N.H, B. C. Sarmah, M. K. Tamuli, Anubrata Das and K. M. Bujarbaruah. (2008). Change in electrophoretic profile of porcine spermatozoal proteins during epididymal transit. 78: 446.
45. Mohan K, Sarkar, M. and Prakash B S. (2009). Efficiency of Heatsynch Protocol in Estrous Synchronization, Ovulation and Conception of Dairy Buffaloes (*Bubalus bubalis*). *Asian- Australian Journal of Animal Sciences* 22(6): 774-780.
46. Prakash B S, Sarkar, M. and Mondal M. (2008). An update on reproduction in yak and mithun. *Reproduction in Domestic Animal* 43 (suppl 2.), 1-7.
47. Sarkar, M, D.H. Sengupta, B. Dutta borah, J. Rajkhoa, S. Bora, S. Bandopadhaya , M. Ghosh, F.A. Ahmed, P. Saikia , K. Mohon and B.S. Prakash. (2008). Efficacy of Heatsynch protocol for induction of estrus, synchronization of ovulation and timed artificial insemination in yaks (*Poephagus grunniens* L.). *Animal Reproduction Science* 104(2-4): 306-312.
48. Sarkar, M, Dutta borah, B K, Meyer, H H D and Prakash B S. (2008). Application of sensitive enzyme immunoassay for the determination of testosterone in yak (*Poephagus grunniens* L.). *General and Comparative Endocrinology* 158: 240-244.
49. Sarkar, M, B.K. Dutta borah and B.S. Prakash. (2009). Strategies to optimize reproductive efficiency by regulation of ovarian function in yak (*Poephagus grunniens* L.). *Animal Reproduction Science* 113: 205-211.
50. Sarkar, M, U.A. Nandankar, B. K. Duttaborah, M. Bhattacharya and B.S. Prakash. (2008). Plasma growth hormone concentrations in

female yak (*Poephagus grunniens* L.) of different ages: relations with age and body weight. *Livestock Science* 115: 313-318.

51. Sarkar, M, P. Chakraborty, B.C. Sharma, B.C.Deka , B. K. Duttaborah, T.K. Mohanty and B.S.Prakash. (2008). Assessment of Superovulatory Responses in Terms of Palpable Corpora Lutea and Embryo Recovery Using Plasma Progesterone in Yaks (*Poephagus grunniens* L.). *Research in Veterinary Science* 85: 233-237.

Technical Papers/ review articles /Invited pepers/trainings etc.

1. Sharma G.Taru (2009) Temporal patterns of buffalo embryonic gene expression. (Key Speaker) International Conference and ISSRF to be held at Indian Institute of Science, Bangalore, January, 2009.
2. Sharma G.Taru (2008) Embryo Genomics; Advanced Molecular Biology Tools used in Animal Disease Research and Diagnosis, DBT Sponsored (10.12.08 to 30.12.08)
3. Sharma G.Taru (2008) Recent advances in cryopreservation of female germplasm. Recent Development in Animal Production and Reproduction CAS in Veterinary Physiology (3.12.2008 to 23.12.08)
4. Vikash Chandra and G.Taru Sharma (2008) Aanth part mahish brun utpadan me vradhi karko ka prbhav. *Krishi Prabandhan ken aye aayam*. NAARM, ICAR Aank 2, 75-81.

List of papers in seminar/symposium

Research Abstracts

- Eswari S, Sai Kumar G and Sharma G.Taru (2009) Analysis of expression pattern of Leukaemia inhibitory factor and its receptor in buffalo preimplantation embryos produced in vitro. Pp 120-121, Stem cell and Biotechnology section.. XVIII Annual Conference of SAPI 26-28, January, NIANP, Bangalore.
- Kulkarni Srikant, Varshney, V.P, Sharma G.Taru, Saini M, Sastry KVH and Ketki (2009) Changes in the activities of different components of immune system of goats during pregnancy. PP159, Young Scientist section, XVIII Annual Conference of SAPI 26-28, January, NIANP, Bangalore.
- Pawan K. Dubey, S.K. Meur and G. Taru Sharma (2009) Impact of growth factors on survival, growth, antrum formation and

steroidogenesis in buffalo (*Bubalus bubalis*) preantral follicles cultured *in vitro* ISSRF to be held at Indian Institute of Science, Bangalore, January, 2009.

- Pawan K. and G. Taru Sharma (2009) *In vitro* maturation , fertilization and developmental competence of embryos from

immature oocytes harvested from *in vivo* developed buffalo ovarian antral follicles. International Conference on novel updates in reproductive biology and comparative endocrinology and SRBCE, January, 2009, University of Hyderabad.

