ANNUAL REPORT

2010-11

Guru Angad Dev Veterinary and Animal Sciences University

Ludhiana (Punjab) India

Annual Report
2010-11
Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana

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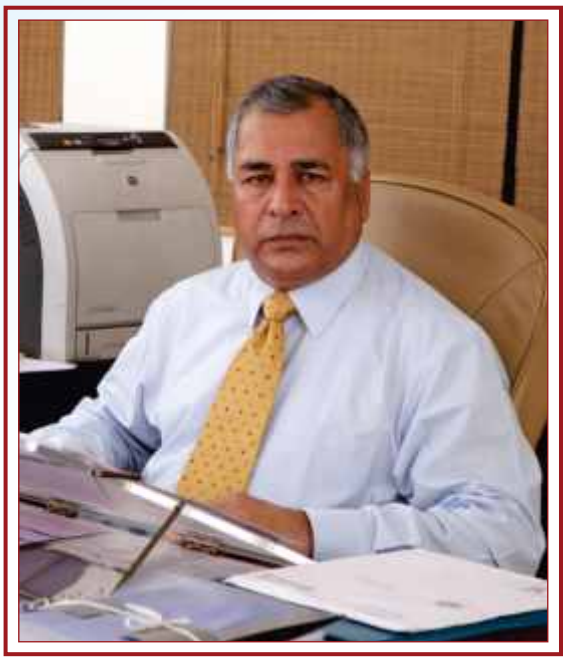
PREFACE



Guru Angad Dev Veterinary and Animal Sciences University (GADVASU) made fast progress in its trinity functions i.e. teaching, research and extension education. The university now has five colleges/academic units viz. College of Veterinary Science, College of Dairy Science and Technology, College of Fisheries, School of Animal Biotechnology and Veterinary Polytechnic. The university during the year got accreditation from the University Grants Commission (UGC) and has completed the process for getting accreditation from ICAR. School of Animal Biotechnology has been granted accreditation to confer M.V.Sc./ M.Sc. and Ph.D. degrees under the aegis of Ministry of Science and Technology. College of Fisheries won ICAR Niche Area Excellence Project "Inland Aquaculture in Punjab". A collaborative project under International Fund Program on Public Health, Zoonoses and Environment Toxicology has been taken up with University of Saskatchewan, Canada.

The university further strengthened its capacity and capabilities to meet the present and future needs. Important laboratories viz. clinical diagnostic, immunopathology, toxicology, molecular biology and genetic engineering have now state-of-the-art facilities for teaching and research with renewed emphasis on disease diagnosis and treatment. Value addition of livestock products received high focus. Chicken snack sticks which appear like kurkure were developed. A number of fish products from low value fishes were developed and are being scaled up for commercial production. The university has set up an eco-friendly bio-gas plant using animal dung for generation of electricity, which in turn is being used for machine milking and chilling of milk. The animal farm washings are being recycled into aquaculture through duckweed based bioremidation system producing protein rich duckweed biomass as a by product, which can be used as livestock fodder or feed. Adoption of such a practice while adding value to dung and farm washings helps in maintaining a clean environment. Azolla culture technology has been demonstrated for producing a potential feed for livestock.

University scientists won a number of extramural research grants. The genetic improvement of cattle and buffalo at university dairy farm resulted in average lactation yield of 6557 kg in cattle and 2763 kg in buffalo. The maximum lactation milk yield for an individual cow in the herd was recorded as 7496 kg. Five breeding crossbred bulls were selected for the ICAR field

progeny testing program. Ten elite cow calves have been produced in the field through embryo transfer technology, The commercial broiler (IBL-80) developed in the university has the potential to attain average 6-week body weight of 1600-1700g and the commercial "Satluj Layer" has a potential to lay 270-280 eggs a year with an average egg weight of 57g. Three strains of quail namely Punjab Quail-1, Punjab Quail-2 and Punjab Quail-4 have been developed and released for commercial use. Average five week body weight of the commercial crosses was found 240-250g.

The academic excellence, time warranted research and developmental support through extension services for enhanced nutritional and livelihood security of the livestock farmers have made the presence of the university felt among its stakeholders not only in the service areas but regionally and nationally also. The university today is well equipped to play crucial role for promotion of demand driven livestock, poultry, fisheries and dairy technology sectors. Our focus is to further strengthen the system to provide quality services and germplasm to farming community.

The students performed extremely well on all fronts, be it academics, sports or co-curricular activities and brought laurels to the university at national level. The time is changing and more job openings shall be available in private sectors-banking, multi-specialty private hospitals, pharmaceutical, large dairy farms etc. This calls for further strengthening of our teaching and training programs both at graduate and post-graduate levels so that future graduates are well equipped to provide specialized services.

I must say that we have done well but still have to go a long way to achieve excellence and emerge as one of the best Veterinary and Animal Sciences University in the country and Asia.

(Vijay Kumar Taneja)
Vice Chancellor

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EXECUTIVE SUMMARY

Guru Angad Dev Veterinary and Animal Sciences University (GADVASU) started functioning at Ludhiana from 21st April, 2006 with one college i.e. College of Veterinary Science with the motto to act as a centre of excellance for teaching, research, extension and learning in animal health and production. To produce highly efficient and skilled human resource for giving boost to activities of livestock and fishery sectors in Punjab, the GADVASU has created College of Fisheries, College of Dairy Science and Technology, School of Animal Biotechnology and Veterinary Polytechnic. One private veterinary college, Khalsa College of Veterinary and Animal Sciences at Amritsar (Punjab) has been affliated with the university. Two Regional Livestock Research and Training Centres, one at Kaljharani (Bathinda) and other at Talwara (Hoshiarpur) have been established for catering to the specific needs of the area. The University got recognition from the University Grants Commission (UGC) in order to receive central assistance under section 12 (B) of UGC Act, 1956.

The University in a short period of its establishment has strengthened its capacity and capabilities to meet the present and future needs. Important laboratories viz. histopathology, immunopathology, clinical pathology, toxicology and molecular biology have now state-of-the-art facilities for teaching and research with renewed emphasis on disease diagnosis and treatment.

Scientists from College of Fisheries won a Niche Area of Excellence Project "Inland Aquaculture in Punjab" from ICAR at a total cost of ` 300 lacs. GADVASU and University of Saskatchewan, Canada, have taken up a collaborative project under International Fund Program on Public Health, Zoonoses and Environment Toxicology.

Budget

The university received ` 4864.00 lacs from State Government which includes ` 4315.00 lacs for different research projects under plan/non-plan schemes, ` 249 lacs for establishment of College of Dairy Science and `300 lacs for Establishment of College of Fisheries. Grant received from ICAR was ` 1827.44 lacs which included ` 139.31 lacs under NAIP, ` 369.26 lacs as development grant and `1318.87 lacs for various research projects/schemes. Grant received from other agencies was ` 2139.39 lacs which included ` 1500 lacs under RKVY, ` 500.00 lacs under PGIVER (ACA) and ` 139.39 lacs under various other projects granted by DBT, DST, UGC etc. The total expenditure for the year 2010-11 was ` 7956.53 lacs which include ` 4979.36 lacs for salary, ` 2825.36 lacs for contingency, ` 134.74 lacs for wages and ` 17.07 lacs for T.A.

Faculty Profile

The present faculty strength in the constituent colleges of the GADVASU is 179, out of which 50 are Professors or equivalent, 42 Associate Professors or equivalent and 87 Assistant Professors or equivalent. About 109 faculty members are in the teaching schemes, 55 in the research schemes and 15 in the extension schemes. On university basis, 20% of the faculty is female and 75% faculty holds doctoral degree.

Student Profile

The present strength of students in various programs of the constituent college is 671, out of which 73% are in undergraduate courses, 16% are in postgraduate courses, 6% are in doctoral program and 5% are in diploma course. The distribution of male and female students in the university is 75% and 25%, respectively.

Teaching

Admission in various undergraduate programs and diploma course was done strictly on the basis of entrance examination conducted by Controller of Examination. The total number of students admitted for the session 2010-11 was 252 which included 86 in B.V.Sc. & A.H., 20 in B.F.Sc., 29 in B. Tech. (Dairy Technology), 60 in M.V.Sc./M. Sc., 1 in M.F.Sc., 25 in Ph.D program and 31 in Diploma for Veterinary Science and Animal Health Technology. A total of 101 students successfully completed their degrees in different disciplines (59 - B.V.Sc. & A.H., 37 - M.V.Sc./M.Sc., 2 - M.F.Sc. and 3 – Ph.D.).

University Merit Scholarship was awarded to 75 undergraduate students, 20 postgraduate students and 4 doctoral students. Thirty one undergraduate students admitted through All India Entrance Examination were

awarded National Talent Scholarship. Junior Research Fellowship of ICAR bagged by 15 postgraduate students and Senior Research Fellowship by 2 doctoral students. Six postgraduate students admitted in Animal Biotechnology through All India Entrance Examination were awarded DBT Merit Scholarship. Eleven undergraduate students received assistance from other agencies.

The students in the undergraduate programs were offered courses as per recommendation by the IV Dean's Committee of ICAR for Fisheries (B.F.Sc.) and Dairy (B. Tech. Dairy Technology), and as per Veterinary Council of India-Minimum Standards of Veterinary Education for B.V.Sc. & A.H. Regulations, 2008. The postgraduate and doctoral students of session 2010-11 were offered courses as per ICAR revised course curricula, syllabi and common academic regulations.

All India Study Tour of 17 days for final year B.V.Sc. and A.H. students was organized during Jan. 2011. Eighty three students of 2006 batch visited various veterinary colleges, national institutes, laboratories and wild life sanctuaries at Mumbai, Goa, Bangaluru, Chennai and Hyderabad.

Five students of College of Veterinary Science participated in various equestrian activities during Republic Day Camp and Prime Minister Rally 2011. Cadets brought laurels to the institute by winning Dr Sharma Trophy, one gold medal, three silver medals and one bronze medal. The Cadets of GADVASU participated in various activities during 2010-11 like horse shows at Fatehgarh Sahib and Khanna, traffic control rally and tree plantation program. Cadets attended Combined Annual Training Camp and appeared in Certificate 'B' and 'C' examinations.

The students of College of Dairy Science & Technology attended five day NSS camp and participated in various activities like tree plantation, maintenance of ornamental plants, poster making and debate on various topics. The undergraduate students of the College of Fisheries attended one week NSS camp with a slogan "Tandrust Naujawan Tandrust Punjab" ("Healthy Youth and Healthy Punjab") and participated in various activities like aquatic life conservation campaign, cleanliness campaign and compititions like poster making, rangoli making, essay writing and mehandi competitions.

Two trainings were conducted for the scientists by the Centres of Advanced Studies in collaboration with Centre of Advanced Faculty Training, ICAR, New Delhi. Department of Veterinary Microbiology organized one month training course on Microbiological and Molecular Biological Techniques. Departments of Epidemiology and Preventive Veterinary Medicine, Livestock Products Technology and Veterinary Surgery and Radiology organized nine training programs for field Veterinary officers in collaborations with State Animal Husbandry Department and Punjab Veterinary Council. FAO sponsored training course for Nepalese Technicians was organized jointly by Department of Veterinary Microbiology and Veterinary Pathology. A 21 days ICAR-sponsored winter school on Veterinary laboratory Diagnostics was organized by Department of Veterinary Pathology. Two days workshop on laparoscopy and endoscopy in small animal practice was organized by Department of Veterinary Surgery and Radiology in collaboration with Karl Stroz, Mumbai. An International Workshop on Environmental Pollutants and their impact on Human and Animal Health was organized by Department of Veterinary Public Health in collaboration with University of Saskatchewan, Saskatoon, Canada.

Faculty participated in international and national conferences, symposia and workshops and presented research papers. The faculty has won several awards and honours and published 110 research papers, 5 books, 18 compendium/proceedings/training manuals/bulletins and prepared/revised 17 practical manuals for the undergraduate and postgraduate students.

Teaching and diagnostic laboratories in various departments of constitute colleges have been strengthened and were made fully operational. Modern machine milking parlour for milking of 12 animals (cattle) with electronic recording has been installed. A Biogas Generator Set has been procured for production of electricity using eco-friendly biogas plant. Small Animal Hospital (Medicine Wing) has been renovated and is in use since the last week of July 2010. A new Lecture hall with Audio-Visual Aid facility has been constructed with a sitting capacity of 118 students in the Silver Jubilee Block. The College of Fisheries has established Bio-remediation model for recycling of animal shed waste water through duckweed bioremediation and Azolla culture unit for livestock feed production.

Research

Undertaking need based research on different aspects related to production and health of various livestock species, poultry and fisheries forms an integral part of the mandate of the university. During the year 2010-11, a total of 121 research schemes were operational, which included 51 non plan/ plan schemes, 15 ICAR schemes, 4 revolving fund schemes, 34 RKVY schemes and 17 miscellaneous schemes. A total of 50 new project proposals were submitted to various funding agencies.

Animal Breeding

The genetic improvement of cattle and buffalo at the university dairy farm resulted in average lactation yield of 6557 kg in cattle and 2763 kg in buffalo. The maximum 305-day milk yield for an individual cow in the herd was recorded as 7496 kg. Five breeding crossbred bulls were selected for the ICAR field progeny testing program. Six cow and 31 buffalo bulls/ bull calves and thousands of semen doses were supplied to the farmers and other dairy development agencies for the genetic improvement of cattle and buffalo population in the state. Ten elite cow calves have been produced in the field through embryo transfer technology during the last one year.

The commercial broiler (IBL-80) developed in the university has the potential to attain average 6-week body weight of 1600-1700g with a feed efficiency of 1.8 to 1.9 and the mortality less than five percent. The commercial stock "Satluj Layer" developed at GADVASU has a potential to lay 270-280 eggs in a year with an average egg weight of 57g. Another bird (Rhode Island Red) lays tinted (brown) eggs and is thus popular in rural areas of state. It lays 250-260 eggs in a year with an average egg weight of 53g. Three strains of quail namely Punjab Quail-1, Punjab Quail-2 and Punjab Quail-4 have been developed. Average five week body weight of the commercial crosses was found 240-250g. Quails were found less susceptible to common diseases of poultry and need no vaccination against common poultry diseases. University supplies quail eggs, day old chicks and 5-week old dressed/ live birds.

Animal Health

Disease Occurrence

Occurrence of infectious diseases has been posing a serious concern to the dairy industry in state. The prevalence of brucellosis has been continuously rising since 2004; reaching up to 34% in 2010. The tuberculosis was found to be prevalent in 5% of bovines. During 2010, more than 50 disease outbreaks comprising foot and mouth disease (FMD), hemorrhagic septicemia (HS), black quarter (BQ), sheep pox, transmissible gastroenteritis (TGE) of pigs, blood protozoan infections and nitrate/ nitrite and cyanide toxicity has been reported at the university throughout Punjab. The BQ in calves, TGE of pigs and nitrate toxicity outbreaks proved to be very fatal where more than 50% affected animals died.

The majority of clinical mastitis cases in dairy animals occurred during the rainy season i.e. July to September. The staphylococci were found to be the major etiological agents. Machine milking, when not properly used, may have some untoward effects on teat health. The immediate effects of milking machine on teat health were observed as change in colour (red or red-blue, 22%) and morphology of teat (ringing at base or hardening at teat end, 18%). Major long term effect of milking was the hyperkeratosis of teat end with 10% cases as very rough to open lesions. The occurrence of teat end lesions showed a significant relationship with the occurrence of mastitis. Besides, warts, dryness and leaky teats constituted the other predominant teat lesions.

The presence of sole ulcers and/or white line fissures in hooves are mainly responsible for causing clinical lameness whereas presence of other lesions like sole avulsions, under run soles, overgrown hooves and heel erosions tends to increase the asymmetry of gait.

The fecal examination of diarrheic neonatal dairy cattle and buffalo calves in peri-urban surroundings of Ludhiana revealed an overall 38.56% prevalence of cryptosporidiosis. The overall prevalence of GI parasitic infections in dairy cows and buffaloes in Punjab was found to be 39% in adults and 71% in calves. The *Strongyles* (22%) constituted the predominant parasitic infestations in adult animals whereas *Eimeria* (53%) was the main parasite in calves. *Toxocara vitulorum* (7%) was recorded from calves only. *Hyalomma* ticks collected from cattle and buffaloes showed up to 15% prevalence of *Theileria annulata* infection. The infection was almost two times in female than male ticks. Hot and dry climate of western semi arid zone of Punjab favored the development of *T. annulata* sporozoites in ticks. *Ehrlichia* (7.8%), *Babesia* (4.5%) and *Hepatozoon canis* (1%) were found the most prevalent haematozoa in dogs. They resulted in anemia, thrombocytopenia and hyper gammaglobulinemia in infected animals.

The prevalence of skin affections in fish was found to be 27.61% with *Aeromonas* and *Vibrio* spp as the predominant isolates.

Disease Diagnosis

Real time PCR was found the most sensitive molecular approach for ante-mortem detection of rabies from skin samples. This could be used as most feasible approach for mass epidemiological survey of rabies with molecular detection of rabies in hair follicles of suspected animals. The sensitivity of FAT (fluorescent antibody test) of corneal impression smears in comparison with FAT of brain impression smears was found to be 42.86%.

The use of PCR resulted in significantly higher efficacy of detection of various blood protozoan infections such as *Anaplasma marginale*, *Babesia bigemina*, *Theileria annulata* and *Trypanosoma evansi* as compared to microscopic examination of blood smears.

The *Pasteurella multocida* infection in water buffalo results in marked increase in the expression of tumor necrosis factor alpha (TNFα) in lungs.

Standardization of immunohistochemical techniques for localizing viral antigens in tissue sections could detect and differentiate up to 20% of neoplasm caused by avian oncogenic viruses such as Mareks disease virus (MDV), reticuloendotheliosis virus (REV) and avian leucosis virus (ALV). Use of immuno-histochemistry showed 75% accuracy of cytology in diagnosing canine mammary tumours with a sensitivity of 97.22%. Out of different factors used to assess prognosis of animals suffering from canine mammary tumors, presence of inflammation, micro calcification and Her2/neu in conjunction with EGFR were found responsible for poor survival

A new staining technique with acridine orange was standardized for identifying haematozoa. The staining seems to be simple and rapid method for detection of low parasitaemia with better accuracy but the limitation is the use of fluorescence microscope. The saturated sugar solution floatation staining techniques gave the highest sensitivity of 83.92% in detection of cryptosporidium in calf feces.

As diagnostic indicators of gastrointestinal disorders in dairy animals, higher total leukocyte counts (TLC) were observed in peritonitis, omasal impaction, reticular abscess, intestinal obstruction and traumatic pericarditis. Marked left shift was seen in abomasal ulceration, peritonitis and traumatic pericarditis. Total protein concentration was elevated in cases of reticular abscess and traumatic pericarditis. Peritoneal fluid examination was found very useful in diagnosis of peritonitis.

Diagnosis of subclinical mastitis at farmer level could be best undertaken by using Sodium lauryl sulphate (SLS) paddle and Bromothymol blue (BTB) card tests, the kits for which could be procured from the university.

Locomotion scoring and rear leg view index may be used as reliable indicators of clinical lameness on dairy farms.

Disease Management

Therapeutic management of gastrointestinal disorders with different antibiotic combinations and fluid therapy along with supportive therapy could cure more than 50% cases. Combined therapy with hypertonic saline solution, flunixin meglumine and dextran– 40 improved the survival time in calves suffering from endotoxemia. Exploitation of therapeutic potential of bacteriophages against *Salmonella dublin* and locally prevalent *Brucella* organisms showed encouraging results.

Current culture sensitivity pattern of clinical mastitis in dairy animals showed maximum in vitro sensitivity to ceftriaxone-tazobactam (87%) followed by cefquinome (85%), amoxicillin-sulbactam (80%), enrofloxacin (73%) and gentamicin (71%). The ampicillin (24%) was found least effective. Isolates from fish skin affections were found to be sensitive to chloramphenicol.

Pharmacokinetic study of ceftazidime in calves showed extensive distribution of drug to various body tissues and low plasma protein binding. Sub-chronic exposure of carbendazim in male goats decreased the testosterone levels, altered the antioxidant status and caused mild liver and kidney dysfunctions.

Clinical Interventions

The major abdominal disorders in dairy animals needing surgical intervention constituted foreign body syndrome, diaphragmatic hernia and omasal impaction. Radiography and ultrasonography were found good tools for diagnosis of abdominal disorders. Reticular abscess could be diagnosed and drained under ultrasound guidance. Rounding and dilatation of vena cava along with hepatomegaly was always associated with traumatic pericarditis in cows and buffaloes. In general surgical management of atrersia ani resulted in good recovery. Spinal anesthetics were found to provide good muscle relaxation and adequate analgesia for long and short term. Interlock nailing technique was found very much encouraging for the repair of long bone fractures in bovines.

Animal Nutrition

Mapping revealed wide-spread mineral deficiencies particularly the calcium, phosphorus, copper, iodine, zinc and manganese in dairy animals at different levels in different zones of Punjab, and accordingly area specific mineral mixture has been recommended. The highest deficiency for calcium was found in south western districts, and for zinc and manganese in central districts. On the other hand, mineral toxicities e.g. fluorosis was observed in south western districts (Bathinda, Mansa, Sangrur), and selenosis in Hoshiarpur and Nawanshahr districts of Punjab. The strategic supplementation of chelated minerals like Cu and Zn improves the reproductive performance in crossbred cattle.

Baby corn husk (BCH), a waste product (outer peels) of baby corn cob, could be used as a feed resource for livestock. The fresh or ensiled BCH was highly acceptable and palatable as compared to conventional maize fodder.

Evaluation of different energy supplements for methane production rations with low methane production potential could be best formulated by using conventional and non conventional feedstuffs e.g. concentrate feed ingredients like barley, waste bread, cotton seed cake, tomato pomace, rice bran; forages like shaftal and straws like moong straw, groundnut straw and soybean straw. Cauliflower leaves had an edge over other fruit, vegetable and cannery wastes.

The oat fodder silage can be prepared in poly bags, and the quality of silage prepared in translucent plastic bags was found better than that in high-density polyethylene (HDPE) plastic bag or pit.

Treatment of oil seed cakes for protection of proteins could be best achieved at 1.0% level of formaldehyde.

Animal Reproduction

Use of hormones (GnRH, PGF2a and progesterone) was found 100% successful for inducing estrus in anestrous buffaloes, but satisfactory fertility was achieved only when progesterone releasing intra-vaginal device was inserted along with PGF2a and GnRH administration. Progestagens along with Ovsynch protocols (GnRH- PGF2a - GnRH) were found very much effective in alleviating repeat breeding due to hormonal imbalance and resulted in improved conception rates. GnRH and hCG administration as antiluteolytic strategies on 5th day or on 12th day after breeding were found to improve first service conception rate in buffaloes to 71% with GnRH and 47% with hCG as compared to 29% in control.

Monensin, an ionophore being used in cows for improving lactation and reproduction when supplemented at dose rate of 150mg/ day/ animal induced ovarian cyclicity in 62% of the supplemented buffalo heifers.

Supplementation of antioxidants like vitamin C, vitamin E and selenium separately or in combination to goats during summer stress could improve the conception rates by up to 25%.

In place of measuring systemic levels of ovarian steroids, simple physical and biochemical characteristics of cervico-vaginal mucus like pH, spinnbarkeit, viscosity and chloride can be used as important indicators for prediction of conception in buffaloes.

Developmental Anatomy

Studies on prenatal development of different organs in buffalo revealed that undifferentiated ovarian cells were visible at 118 days of foetal age. Fully developed oogonia were observed at 267 day. The cellular differentiation of the oviduct mucosa into ciliated and secretory cells occurred at 156 day. The differentiation of vertebrae started at 38 day of foetal age. The intervertebral discs were evident at 42 days. Thirteen pairs of cartilaginous ribs were clearly visible at 44 days. The initial hepatic lobulation was observed at 136 days. The gall bladder was observed as an enclosed pouch at 64 days and was fully differentiated at 197 days of fetal life.

Transmission electron microscopy of spermato-genesis in adult rams showed spermatogonial cell lying on the basement membrane of seminiferous tubule, which divided mitotically and meotically to form spermatocytes and spermatids. The spermatids were found studded on the luminal surface of sertoli cells. Spermatozoa with typical nine plus two arrangement of tail were observed in the lumen.

Livestock Production Management

The fan pad system was found more efficient in cooling for broiler chick production during hot-dry season, thus enhancing the growth and reducing mortality rate. Supplementation of iron and copper to sows during last week of gestation found beneficial in maintaining normal hemoglobin and total erythrocyte counts in new born piglets.

Disbudding of kids following administration of non-steroidal analgesics (Meloxicam) without applying cornual nerve block may be used as farmer friendly technique.

Livestock Products Technology and Public Health

Various value added livestock products such as goat meat loaves, wadi and mathi, pork sausage, low cost turkey meat products such as nuggets, balls and patties, fish balls and fish caruncles, croquettes and buffalo mozzarella cheese with good sensory attributes, higher nutritive value and long shelf life were developed.

The incorporation of L-carnosine at 100ppm and L-carnitine at 200ppm was found the best choice in maintaining physico-chemical, sensory and microbiological quality of cooked pork sausage at refrigerated storage temperature up to 20 days.

The packaging of fish keema in laminated pouches with gases flushed in concentration of 10% O_2, 20% CO_2 and 70% N_2 enhanced the shelf life of product under refrigerated storage to 15 days as compared to <9 days under aerobically packaged in low density polyethylene pouches.

The 0.39% of milk and 0.48% farm water samples were found to contain arsenic levels above maximum permissible levels in Punjab. The high lead levels were present in 4.78% of milk and 60.97% of farm water samples

Testing of 59 water samples for portability revealed 12 (20%) unfit for human consumption. Also 02/43 milk product samples were found contaminated with *S. aureus*.

The 18.56% of individuals among the occupational risk groups suffered from brucellosis. Besides, hydatidosis was seen another emerging zoonotic disease among the dog handlers and dairy farmers.

Animal Biotechnology

PCR based on immunodominant outer membrane protein gene LipL32 and 16SrRNA gene was developed for rapid diagnosis of leptospirosis from clinical samples.

Primers were developed for TLR gene sequencing of Indian major carp "*Catla catla*" on the basis of available DNA sequences of *Cyprinus carpio*, a close relative of *Catla catla*.

Development of a Novel marker vaccine for Bovine Herpesvirus-1 (BHV-1) and a companion diagnostic test was undertaken.

A recombinant baculovirus was constructed by incorporating BHV-1 glycoprotein C (an immuno-dominant believed to play role in initial viral attachment) coding gene to characterize the expression of the glycoprotein in infected insect (*Spodoptera fugiperda*) cells.

Chickens are found very sensitive to high ambient temperatures as compared to other species. Heat Shock protein "HSP70" is the most abundant, ubiquitous and temperature sensitive of the all HSPs and its expression is suggested to be an indicator of acquired thermo tolerance and in the induction of innate and adaptive immunity in both eukaryotic and prokaryotic cells. The present study was conducted to clone, sequence and express profiling of HSP70 gene in chickens and then to compare it with other species.