- Rajarajan K, Saikumar G, Sharma G.Taru (2009) Expression of developmentally important genes involved during energy metabolism in oocytes and preimplantation buffalo embryos produced *in vitro*. ISSRF to be held at Indian Institute of Science, Bangalore, January, 2009.
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*** Technical papers/review articles /full invited papers in conferences/training, etc.**

1. Gyanendra Singh (2009) Impact of global warming on animal health. Delivered in five days Training Programme organized for Technical Officers, NGOs and Farmers from 3 - 7 November at Joint Directorate of Extension Education, IVRI, Izatnagar.
 2. Gyanendra Singh and M. C. Pathak (2010) Nuclear diagnostic techniques for animal disease diagnosis. Delivered in National Training Course on *"Recent Advances in Animal Disease Diagnosis and Their Treatment"* From 8th - 15th February at Joint Directorate of Extension Education, IVRI, Izatnagar.
- Abstracts/papers presented in conferences/ symposia
 1. Pawan K. Dubey, Amar Nath, Om Prakash Verma and G. Taru Sharma. Co-culture of buffalo preantral follicles with antral follicles: comparative study of the maturation and embryonic developmental competence of oocytes using in vivo developed and in vitro cultured antral follicles. ISSRF, held at Rajasthan University, Jaipur, from 8-10 February, 2010.
 2. Amar Nath, Pawan K. Dubey, Om Prakash Verma and G. Taru Sharma. Expression and immunolocalization of IGF-IR, IGF-IIR, IGFBP- 3 and- 4 in buffalo (*bubalus bubalis*) ovarian follicles and oocytes. ISSRF, held at Rajasthan University, Jaipur from 8-10 February, 2010.
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4. G.Taru Sharma Functional molecules, the transcription factors of pluripotent stem cells. (Key Speaker) ISSRF, held at Rajasthan University, Jaipur from 8-10 February, 2010.
 5. Manjinder Sharma, Rajesh Kumar, Amarnath Katiyar, Pawan Dubey, G.Sai Kumar and G.Taru Sharma Expression of Oct-4 gene and immunolocalization of its protein in blastocysts and embryonic stem cells derived from in vitro produced buffalo embryos.ISSRF, held at Rajasthan University, Jaipur from 8-10 February, 2010.
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OX - 2	Molecular characterization of buffalo SOX 2 cDNA and its expression in developing embryos and embryonic stem cells.	GQ451841	01-09-2009	Kumar,R.,Sharma,M.,Sai Kumar,G. and Taru Sharma,G
connexin-43	Bubalus bubalis connexin-43 mRNA, partial cds. 346 bp mRNA linear	GQ896281	18-10-2009	Mishra,A., Chandra,V.,Kumar,G. and Taru Sharma,G
polyA	Direct Submission	GQ896282	18-10-2009	Mishra,A., Chandra,V., Kumar,G. and Taru Sharma,G
ox-2	Cloning and characterization of Sox2 gene in buffalo embryonic stem cells	GQ853881	30-10-2009	Kumar,R., Sharma,M., Dubey,P.K., Amar Nath, SaiKumar,G. and Taru Sharma,G
SC-3	Studies on expression of desmocolin 3 (DSC3) during in vitro production of buffalo	GU984381	09-03-2010	Taru Sharma,G., Amar Nath, and Sai Kumar, G.

	(Bubalus bubalis) embryos			
CNA	Expression of proliferating cell nuclear antigen (PCNA) in buffalo ovarian tissue, preantral follicles, antral follicles, and granulosa cells	GU9 84380	09 -03-2010	Taru Sharma,G., Amar Nath, Pawan K. Dubey, and Sai Kumar, G.
SG1	Studies on expression of Desmoglein 1 during in vitro production of buffalo (Bubalus bubalis) embryos	GU4 77348	18 -01-2010	Taru Sharma,G., Amar Nath, and Sai Kumar, G.
SC2	Studies on expression of desmocolin 2 (DSC2) during in vitro production of buffalo (Bubalus bubalis) embryos	GU8 10380	13 -02-2010	Taru Sharma,G., Amar Nath, and Sai Kumar, G.
GFB P-4	Expression of insulin-like growth factor binding protein 4 (IGFBP4) during folliculogenesis and oocyte development in buffalo	GU8 10381	14 -02-2010	Taru Sharma,G., Amar Nath, Pawan K. Dubey, Om Prakash Verma and Sai Kumar, G.
GFB P-3	Expression of insulin-like growth factor binding protein 3 (IGFBP3) during folliculogenesis and	GU8 10382	14 -02-2010	Taru Sharma,G., Amar Nath, Pawan K. Dubey, Om Prakash Verma and Sai Kumar, G.