Work was undertaken for studying functional characterization of Toll like Receptor 2 (TLR2) in immune-competent adult Murrah buffaloes.

Fisheries

On-farm carp culture trials in salt affected water logged areas of Fazilka, district Ferozpur recorded productivity upto 2.5t/ha/yr. Sundried *Spirodela* (duckweed) can be incorporated up to 30% in carps diets for 43% higher yield, 64% higher net profit and superior meat quality with respect to higher protein contents in a semi-intensive carp poly-culture system. Sundried *Azolla* can be incorporated in carp diet @ 10% for 28% higher yiels, 39% higher net profict and higher muscle protein in a semi-intensive carp polyculture system.

Comparative evaluation of cow dung vermicompost and traditionally used raw cow dung as pond manure for semi-intensive carp culture revealed maximum yield in ponds manured with vermicompost @ 15,000 kg/ha/year and the water quality remained within the optimum levels for carp culture

Captive breeding of Catfish (*Heteropnuestes fossilis*) was carried out successfully through induced breeding technique without scarifying the male.

Breeding and seed production techniques for ornamental live bearing fish - Platy were standardized.

Colour development in wild (brass coloured) gold fish by incorporation of dried marigold flower petals (natural colour enhancer) in formulated pelleted diets revealed maximum colour enhancement in fish fed with diets containing dried marigold flower petals @ 2%.

Extension

In order to transfer the new technologies evolved by the university, training courses/programs (56) were organized for the farmers, field veterinarians and scientists from other universities. Faculty published about 130 extension publications in various magazines, journals, News papers etc. in order to disseminate important information to farmers. The faculty members delivered 32 TV talks and 24 Radio talks on different topics of animal health and production.

Animal welfare camps (14) were organized in the rural areas of Punjab for treatment of animals. Farmers and field functionaries were made aware of the recommended animal health practices.

The faculty members delivered extension lectures to the farmers in collaboration with the other animal welfare agencies of the state like Department of Animal Husbandry, Fisheries and Dairy Devlopment, Govt. of Punjab, Fish Farmer's Development Agencies, Punjab, Nestle, Smith Klime Beecham, Punjab & Sind Bank and in the training programs organized by the Krishi Vigyan Kendras and Department of Extension Education, PAU, Ludhiana. On these occasions, demonstrations regarding the collection, dispatch and transport of clinical material like blood, mucous discharge and faeces from the animals, correct method of milking, teat dip, computation of ration, silage making, acaricide drug application and heat detection were carried out in the field for livestock farmers.

Two Pashu Palan Mela were organized, each in the months of March and September. University also organized its first regional Pashu Palan Mela at Regional Research and Training Centre at Batoli, Talwara (Hoshiarpur). Various departments of the university exhibited new technologies/innovations for use in livestock and poultry farming. On this occasion, other Govt. and private agencies involved in animal welfare work also displayed their exhibits of importance to the farmers. Training courses and awareness camps were organized by Regional Research and Training Centre, Kaljharani, Bathinda and Regional Reseach and Training Centre Bhatoli, Talwara at different places in the adjoining areas.

The university scientists also participated in annually organized Dairy Shows and Livestock shows by Progressive Dairy Farmers Association and Department of Animal Husbandry, Fisheries and Dairy Devlopment, Govt. of Punjab.

Regular meetings/seminars of Progressive Dairy Farmers Association, Innovative Fish Farmers Association, Progressive Piggery Farmers Association, and Punjab Goat Farmers Association were held at GADVASU under the technical guidance of university experts.

Under information services, preparation as well as sale and distribution of the university publications like: Package of Practices for Livestock Health Management, Vigyanak Pashu Palan (Monthly Punjabi Magazine), Hand book on Infectious Animal Diseases, Veterinary Punjabi Shabad Kosh, Dairy Farming, Goat Farming in Punjab (English & Punjabi), Fish Farming and GADVASU hand-book was undertaken.

Services for fish farmers: Free pond water testing for fish farmers, on-campus and off-campus consultancy for Carp culture, Carp breeding and seed production, post-harvest processing and value addition, ornamental fish breeding and seed production and farm visits to address farmers problems related to water quality management, feeding, breeding and disease outbreak.

Under the National Agricultural Innovation Project, (NAIP) project on sustainable livestock based farming system for livelihood security in Hoshiarpur District of Punjab, deliverables like mineral mixture, dewormers, uromin licks for the livestock and good quality seed of crops, pulses, oilseed for improvement in livestock and agriculture fields have been made available. Animal welfare camps, animal welfare days and agriculture camps were organized at different places in the area to transfer modern technologies to the farmers. Income generation activities like rope-making, bee-keeping, stitching & embroidery, tie and dye of dupattas, candle making, vermicelli making, nugget & papad making etc. were demonstrated. Twenty rope-making machines were distributed in eight villages. A team from the Project Implementation Unit (PIU) of NAIP, New Delhi visited the Operational Area of the Project on Feb. 10, 2011 and captured the live activities of the project. The concerned farmers expressed their satisfaction about the working of the project and demanded similar additional activities in their area.

University Library and Networking

The University Library having state-of-the-art infrastructure and ultra-modern facilities has been supporting the education and research goals of GADVASU through knowledge dissemination and

knowledge application. The library is fully automated of its operations. It allows open access to its collections.

The University organised a two-day book exhibition at the premises of College of Veterinary Science on 14-15th February, 2011. Around 19 renowned book sellers/ publishers from various parts of Northern India including New Delhi, Lucknow, Jaipur, Jodhpur, Rohtak and Ludhiana displayed around 5,000 books on the different disciplines of Veterinary, Animal Sciences, Dairy Technology, Fisheries, Biotechnology and allied areas.

The library purchased 260 books on the different disciplines worth Rs.2,50,000/- and subscribed to 35 foreign Journals and 13 Indian Journals at a subscription cost of about 23.92 lacs during 2010. Library also subscribed to 13 newspapers and 7 magazines.

Library also subscribed to two databases i. e. Veterinary Science Database and Indiastat.com. Consortium for e-resources in agriculture which provides access to a collection of +2000 journals has been installed. The online access to foreign journals was also provided. The library also provides CD server facility to its members.

The library is in the process of establishment of Integrated University Management System (IUMS). This will automate most of the University processes like financial accounting, human resource management, pay-roll, admission, academics, examination, livestock farm management, veterinary hospital management, assets, inventory and estate management, etc.

The University Website (www.gadvasu.in) has been totally restructured keeping in view the addition of new colleges, institute and school and many other new features. It has several new features including farmer's helpline, frequently asked questions (FAQs), discussion forum, photo galleries both at the university and college levels, directory, useful links, web mail, intranet, placement cell, RTI, downloads, banner display, notice board and news.

Sports and Co-curricular activities

The University has created enough facilities to promote the sports activities among the students. Large numbers of students (both boys and girls) from different constituent colleges have shown keen interest in sports activities. National Sports Organisation (NSO) program is being run by this university and students of College of Dairy Science and Technology and College of Fisheries opt for this program of two years.

The 5th Annual Athletic Meet of the university was successfully organized on Feb. 9, 2011. Priyanka Rana declared best athlete and Taranjot Kaur Sran declared 2nd best athlete in women section for the session 2010-11. Gurinder Singh Chahal was declared best athlete and Rajandeep declared 2nd best athlete in Men section for the session 2010 –11.

The students (both boys and girls) from constituent colleges of GADVASU have participated in various events of North Zone/All India Inter-Varsity Tournaments and won several gold, silver and bronze medals. GADVASU contingent got overall 3rd position in 12th All India Inter Agricultural University Sports & Games Meet held at Kerala Agricultural University, Vellanikkara Thrissur, Kerala from Feb. 16-20, 2011. The Table Tennis (M) team won the gold medal. In athletics, GADVASU (W) team won overall 2nd position. In the All India Inter Veterinary Colleges' Badminton (M&W), Table Tennis (M&W) and Professional Quiz Competitions held at GBPUAT, Pantnagar from 23 to 25 March 2011 (Session 2010-11) the Player of COVS (GADVASU), Ludhiana won the Overall 1st runner up. The Table Tennis (M) team won the gold and Badminton (M&W) teams won the silver medals.

GADVASU celebrated 63rd Independence Day and paid rich tributes to all those who fought for country's freedom. On this occasion the members of GADVASU Green Club distributed a number of toys, gifts items and cash money to the inmates of SBG Children's Home. A Teej festival was also celebrated and a large number of girls gathered at GADVASU campus to enjoy this cultural festival and participated in number of competitions organized.

National and International Linkages

The University Grants Commission (UGC), New Delhi, declared GADVASU eligible for receiving Central Assistance under rules framed under section 12(B) of the UGC Act, 1956.

Guru Angad Dev Veterinary and Animal Sciences University (GADVASU) Ludhiana and University of Saskatchewan, Canada has taken up a collaborative research project under International partnership fund program for $300,000 in which both the institutes will equally contribute. The inter-disciplinary theme areas of public health, zoonoses and environmental toxicology have been identified for this partnership for their strategic research need for Punjab.

ABOUT THE UNIVERSITY

Guru Angad Dev Veterinary and Animal Sciences University (GADVASU) started functioning independatly from April 21, 2006 at Ludhiana to act as centre of excellence for teaching, research, extension and learning in animal health and production. To produce highly efficient and skilled human resource for giving boost to activities of livestock, dairy and fishery sectors in Punjab, the university has created new academic institutions viz. College of Dairy Science and Technology, College of Fisheries, School of Animal Biotechnology, and Veterinary Polytechnic. Two Regional Research and Training Centres at Kaljharani (Bathinda) and Talwara (Hoshiarpur) have been established for catering to the specific needs of the area. More regional stations are proposed for providing effective dissemination of technologies. The University got accreditiation from University Grants Commission (UGC) in order to receive central assistance under section 12 (B) of UGC Act, 1956.

Mandate

- To impart education and to produce quality graduates in different disciplines of veterinary, animal, fishery and dairy sciences and technology for the advancement of learning and execution of research activities and upliftment of livestock owners.
- To provide Research and Development support for improving human resource for generation and dissemination of knowledge for the growth of livestock, to serve the nation in terms of food and nutritional security, employment generation, poverty alleviation, women empowerment and economic prosperity.

Goals and Objectives

- To produce trained professionals in the fields of veterinary, dairy, poultry and fishery sciences capable of handling livestock health and production activities as per the needs of the State, industry and farming community.
- To undertake research in priority areas in veterinary, dairy, poultry and fishery sciences.
- To strengthen extension programs for transfer of technology to livestock owners and allied agencies.
- To run “Referral” hospital for specialized treatment of the referred clinical cases.
- To provide opportunities to faculty for participation in training programs, conferences, workshops, seminars, symposia etc. and encourage cooperation and collaboration with other departments, colleges, universities and industries both nationally and internationally.

ACADEMIC UNITS OF THE UNIVERSITY

College of Veterinary Science

The College of Veterinary Science is a daughter institution of Veterinary School established in 1862 with one year course at Poona which was later upgraded as the first Veterinary College at Lahore in 1882. A part of the Lahore Veterinary College was shifted to Hisar in 1948 after partition. Later, the College of Veterinary Medicine was set up in 1969 as a constituent college of Punjab Agricultural University, Ludhiana. Now, this college is a part of Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana. The college was created to be a centre of regional, national and international excellence in teaching, research and learning in animal health and production. It caters to the needs of Punjab by carrying out teaching, research and extension education programs pertaining to livestock production and health problems and has been instrumental in ushering in an era of 'White Revolution' in the State.

At present, the college has 18 departments with highly competent and experienced faculty who have made significant contributions in research on animal health and production and won various national and international awards. A well equipped veterinary teaching hospital caters to the demands of large and small animal health care. In addition, the college also has an elite dairy herd and poultry farm which provide adequate facilities for teaching and research. The College is recognized by the Veterinary Council of India (VCI) and has obtained accreditation from the Indian Council of Agricultural Research (ICAR) in the year 2004. This is the only veterinary college in India having Centres of Advanced Faculty Training in the Departments of Veterinary Surgery & Radiology and Department of Veterinary Gynaecology and Obstetrics for the advanced trainings to faculty from SAUs/ICAR institutes.

The college offers following programs of study:

1. B.V.Sc. & A.H. (Five year program)
2. M.V.Sc.
3. Ph.D.

The program leading to the award of the B.V.Sc. & A.H. degree is designed to equip graduates with the knowledge and skills essential to a veterinary career. The program is divided into three phases. The pre-clinical phase, undertaken in years one and two, provides education in basic sciences such as Anatomy, Physiology and Biochemistry, as well as in Animal Husbandry through intramural learning. The para-clinical phase, undertaken in years three and four, includes bridging subjects between the pre-clinical and clinical phases, such as pathology, microbiology, parasitology and pharmacology. The clinical phase (surgery, medicine and gynaecology) starts in year four and culminates in the fifth and final year. At the end of course work, the students undergo a compulsory rotational internship program of six calendar months envisaging on the job training in animal production, technology, diagnostic laboratories and clinical practice. The program is driven by the Minimum Standards of Veterinary Education Degree Course (B.V.Sc. & A.H.) Regulations, 1993 of VCI and aims for research-enriched learning and subject coherence ensuring a balance of knowledge in relation to the common domestic species. The various departments of the

college, aided by teaching veterinary hospital, ensure both currency and relevance in the basic and applied biological sciences through clinical practice. Recent graduates have shown considerable satisfaction with the program of study, as it prepared them for professional life and have developed confidence in their skills for clinical investigation and lifelong learning, in the context of general practice. The successful completion of B.V.Sc.& A.H. program entitles the graduates for registration with the Punjab State Veterinary Council / Veterinary Council of India as registered veterinary practitioners.

Students Intake Capacity and Entrance Procedure

Programs	Intake Capacity	Mode of Entrance
B.V.Sc. & A.H.	58 (Open seats for domicile of Punjab State and UT of Chandigarh)	Based on CET merit
	10 (VCI)	Based on entrance test conducted by VCI
	1 (Kashmiri Migrant)	Based on CET merit
	12 (NRI)	Merit based on qualifying exam
M.V.Sc. in 16 subjects	93	Based on merit
Ph.D. in 15 subjects	26	Based on merit

College of Dairy Science and Technology

College of Dairy Science and Technology was established in the year 2008 at Ludhiana as one of the constituent colleges of the Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (Punjab). The major objective of the college is to produce trained human resource through its undergraduate and post graduate program to meet the technical manpower requirements of dairy & food processing industries, government departments and R & D organizations. Development of new technologies in the field of milk processing and dairy products development as well as their transfer to end users is another important objective of the college of dairy science & technology. Presently, the college is offering a 4-year program in B. Tech. (Dairy Technology) which is a unique job oriented course for the overall development of students as highly professional dairy specialists through value based education, research and training in dairy science and technology. The graduates during industrial training in their final year get acquainted with various facets of professionally managed industries which include production management, raw material purchases, personnel management, sales and marketing. This helps the students to acquire confidence to work as highly

professional human resource for dairy industry. The curriculum of this degree program is based on the recommendations of the 4th Deans Committee constituted by the ICAR aimed at improving the quality of education and to sustain the "White Revolution" making India prominent on the dairy map of the world.

Mandates:

- To produce quality human resource through its undergraduate degree program.
- To develop new technologies in the field of milk processing and dairy product development.
- To conduct training programs and vocational courses for dairy farmers, entrepreneurs & persons from dairy industries.
- To provide consultancy services to dairy farmers, industry, Govt. & non-Govt. agencies involved in dairy development program.
- To liaison with various dairy development organization(s).

Students Intake Capacity and Entrance Procedure

Programs	Intake Capacity	Mode of Entrance
B.Tech. (Dairy Technology)	25 (Open seats for domicile of Punjab State and UT of Chandigarh)	Based on CET merit
	4 (ICAR nomination)	Based on entrance test conducted by ICAR
	1 (Kashmiri Migrant)	Based on CET merit
	3 (NRI)	Merit based on qualifying exam

College of Fisheries

The College of Fisheries at Ludhiana was established in April, 2008 and is equipped to undertake quality teaching, research and training in fisheries. The college has four departments viz. Aquaculture, Fisheries Resources Management, Aquatic Environment, Harvest and Post-harvest Technology to fulfill the needs of professional courses. The college has highly competent and experienced faculty and adequate basic infrastructure comprising UG/PG laboratories, research laboratories and instructional fish farm. All laboratories are well equipped with modern equipment catering to the important disciplines of fish nutrition, reproductive biology, soil and water analysis, fish processing technology, disease diagnosis and health management. Instructional fish farm covering about 6.0 ha area consists of number of fish ponds/cisterns, hatcheries, polyhouses, duck-fish integrated unit, *Azolla* culture unit, bioremediation model etc. Recently ICAR has

sanctioned Niche Area Excellence Project on 'Inland Aquaculture in Punjab'. The college offers following programs of study:

1. B.F.Sc. 4-year degree program
2. M.F.Sc.in Aquaculture
3. Ph.D. in Aquaculture
4. Post-graduate Diploma in Inland Fisheries (PGDIF)

The curriculum of the four year degree program (B.F.Sc.) is based on recommendations of the 4th Dean's Committee of the ICAR and is divided into eight semesters. During the first six semesters, courses (theory and practicals) covering taxonomy, anatomy, physiology, biology, biochemistry, culture techniques, nutrition, breeding, disease management for finfish and shell fishes, aquatic ecology, culture and capture fisheries resources and their management, post harvest technology, marketing and trading, economics and statistical methods and extension education are offered. The seventh & eighth semesters include experiential learning and hands on training. The curriculum of M.F.Sc in aquaculture is based on ICAR recommendations. It comprises of four semesters and cover theory and practical in advanced aquaculture technologies, fishery resource management, finfish and shell fish biology, post harvest processing, fisheries' economics, marketing and extension. Project/thesis is the integral part of the program. The curriculum of Ph. D. in Aquaclture is also based on ICAR recommendations. The successful completion of B.F.Sc. and M.F.Sc. would entitle the graduates and the postgraduates for better job opportunities in the State Fisheries Department, Universities, Fisheries Institutes and private fisheries sector/ industry.

Goals and Objectives

1. To develop professionally qualified human resource in fisheries and aquaculture by imparting comprehensive, quality and in-depth education.
2. To undertake basic, applied and adaptive research to develop technologies for augmenting fish production from both capture and culture resources.
3. To provide technical service/consultancy to fish farmers, entrepreneurs, industry, government, semi-government, allied agencies and NGOs.
4. To conduct need based vocational trainings in fisheries.
5. To foster faculty development by providing them with opportunities to participate in appropriate training programs, conferences, workshops, seminars, symposia etc. and avail other opportunities in exchange programs.
6. To encourage cooperation and collaboration with other departments, Colleges, Universities and Industries both nationally and internationally.

Students Intake Capacity and Entrance Procedure

Programs	Intake Capacity	Mode of Entrance
B.F.Sc.	18 (Open seats for domicile of Punjab State and UT of Chandigarh)	Based on CET merit
	3 (ICAR nomination)	Based on entrance test conducted by ICAR
	1 (Kashmiri Migrant)	Based on CET merit
M.F.Sc. (Aquaculture)	5	Based on merit
Ph.D. (Aquaculture)	2	Based on merit
PGDIF	5 (State Govt. nomination)	Nominatons by the Director and Warden of Fisheries, Govt. of Punjab

Postgraduate Institute of Veterinary Education and Research

Postgraduate institute of Veterinary Education & Research (PGIVER) has been established in 2007 to give impetus to specialized and need-based research and imparting training to graduates of various disciplines. The basic objectives are to develop and strengthen postgraduate education, research and training programs. The priority areas are molecular biology, biotechnology, diagnostics, bioinformatics, communication technology including computer education and business management. The other objectives of PGIVER include strengthening of embryo transfer technology for better productivity in relation to milk, meat and disease resistance, development of molecular techniques for production of better diagnostics, genetically defined marker vaccines and transgenic organisms for producing animal products of superior quality and identification of physiological, biochemical, molecular and cytogenetic markers for early selection of animals and poultry for increased production and quality products.

Objectives:

- To develop and strengthen post graduate education, research and training programs.
- To strengthen embryo transfer technology for better productivity.
- To develop molecular techniques for diagnostics, production of genetically defined marker vaccines, and identification of physiological, biochemical, molecular and cytogenetic markers for early selection of animals and poultry birds in order to produce the quality products and increase the productivity.
- To have super specialty teaching/referral hospital for equine, companion and wild animals.
- To establish a centralized laboratory of international standards to deal with emerging diseases of livestock and poultry.

School of Animal Biotechnology

The Department of Animal Biotechnology was established in February, 2008 under the aegis of PGIVER. In view of the progress made by the department and the opportunities available in biotechnology, the university established the School of Animal Biotechnology in September 2010 by upgrading the department with the mandate to integrate and strengthen the research in various facets of molecular biology with the aim of improving livestock productivity and health, and to produce professionally trained manpower.

The broad mandates of the School include:

- To generate scientific expertise and human resource in various facets of animal biotechnology
- To develop specialized and state of art facilities for research in cutting edge fields of biotechnology
- To undertake research in different areas of molecular biology and biotechnology for improving animal health and productivity

The thrust areas in Animal Biotechnology are:

- Animal genomics, proteomics vis-a-vis genetic improvement
- Animal disease diagnostics and vaccinology

Presently the School is offering the following programs of study:

1. M.V.Sc./ M.Sc. (Animal Biotechnology)
2. Ph.D. (Animal Biotechnology)

The M.V.Sc./M.Sc. and Ph.D. programs in Animal Biotechnology follow the course curriculum as recommended by the Indian Council of Agricultural Research for the animal biotechnology group. The first batch of the students of M.V.Sc./M.Sc. has completed their program in July/August, 2010. School of Animal Biotechnology has been granted accreditation to confer M.V.Sc./ M.Sc. and Ph.D degrees under the aegis of Ministry of Science and Technology.

Students Intake Capacity and Entrance Procedure

Programs	Intake Capacity	Mode of Entrance
M.V.Sc./M.Sc. (Animal Biotechnology)	4	Based on merit
	2	Based on entrance test conducted by ICAR
	6	Based on JNU, Delhi
Ph.D. (Animal Biotechnology)	3	Based on merit

Regional Research and Training Centre, Kaljharani (Bathinda)

Keeping in view the decline in Sahiwal cow population in the State due to extensive crossbreeding, GADVASU has established a Regional Research Station at village Kaljharani (Bathinda) in 2008 for conservation and genetic improvement of Sahiwal cattle with the following objectives:

- To conserve Sahiwal cattle.
- To improve its genetic potential for production and reproduction traits.
- To supply semen and bulls of Sahiwal breed to the dairy farmers and to different states for up gradation of local cows of that areas.

The Regional Research and Training Centre at Kaljharani has been strengthened with establishment of herds of Sahiwal cattle, crossbred cattle, Beetal goats, fish unit, vermi-compost unit and honey bee unit for area specific studies and demonstration purposes.

Veterinary Polytechnic, Kaljharani (Bathinda)

With an aim to produce trained supporting man power capable of handling livestock health and production, GADVASU has established a Veterinary Polytechnic at Kaljharani, District Bathinda in 2010 for imparting Diploma in Veterinary Science and Animal Health Technology. The diploma has been designed for the training of veterinary pharmacist to support and complement veterinary practitioners in a better way, in order to provide better care and guided treatment to domesticated animals within veterinary hospitals, veterinary colleges, research institutes etc.

Students Intake Capacity and Entrance Procedure

Programs	Intake Capacity	Mode of Entrance
Diploma in Veterinary Science and Health Technology	40	Based on entrance test

Regional Livestock and Poultry Research and Training Centre, Bhatoli (Talwara)

A Regional Livestock and Poultry Research and Training Centre has been extablished at Bhatoli (Talwara) Dist. Hoshiarpur in 2008 with the following objectives:

- To understand the cattle, buffalo, sheep, goat and fish improvement programs suitable for Kandi area
- To introduce small scale and back yard poultry for economic upliftment of the rural people
- To introduce managemental and nutritional strategies
- To provide extension services to the farmers of Kandi area for livestock rearing.

This centre has been established at Bhatoli (Talwara) in Hoshiarpur district for transfer of the technologies developed by the university to the Kandi area of the State. The agricultural farming system of Kandi area is different from the rest of the State because of the rain fed sub-mountainous area, lack of awareness about improved animal production systems and poor financial resources for managing the input systems. The agro-climatic conditions of Kandi area including the type of feed and fodder resources are also different from those prevailing in other parts of the State. This centre is providing extension services to the farmers for improving the livestock enterprises particularly sheep and goat which can be reared effectively in this area.

The centre is also providing a strong supporting hand for the proper implementation of the NAIP sub-project on "Sustainable livestock based farming system for livelihood security in Hoshiarpur district of Punjab". A baseline survey has been conducted to identify the infrastructure and basic problems of the farmers of this area. The locally available unconventional feed ingredients are being identified, evaluated and suggested to be incorporated in the ration of various species of livestock. Animal Welfare camps and Awareness camps are also conducted for vaccination and treatment. Routine testing of animals for ecto- and endo-parasites have been performed and the animals suspected for Brucellosis have also been tested in collaboration with NAIP. Demonstration of different activities related with Animal Husbandry and Agriculture are being organized regularly. Guided visits and training programs on cattle, goat and pig farming are conducted to train the farmers and make them independent. Amla syrup, a by-product of the amla murabba industry was analyzed and incorporated as a source of carbohydrate in the preparation of uromin lick. With the association of NAIP sub-project, self-help groups have been made to create awareness for the employment generation in the area. Pashu Palan melas are also being regularly organized to create awareness among the farmers and to demonstrate the various activities by the different departments of university, banks, Punjab Dairy Development Department, private firms related to agriculture & animal husbandry.