	oocyte development in buffalo			
CNB-1	Expression of cyclin B1 (CCNB1) during ovarian folliculogenesis and oocyte development in buffalo	GU8 10383	14 -02-2010	Taru Sharma,G., Amar Nath, Pawan K. Dubey, and Sai Kumar, G.
LUT-1	Studies on expression of glucose transporter type I (GLUT-I) during in vitro production of buffalo (Bubalus bubalis) embryos	GU8 10384	14 -02-2010	Taru Sharma,G., Amar Nath, and Sai Kumar, G.
SPA-1A	Studies on expression of heat shock protein 1A (HSPA1A) during in vitro production of buffalo (Bubalus bubalis) embryos	HM 025989	23 -03-2010	Taru Sharma,G., Amar Nath, Nandita singh and Sai Kumar, G.

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Technical papers/review articles/full invited papers in conferences/trainings, etc.

1. Gyanendra Singh and M. C. Pathak (2011) Nuclear techniques for animal disease diagnosis. Delivered in National Training Course on “*Recent Advances in Animal Disease Diagnosis and Their Treatment*” From 7th – 14th February at Joint Directorate of Extension Education, IVRI, Izatnagar
2. Gyanendra Singh and M. C. Pathak (2011) Nuclear diagnostic techniques for animal disease diagnosis. Delivered in National Training Course on “*Modern Diagnostic Methods and Innovative Techniques*” From 17th – 26th February at Joint Directorate of Extension Education, IVRI, Izatnagar.
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- 11.Mondal S K, Das B C, Ghosh S K, Das G K, Bhar R and Verma A K. 2010. Reproductive performance of purebred landrace pigs and their crosses under organized farm condition. In Abstracts of XXV Annual Convention

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February-07 March, 2010; under CAFT In Veterinary Physiology, IVRI, Izatnagar - 243 122; Pp 148-149

40. A C Majumdar, Sadhan Bag, B.C. Das and C Anees. 2010. Characterisation Of Stem Cells With Alkaline Phosphatase. Short Term Course On "Recent Advances In Stem Cell Research" 15 February-07 March, 2010; under CAFT In Veterinary hysiology, IVRI, Izatnagar - 243 122; Pp 150
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51. Mohan.N.H (2010). Intestinal stem cells. Advances in stem cell research, Indian Veterinary Research Institute, Izatnagar.
52. Mohan.N.H (2010). Application of gene silencing in stem cell research. Advances in stem cell research, Indian Veterinary Research Institute, Izatnagar.
53. Mohan.N.H (2011) Production of transgenic animals using stem cells. In Therapeutic application of stem cells in livestock, Indian Veterinary Research Institute, Izatnagar.
54. Mohan.N.H (2011) Isolation and characterization of intestinal stem cells. In Therapeutic application of stem cells in livestock, Indian Veterinary Research Institute, Izatnagar.

Abstracts/papers presented in conferences/symposia

1. G.Taru Sharma, Vikash Chandra and Pawan K. Dubey. Morphological changes, DNA damage and embryonic developmental competence of in vitro matured vitrified and thawed buffalo (*Bubalus bubalis*) oocytes: A comparative study of two cryoprotectants and two cryodevices. ASPIRE, April 9-11, 2010, Bangkok, Thailand.