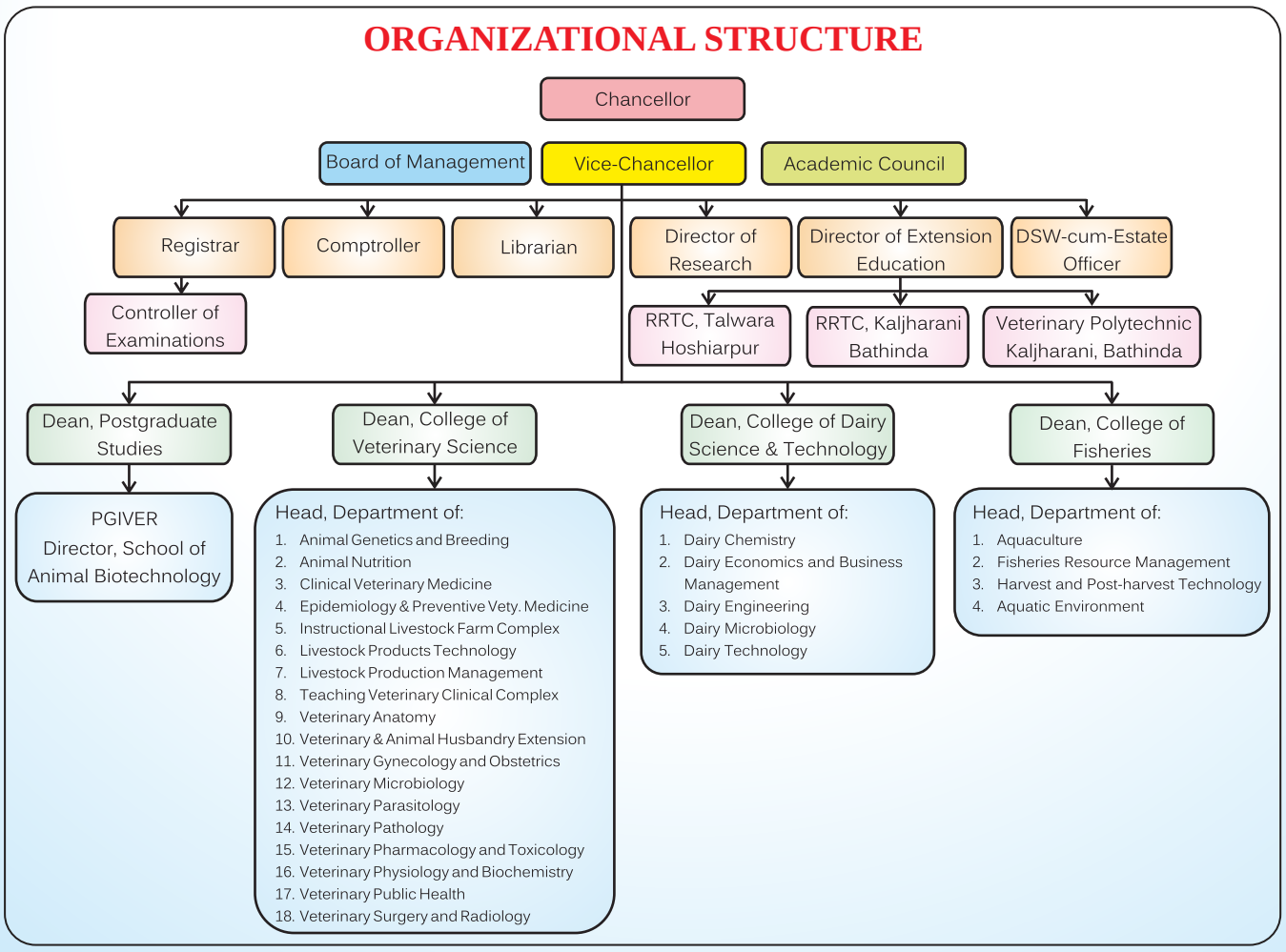
ORGANIZATIONAL SETUP OF THE UNIVERSITY

The functioning of the university is governed by following bodies focused at education, research and extension activities.

- Board of Management
- Academic Council
- Committee on Student's Welfare
- Research Advisory Committee (RAC)
- Extension Education Advisory Committee (EEAC)
- Resident Instruction Committee (RIC)
- Postgraduate Committee
- Board of Studies

The Board of Management is the highest administrative body which controls the finances and assets of the university, appointments of all officers and teachers and provides overall guidance on running of the university. The Academic Council administers the academic functions of the university and is responsible for maintenance of standards of institution, education and examination. Committee on student's welfare regulates various students' activities. Research Advisory Committee regulates the allocation of funds for research, conditions for accepting grants and other matters regarding research programs of the university. Extension Education Advisory Committee coordinates university extension programs with the State and the Center and devises ways and means to implement university extension education programs. Resident Instruction Committee makes recommendations to the Academic Council concerning the new curricula and arrangement, alteration and abolition of existing curricula. Postgraduate Committee examines the courses and curricula for postgraduate students recommended by the Board of Studies before submission to Academic Council. Board of studies proposes to the Academic Council through RIC, the courses of study and curricula for various teaching programs. Board also reviews from time to time the standards of teaching and evaluation of students.

ORGANIZATIONAL STRUCTURE



ADMINISTRATION

BOARD OF MANAGEMENT

Honorary Chairman

- Sh. Shivraj Vishwanath Patil, His Excellency the Hon'ble Governor of Punjab and Chancellor

Working Chairman

- Dr. V.K. Taneja, Vice-Chancellor, GADVASU

Members

- Shri S.C. Agarwal, IAS, Chief Secretary, Punjab, Chandigarh.
- Shri N.S. Kang, IAS, Financial Commissioner, Development, Punjab, Chandigarh.
- Shri Karan Bir Singh Sidhu, IAS, Principal Secretary Finance, Punjab, Chandigarh.
- Shri G.S. Sandhu, IAS, Financial Commissioner, Department of Animal Husbandry, Dairy Development & Fisheries, Punjab, Chandigarh.
- Dr. H.S. Sandha, Director of Animal Husbandry, Punjab, Chandigarh.
- Shri Inderjit Singh, Director of Dairy Development, Punjab, Chandigarh.
- Shri B.K. Sood, Director and Warden Fisheries, Punjab, Chandigarh.
- Dr. Mohinder S. Oberoi, Sub Regional Manager, Emergency Centre for Transboundary Animal Diseases Unit (SAARC) Food and Agriculture Organization of the United Nations, PO Box 25, Pulchowk, Kathmandu, Nepal.
- Dr. R.T. Patil, Director, Central Institute of Post Harvest Engineering & Technology, P.O. P.A.U. Campus, Ludhiana, Punjab.
- Dr. S.N.S. Randhawa, Dean Postgraduate Studies, GADVASU
- Shri. Kanwaljit Singh Sidhu, Progressive Farmer (Fisheries), House No. 237-H, BRS Nagar, Ludhiana.
- Shri Gurdev Singh, Hilton 157, 2040 Klofta, Norway.
- Smt. Seema Sharma, Kothi No. 1-D, Dr. Jagdish Colony, Near Tej Bagh Colony, Patiala-147001, Punjab.
- Dr. Ravinder Singh Dhaliwal, Veterinarian and P.R.O. Nestle Moga.
- Shri. Balsher Singh Dhillon, Progressive Farmer (Livestock) V&PO Badal, Distt. Mukatsar.
- Dr. Parampal Singh, Incharge Semen Bank, Kothi No. 1, Government Bhupindra Dairy Farm, Jail Road, Patiala – 147 001, Punjab.
- President, Teachers Association, GADVASU (Special invitee)

Secretary

- Dr. P.D. Juyal, Registrar, GADVASU, Ludhiana.

ACADEMIC COUNCIL

Chairman

- Dr. V.K.Taneja, Vice-Chancellor

Members

- Dr. S.N.S. Randhawa, Dean Postgraduate Studies
- Dr. S.N.S. Randhawa, Director of Research (Additional charge)
- Dr. Simrat Sagar Singh, Dean, College of Veterinary Science
- Dr. Kamaldeep Kaur, Dean, College of Fisheries
- Dr. K.S. Sandhu, Director of Extension Education
- Dr. S.P.S. Sangha, Dean, College of Dairy Science and Technology (Additional Charge)
- Dr. M.P.S. Bakshi, Professor-cum-Head, Department of Animal Nutrition
- Dr. Motil Lal Chaudhary, Head, Department of Animal Genetics and Breeding
- Dr. (Mrs.) Asha Dhawan, Head, Department of Aquaculture
- Dr. H.M. Saxena, Head, Department of Veterinary Microbiology
- Dr. Rajesh Jindal, Head, Department of Veterinary Physiology and Biochemistry

Special Invitee

- Dr. K.S. Sandhu, Director Student Welfare-cum-Estate Officer
- Dr. S.P.S. Sangha, Controller of Examinations
- Dr. G.S. Brah, Director, School of Animal Biotechnology
- Dr. S.K. Jand, Principal, Khalsa College of Veterinary and Animal Sciences, Amritsar, Punjab
- Dr. H.S. Sandhu, President, GADVASU Teacher's Association

Secretary

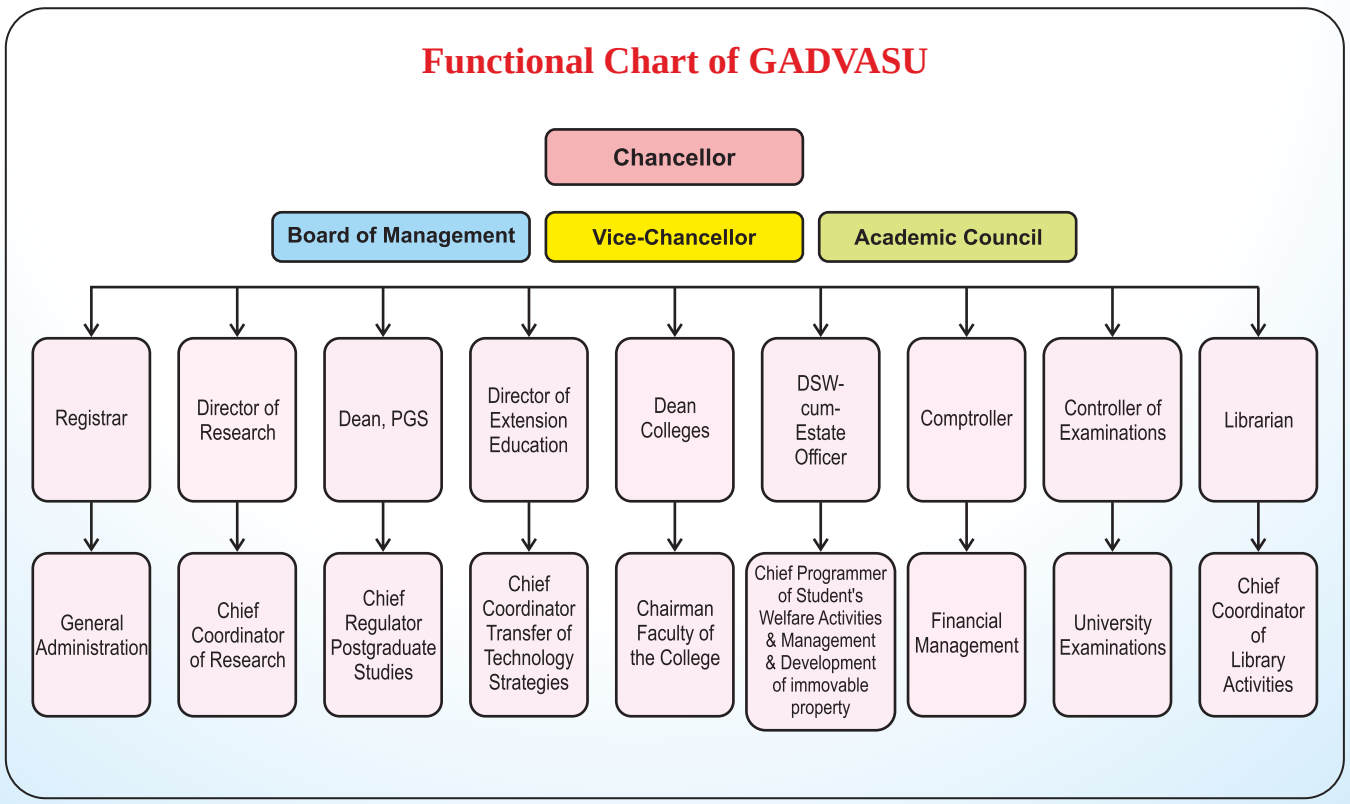
- Dr. P.D. Juyal, Registrar, GADVASU, Ludhiana.

OFFICERS OF THE UNIVERSITY

Chancellor	Sh. Shivraj Vishwanath Patil, His Excellency the Hon'ble Governor of Punjab
Vice-Chancellor	Dr. V.K. Taneja
Registrar	Dr. P.D. Juyal
Director of Research	Dr. S.N.S. Randhawa*
Director of Extension Education	Dr. K.S. Sandhu*
Dean, Post Graduate Studies	Dr. S.N.S. Randhawa
Dean, College of Veterinary Science	Dr. Simrat Sagar Singh
Dean, College of Dairy Science and Technology	Dr. S.P.S. Sangha*
Dean, College of Fisheries	Dr. Kamalpreet Kaur (upto 31.12.2010) Dr. (Mrs.) Asha Dhawan*
Director Students Welfare-cum-Estate Officer	Dr. K.S. Sandhu
Librarian	Dr. Simrat Sagar Singh*
Comptroller	Sh. K. R. Rohella

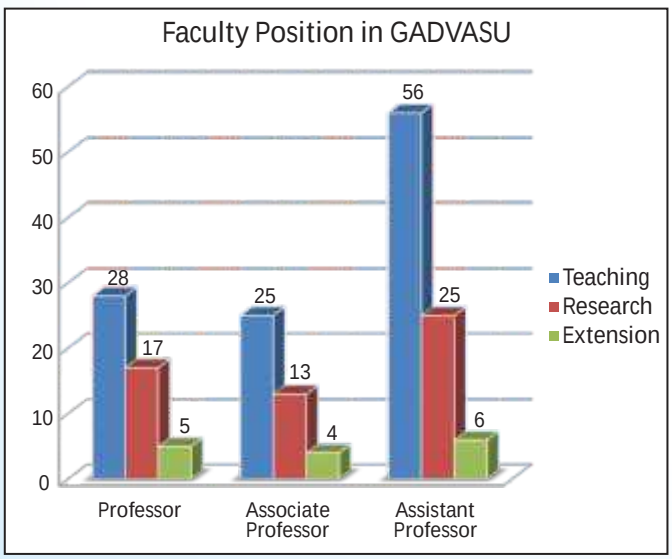
*Additional charge

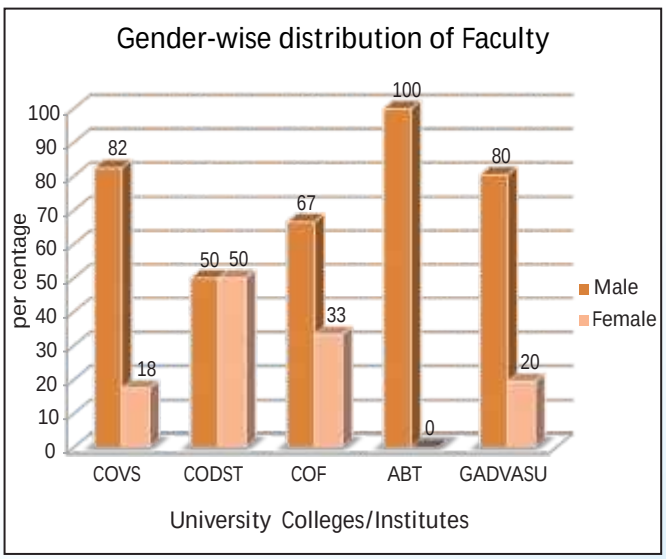
Functional Chart of GADVASU

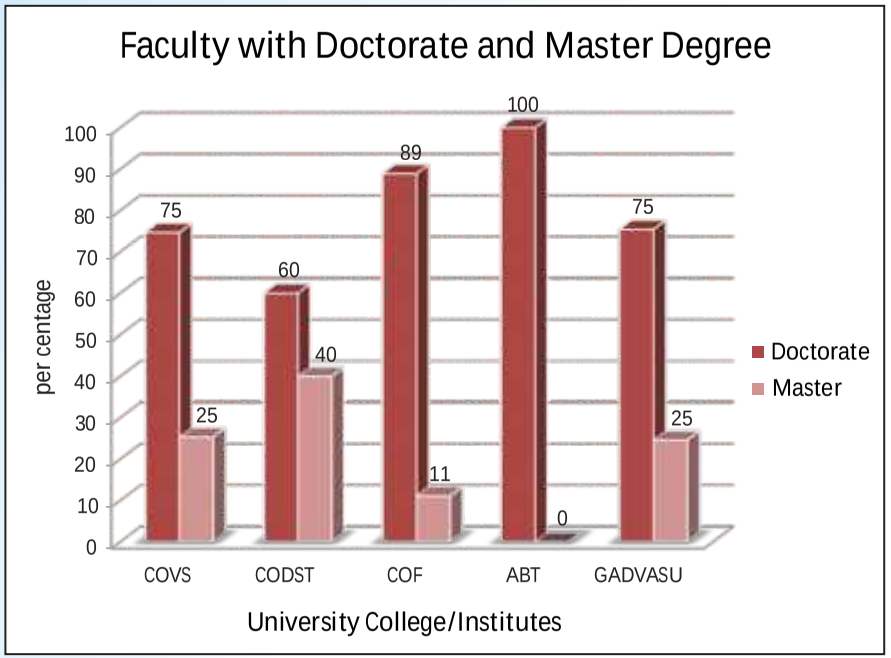


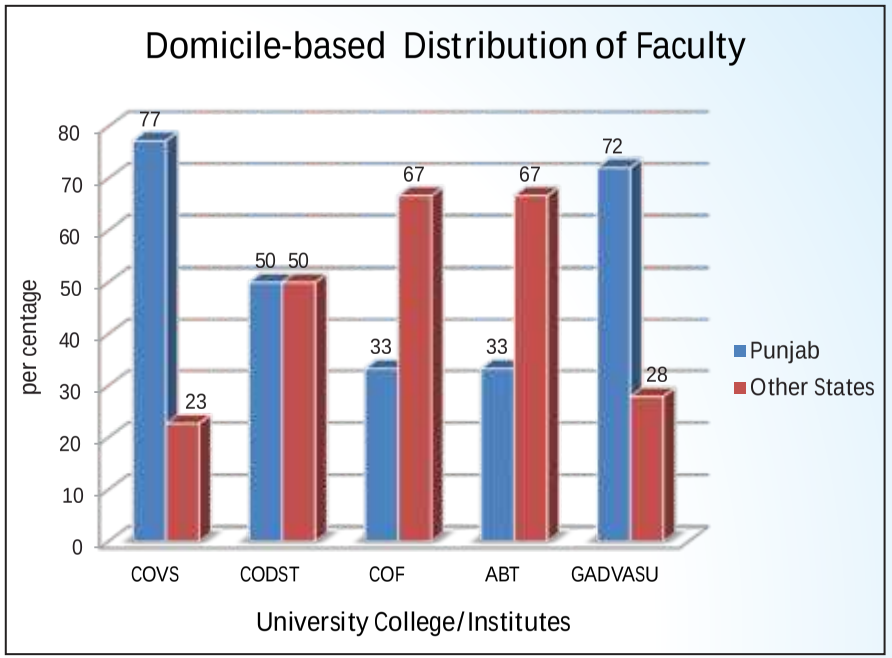
FACULTY PROFILE OF THE UNIVERSITY

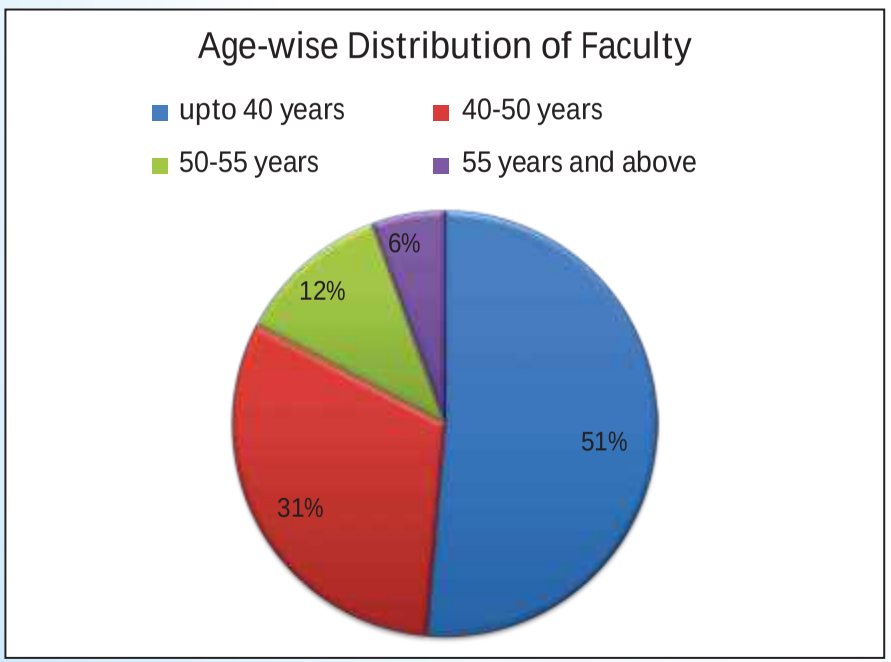
S. No.	College	Faculty Positions						Total	
		Sanctioned			Filled			Sanctioned	Filled
		Prof	Assoc Prof	Asstt Prof	Prof	Assoc Prof	Asstt Prof		
1	College of Veterinary Science (COVS)	65	57	111	47	40	67	233	154
2	College of Dairy Science & Technology (CODST)	2	4	10	0	0	10	16	10
3	College of Fisheries (COF)	2	3	9	1	1	7	14	9
4	School of Animal Biotechnology (ABT)	2	1	6	2	1	3	9	6
Total		**71**	**65**	**136**	**50**	**42**	**87**	**272**	**179**

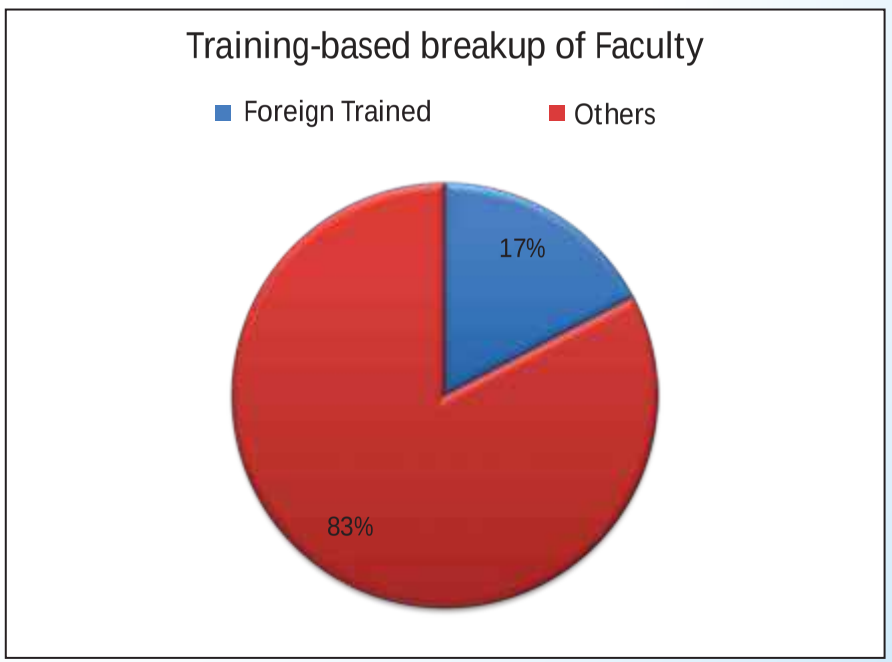





Faculty with Doctorate and Master Degree
per centage
100
90
80
70
60
50
40
30
20
10
0
75
25
60
40
89
11
100
0
75
25
COVS
CODST
COF
ABT
GADVASU
University College/Institutes
Doctorate
Master

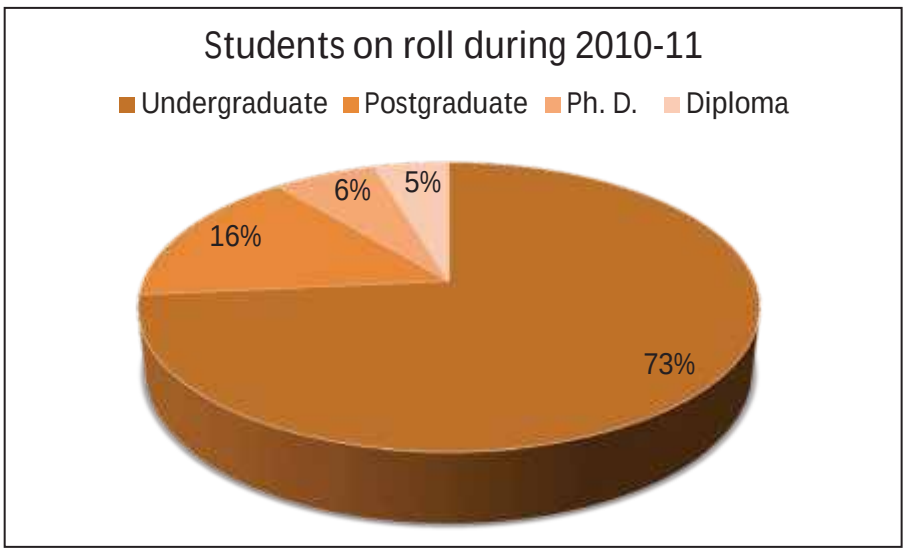

Domicile-based Distribution of Faculty
per centage
80
70
60
50
40
30
20
10
0
77
23
50
50
33
67
33
67
72
28
COVS
CODST
COF
ABT
GADVASU
University College/Institutes
Punjab
Other States

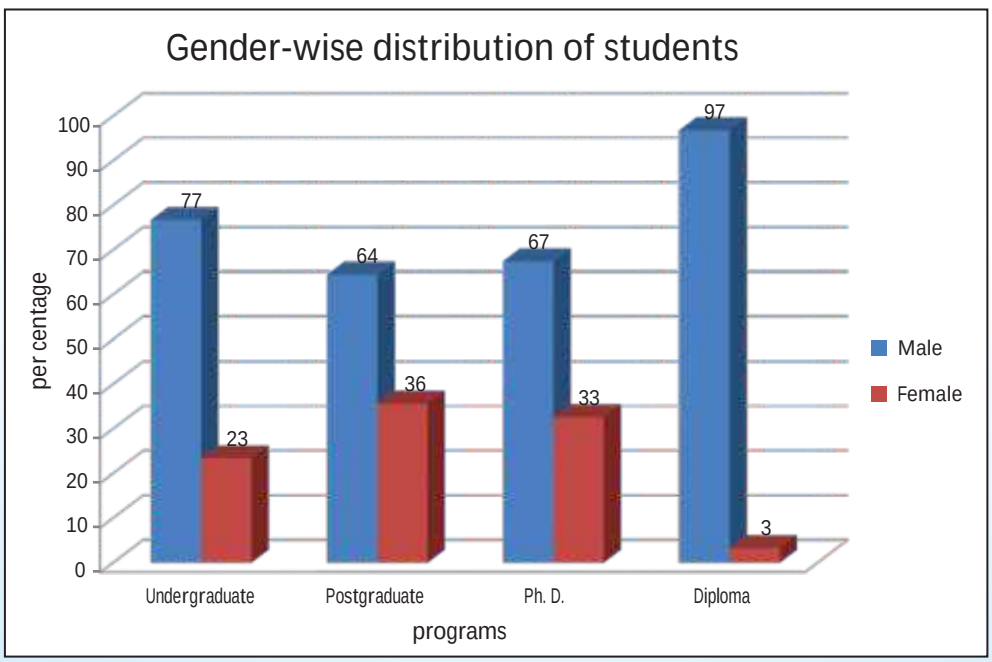

Age-wise Distribution of Faculty
upto 40 years
40-50 years
50-55 years
55 years and above
6%
12%
51%
31%