2. G. Taru Sharma Pawan K. Dubey and G. Sai Kumar Localization and expression of follicle-stimulating hormone receptor (FSHR) gene in buffalo (Bubalus bubalis) preantral follicles. ASPIRE, April 9-11, 2010, Bangkok, Thailand.
3. G. Taru Sharma and Rajesh Kumar. Molecular signalling and the transcription factors of buffalo pluripotent embryonic stem cells. Royan International Twin Congress 11th Congress on Reproductive Biomedicine and Stem cells, September 15-17, 2010 Tehran – Iran.
4. Rajesh Kumar, S.P.S Ahlawat, Manjinder Sharma and G. Taru Sharma Molecular Dissection of Buffalo SOX-2 cDNA and Localization of encoded Protein in Developing Embryos and Embryonic Stem Cells. ASPIRE, April 9-11, 2010, Bangkok, Thailand
5. Pawan K. Dubey, Vrajesh Tripathi, Ram Pratap Singh, Om Prakash Verma, and G. Taru Sharma. Nitric oxide regulated steroid synthesis, growth and apoptosis of buffalo ((Bubalus bubalis) granulosa cells in vitro. Royan International Twin Congress 11th Congress on Reproductive Biomedicine and Stem cells, September 15-17, 2010 at Tehran – Iran.
6. Pawan K. Dubey, Amar Nath, Om Prakash Verma and G. Taru Sharma Expression of proliferating cell nuclear antigen (PCNA) and cyclinB1 in buffalo (Bubalus bubalis) ovary during follicular development. International conference on physiological capacity building in livestock under changing climate scenario. Nov. 11th to 13th 2010, IVRI Izatnagar, Bareilly
7. Pawan K. Dubey, Vrajesh Tripathi, Ram Pratap Singh, KVH Sastry, and G. Taru Sharma. Localization and expression of endothelial nitric oxide synthase (eNOS) in buffalo (Bubalus bubalis) ovary during different stages of follicular development. International conference on physiological capacity building in livestock under changing climate scenario. Nov. 11th to 13th 2010, IVRI izatnagar, Bareilly, India.
8. Amar Nath, Nandita Singh, G. Saikumar and G. Taru Sharma. Expression of heat shock protein (HSPA-1A) in in-vitro derived buffalo (Bubalus bubalis) embryos. International conference on physiological capacity building in livestock under changing climate scenario. Nov. 11th to 13th 2010, IVRI Izatnagar, Bareilly, India.
9. Rahul kumar Udehiya, Amarpal, Amar Nath, Om Prakash Verma Sarita Kankoriya and G. Taru Sharma. Isolation, culture and molecular characterization of mesenchymal stem cells (MSCs) derived from rabbit

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10. Om Prakash Verma, Amar Nath, Rajesh kumar, Pawan K. Dubey, Manjinder Sharma, G Saikumar and G. Taru Sharma. In vivo assessment pluripotency of buffalo (*bubalus bubalis*) embryonic stem cell by teratoma assay. Ovary during follicular development. International conference on physiological capacity building in livestock under changing climate scenario. Nov.11th to 13th 2010, IVRI Izatnagar, Bareilly, India.
 11. Ashish Mishra, Vikash Chandra, G. Taru Sharma and G Saikumar. Cloning and partial sequence of connexin 43 gene expressed in buffalo oocytes and developing embryos produced *in vitro*. International conference on physiological capacity building in livestock under changing climate scenario. Nov.11th to 13th 2010, IVRI Izatnagar, Bareilly, India.
 12. S. Eswari and G. Taru Sharma. Effect of supplementation of recombinant leukemia inhibitory factor on *in vitro* development of buffalo embryos. International conference on physiological capacity building in livestock under changing climate scenario. Nov.11th to 13th 2010, IVRI Izatnagar, Bareilly, India.
 13. S. Satheshkumar, A. Palanisamy, S. Rangasamy, D Kathiresan, G. Taru Sharma and K. Kumanan. Superovulatory response in buffaloes subjected to different superovulatory protocols. International conference on physiological capacity building in livestock under changing climate scenario. Nov.11th to 13th 2010, IVRI Izatnagar, Bareilly, India.
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17. Pawan K. Dubey, Amar Nath, Nitin E. Gade, Ram Pratap Singh, KVH Sastry, Vrajesh Tripathi, and G. Taru Sharma. Localization and expression of inducible nitric oxide synthase (iNOS) in buffalo (*Bubalus bubalis*) during different stages of follicular development. International conference on frontiers in reproductive biotechnology. 9th to 11th Feb 2011, NDRI Karnal, India.
18. Amar Nath, Saikumar G., Gade Nitin Eknath, Taru Sharma G. Constitutive expression of HSPA-1A gene in two different sources of buffalo (*Bubalus bubalis*) embryos. 5th international qPCR symposium on Molecular Diagnostics: from single cells to Next Generation Sequencing., TUM, Freising Weihenstephan, Germany. 28th March-1st April 2011. qPCR 2011– Online Proceedings–page31.
19. Sadhan Bag¹, B C Das¹, R Chetri¹, Gopal Puri¹ and A C Majumdar¹ (2010). Effect of different culture condition on development of stem cell like cells from ivf derived early developing embryos in buffalo. ISSRF, Karnal
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24. Satisha K B, Sadhan Bag, B C Das, Pankaj K S, Venkatesha V, N C Nath and Anees C. 2009. Comparative expression of developmental related genes OCT4 and NANOG between parthenogenetic and IVF derived embryos in buffalo. ISSRF held at Jaipur, 8-9 Feb,2010
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