Training-based breakup of Faculty
Foreign Trained
Others
17%
83%

STUDENT PROFILE OF THE UNIVERSITY

Programs	Boys	Girls	Total
B.V.Sc. & A.H.	295	91	**386**
B.F.Sc.	17	15	**32**
B. Tech. (Dairy Technology)	66	9	**75**
M.V.Sc./M.F.Sc./M.Sc	67	37	**104**
Ph. D.	29	14	**43**
Diploma in Veterinary Science and Animal Health Technology	30	1	**31**
Total	**504**	**167**	**671**



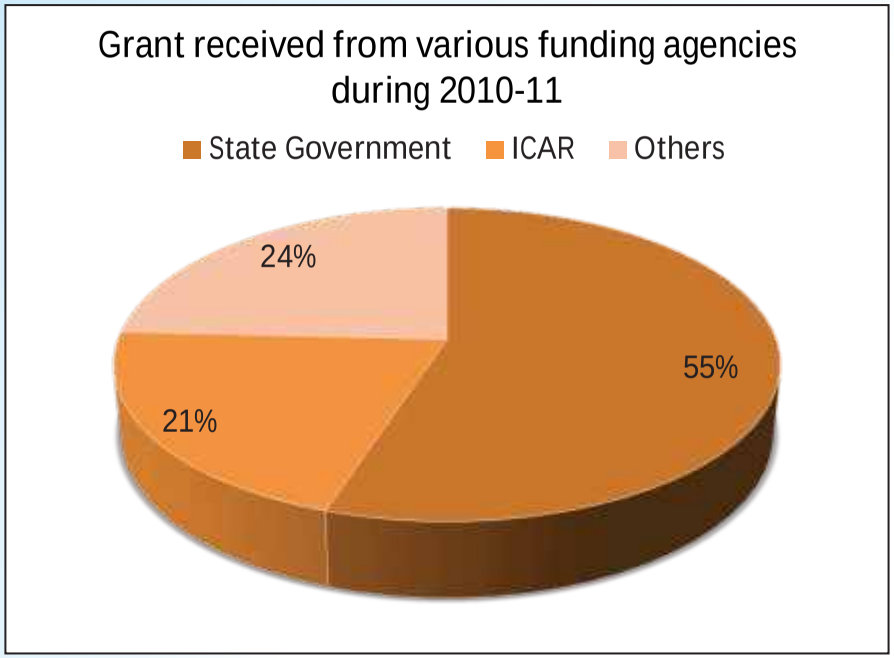


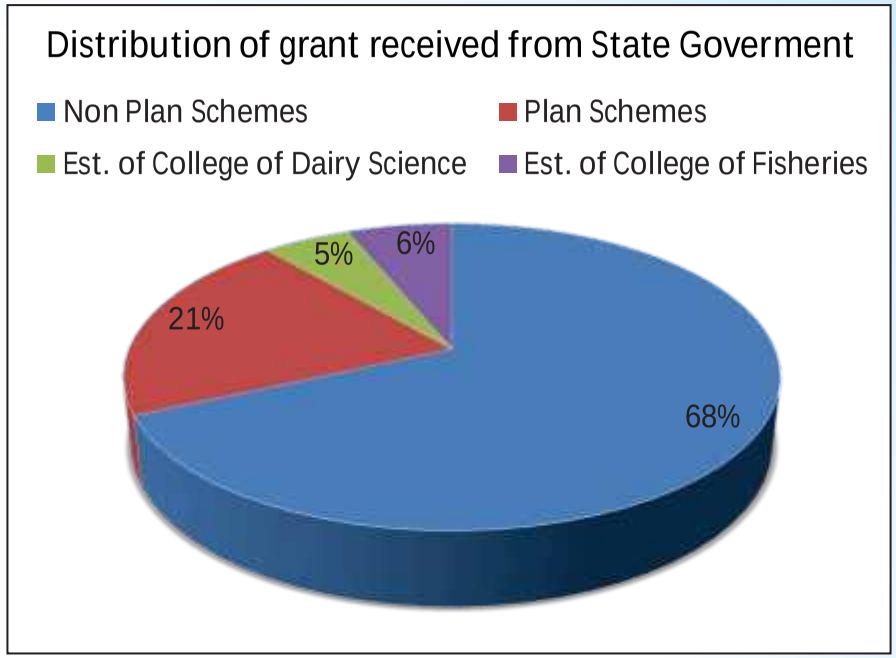
BUDGET

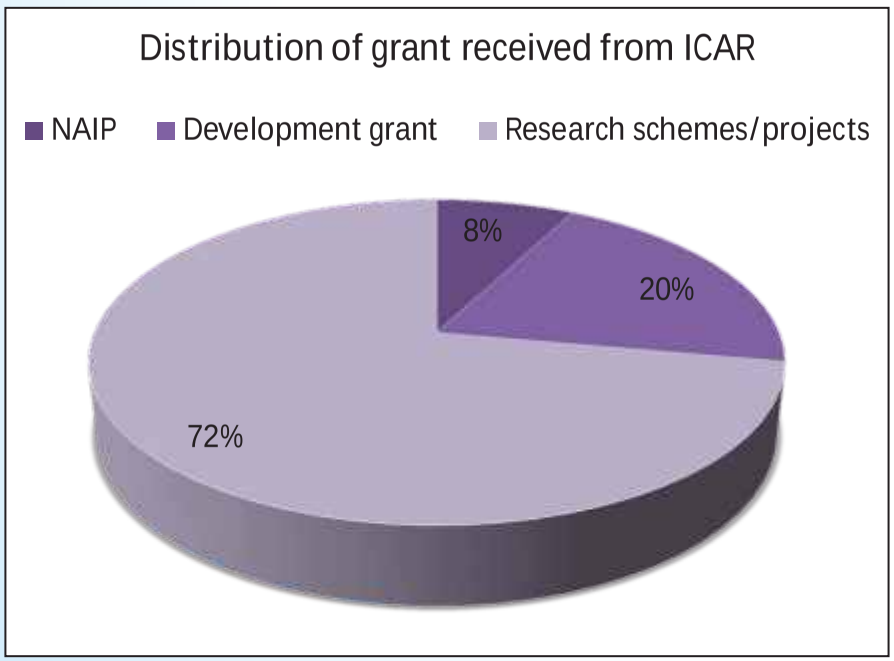
The university received `4864.00 lacs from State Government which includes `4315.00 lacs for different research projects under plan/non-plan schemes, `249 lacs for establishment of College of Dairy Science and `300 lacs for Est. of College of Fisheries. Grant received from ICAR was `1827.44 lacs which included `139.31 lacs under NAIP, `369.26 lacs as development grant and `1318.87 lacs for various research projects/schemes. Grant received from other agencies was `2139.39 lacs which included `1500 lacs under RKVY, `500.00 lacs under PGIVER (ACA) and `139.39 lacs under various other projects granted by DBT, DST, UGC etc.

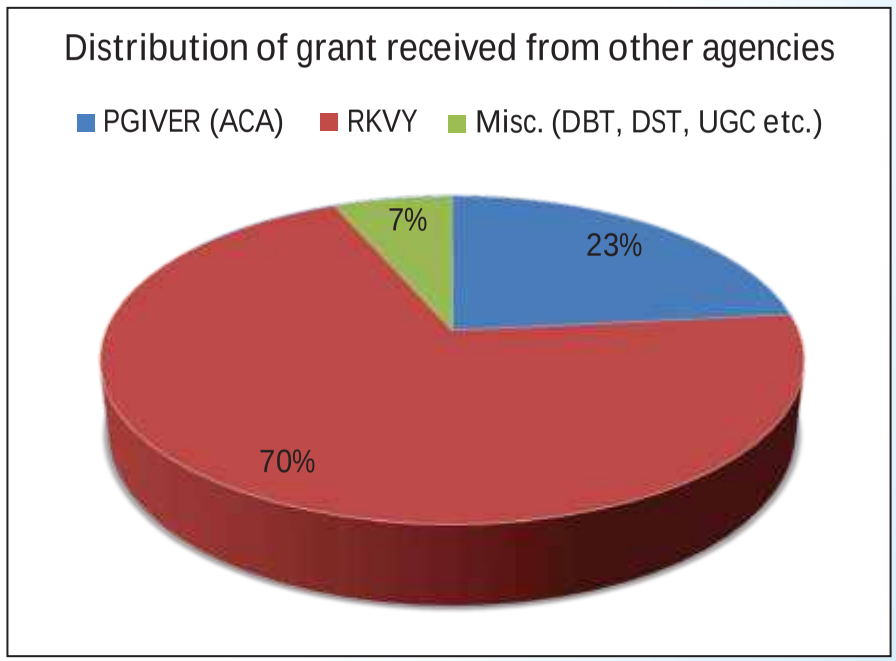
(`in lacs)

Schemes	Grant Received	Expenditure		
		Salary	Contingency, T.A., Wages	Total
State Non Plan Schemes	3315.00	3635.46	155.66	**3791.12**
State Plan Schemes	1000.00	414.37	744.52	**1158.89**
Est. of College of Dairy Science	249.00	34.56	270.30	**304.86**
Est. of College of Fisheries	300.00	15.42	10.05	**25.47**
Est. of Vety. Polytechnic	0.00	0.00	8.88	**8.88**
ICAR Projects/Schemes	1827.44	837.98	741.89	**1579.87**
Other Schemes	2139.39	41.57	1045.88	**1087.45**
Total	**8830.83**	**4979.36**	**2977.17**	**7956.53**

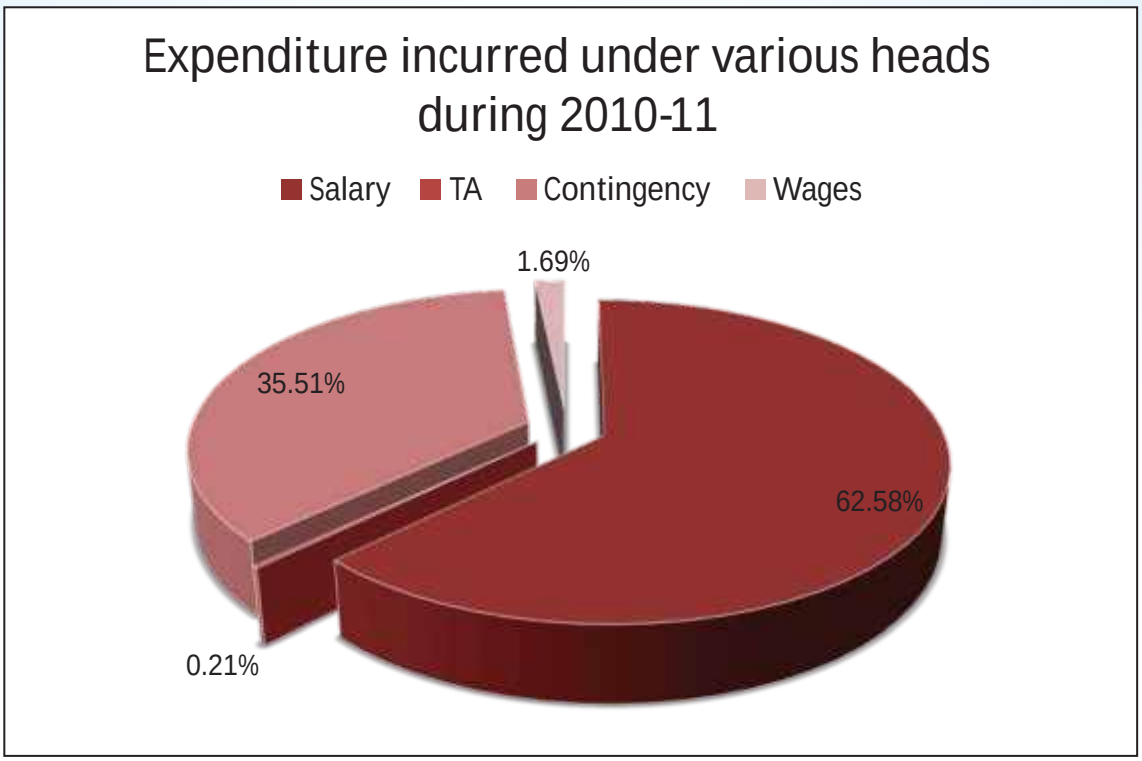

Grant received from various funding agencies during 2010-11
State Government
ICAR
Others
24%
55%
21%

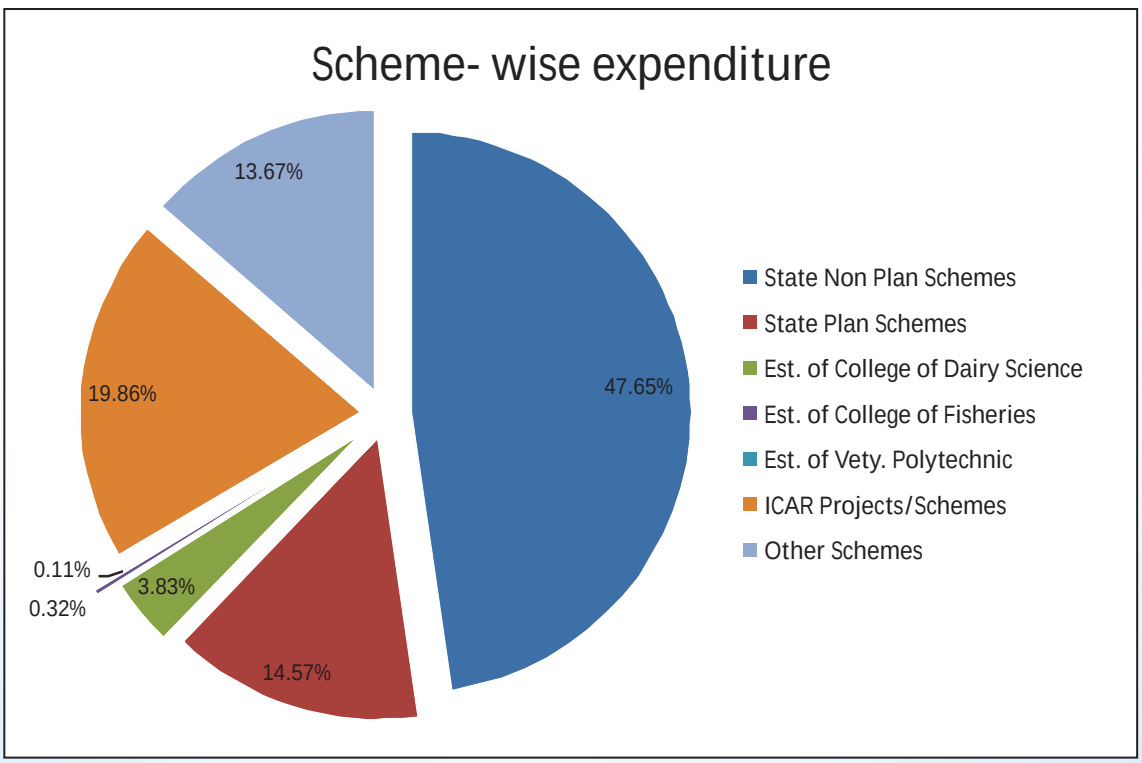

Distribution of grant received from State Goverment
Non Plan Schemes
Plan Schemes
Est. of College of Dairy Science
Est. of College of Fisheries
5%
6%
21%
68%


Distribution of grant received from ICAR
NAIP
Development grant
Research schemes/projects
8%
20%
72%


Distribution of grant received from other agencies
PGIVER (ACA)
RKVY
Misc. (DBT, DST, UGC etc.)
7%
23%
70%

The total expenditure for the year 2010-11 was `7956.53 lacs which include `4979.36 lacs for salary, `2825.36 lacs for contingency, `134.74 lacs for wages and `17.07 lacs for T.A.





TEACHING

Academic programs of the university are of high standard and attract students and fellows both at national and international level for education and research.

Educational Program(s)

Admissions to the various undergraduate programs of the university, and Diploma for Veterinary Pharmacists were strictly on the basis of entrance examinations conducted by the Controller of Examinations. In addition, the entrance examination was also conducted for six seats of M.V.Sc./M.Sc. Animal Biotechnology.

Entrance Tests conducted by Controller of Examinations for admission to various programs of the University

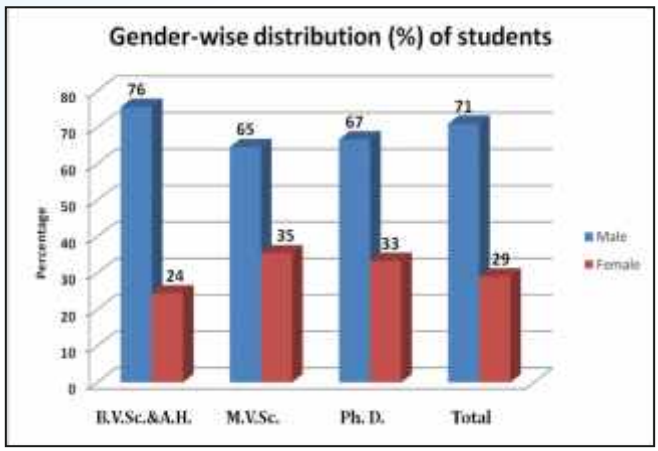
S. No.	Test	Date of Test	Number of Applications Received	Number of Candidates appeared in the test
1	Common Entrance Test (CET-2010) for admission to undergraduate programs of the university i.e B.V.Sc. & A.H./ B.F.Sc./ B. Tech (Dairy Technology)	23.06.2010	987	805
2	Entrance test for admission to M.V.Sc./ M.Sc. (Animal Biotechnology)	24.07.2010	26	17
3	Entrance Test for admission to Diploma for Veterinary Pharmacist	08.08.2010	47	41

The detail of admissions made in various undergraduate and postgraduate programs for the academic session 2010-11 is as below

Program	General/ Reserve Catagories	VCI/ICAR/ State Govt. Nominations	NRI Seats/ Foreign Nationals	Total
B.V.Sc. & A.H.	61	9	16	**86**
B.F.Sc.	19	1	-	**20**
B. Tech. (Dairy Technology)	26	3	-	**29**
M.V.Sc./M.Sc.	24	36	-	**60**
M.F.Sc.	-	1	-	**1**
Ph.D.	23	-	2	**25**
Diploma in Veterinary Science and Health Technology	31	-	-	**31**
Grand Total				**252**

College of Veterinary Science

The total number of students admitted in the College of Veterinary Science for the session 2010-11 was 155 which included 86 in B.V.Sc. and A.H., 48 in M.V.Sc. and 21 in Ph.D program. Among 155 students admitted, 110 were male and 45 were female. The gender-wise distribution of male and female students admitted in different programs is shown as below:



During 2010-11, a total of 94 students' suuessfully completed their degrees, of which 59, 32 and 3 students completed B.V.Sc. & A.H., M.V.Sc. and Ph. D. programs, respectively in different disciplines.

Thesis/Dissertations

Master of Veterinary Science

S. No.	Name	Month & Year of completion	Major Subject and Title of Thesis
1	Mohamed S. M. El Jadar	April, 2010	**VETERINARY PARASITOLOGY** "Clinico-Diagnostic Studies on Vector Transmitted Haemoprotozoan Diseases in Dogs".
2	Guesh Negash Haile	June, 2010	**VETERINARY SURGERY & RADIOLOGY** "Studies on Ultrasound and Laparoscopic guided biopsy for the diagnosis of abdominal disorders in dogs".
3	Shah Ahsan Ul Haq	July, 2010	**VETERINARY PHARMACOLOGY & TOXICOLOGY** "Disposition kinetics and bioavailability of ceftazidime in buffalo calves".
4	Aadil Fareed	July, 2010	**EPIDEMIOLOGY & PREVENTIVE VETERINARY MEDICINE** "Studies on serological response in female calves vaccinated with S-19 Brucella abortus vaccine and molecular diagnosis of Brucellosis in cows and buffaloes".

Scholarships/Fellowships

The university awards merit scholarships to students for academic excellence. During 2010-11, university merit scholarship was given to 51 undergraduate, 15 M.V.Sc. and 4 Ph. D students. Twenty three undergraduate students admitted through an all India entrance examination were awarded National Talent Scholarship. Junior Research Fellowship of ICAR was awarded to 15 M.V.Sc students and Senior Research Fellowship to one Ph.D student. Nine students received fellowships/scholarships from other societies like Guru Harkrishan Education Society (1), Animal Science Scholarship (1), Babu Singh Chhinna Scholarship (1), Government of India Fellowship to Backward Class (1) and Post Matric Scholarship (5).

Courses Taught

The undergraduate students of the college were offered courses as per the course curriculum of Veterinary Council of India. The 1st and 2nd Professional B.V.Sc. & A.H. students were offered courses as per Veterinary Council of India – Minimum Standards of Veterinary Education Degree Course (B.V.Sc & A.H.) Regulations, 2008. The students were offered 48 courses in the Semester I and 35 courses in Semester II. Postgraduate students were offered courses in their respective major, minor and supporting field as approved by the Dean, Postgraduate Studies.

S. No.	Name	Month & Year of completion	Major Subject and Title of Thesis
5	Waghe Prashantkumar Marutirao	July, 2010	**VETERINARY PHARMACOLOGYAND TOXICOLOGY** "Studies one endocrine disruption potential of carbendazim with reference to testosterone cyclicity in male goats".
6	Irtiza Nabi	August, 2010	**VETERINARY PHYSIOLOGY** "Physio-pathological studies on Induced Endotoxemia in Buffalo calves".
7	Rajesh Ranjan	August, 2010	**VETERINARY ANATOMY & HISTOLOGY** "Histomorphological and histochemical studies on placenta of buffalo (*Bubalus bubalis*)".
8	Anil Sharma	August, 2010	**VETERINARY ANATOMY & HISTOLOGY** "Studies on prenatal development of epididymis in Indian buffalo *(Bubalus bubalis)*".
9	Mir Nadeem Hassan	August, 2010	**VETERINARY MICROBIOLOGY** "Studies on molecular detection and heterogeneity among isolates of *Brucella* species".
10	Kothule Viren Ramlal	August, 2010	**VETERINARY PATHOLOGY** "Studies on effects of high cholesterol and vitamin D_3 on cardiovascular system".
11	Dalbir Singh	August, 2010	**VETERINARY MICROBIOLOGY** "Studies on the humoral and cellular immune responses to *Pasteurella multocida* in vaccinated buffaloes".
12	Kamalpreet Kaur Gill	August, 2010	**VETERINARY PHARMACOLOGY AND TOXICOLOGY** "Studies on toxic effects of fipronil, fluoride and their interaction in buffalo claves "
13	Gadhave Prashant Dattatray	August, 2010	**VETERINARY PATHOLOGY** "Prevalence and pathology skin affections in fish".
14	Suhail Ahmad Bhat	August, 2010	**VETERINARY PARASITOLOGY** "Parasitological and molecular diagnosis of cryptosporidiosis in neonatal calves in periurban dairies of ludhiana".
15	Umar Nazir Zahid	August, 2010	**CLINICAL VETERINARY MEDICINE** "Clinico-therapeutic studies on foot lameness in dairy cattle".
16	Manu Dixit	August, 2010	**EPIDEMIOLOGY & PRVENTIVE VETERINARY MEDICINE** "Epidemiological studies on Johne's Disease in sheep and goats in Punjab".

S. No.	Name	Month & Year of completion	Major Subject and Title of Thesis
17	Sharika Sharma	September, 2010	**VETERINARY & ANIMAL HUSBANDRY EXTENSION** "Impact of Dairy Training Courses on adoption of Dairy Farming and Socio-Economic Conditions of Farmers in Punjab".
18	Gurleen Kaur	September, 2010	**VETERINARY PATHOLOGY** "Studies on differential diagnosis of neoplasms caused by avian oncogenic viruses using immunohistochemical techniques."
19	Rahila Shamim Khan	September, 2010	**VETERINARY PHYSIOLOGY** "Physical and biochemical characteristics of cervico vaginal mucus vis-à-vis conception in Murrah Buffaloes."
20	Rabane Shunthoo	September, 2010	**VETERINARY PUBLIC HEALTH** "Studies on toxic and heavy metals in milk and water in punjab and its public health significance".
21	Harsh Shaveta	September, 2010	**VETERINARY MICROBIOLOGY** "Studies on B lymphocytes response in bovines vaccinated against hemorrhagic septicaemia".
22	Venkanagouda Doddagoudar	September, 2010	**ANIMAL REPRODUCTION, GYNAECOLOGY AND OBSTETRICS** "Induction of fertility in Anestrus Dairy Buffalo Heifers through supplementary feeding strategies."
23	Serlene Joseph	September, 2010	**LIVESTOCK PRODUCTS TECHNOLOGY** "Efficacy of lycopene rich tomato and pink guava on storage stability of pork patties".
24	Mandeep Atray	September, 2010	**VETERINARY SURGERY AND RADIOLOGY** linical studies on diagnostic and prognostic factors for management of canine gastrointestinal obstruction".
25	Syed Ashaq Hussain Shah	September, 2010	**CLINICAL VETERINARY MEDICINE** "Studies on prevalence, clinico - hemato-biochemical alterations and therapy of gastrointestinal impaction in dairy animals."
26	Ambika Kaw	September, 2010	**VETERINARY PATHOLOGY** "Studies on Molecular approaches for ante-mortem and post-mortem detection of rabies in natural cases in animals."
27	Pushpinder kaur	September, 2010	**VETERINARY MICROBIOLOGY** "Studies on identification of the molecular target of infectious Bursal disease virus on chicken lymphocytes."
28	Nipun Thakur	October, 2010	**VETERINARY SURGERY & RADIOLOGY** "Comparative evaluation of dynamic compression plate vis-à-vis horn plate for the repair of long bone fracture in canines."

S. No.	Name	Month & Year of completion	Major Subject and Title of Thesis
29	Watitoshi	October, 2010	**LIVESTOCK PRODUCTS TECHNOLOGY** "Effect of Carnosine and L-carnitine on the storage quality of raw and cooked pork sausages."
30	Sumedha Awahan	November, 2010	**VETERINARY PATHOLOGY** "Ante-mortem and post-mortem detection of rabies virus antigen in natural cases of rabies in animals-an immunopathological study."
31	Sonia	January, 2011	**CLINICAL VETERINARY MEDICINE** "A study on the diagnosis of canine cardiac diseases and their therapeutic management."
32	Shubhneet Singh Sran	January, 2011	**VETERINARY SURGERY & RADIOLOGY** "Studies on dissolution protocols and surgical management of canine urolithiasis."

Ph.D. program

Sr. No.	Name	Month & Year of completion	Major Subject and Title of Thesis
1	Ashwani Kumar	October, 2010	**VETERINARY SURGERY & RADIOLOGY** "Ultrasonographic evaluation of bovine and equine patients with abdominal affections".
2	Radya A. A. Mustafa	October, 2010	**EPIDEMIOLOGY & PREVENTIVE VETERINARY MEDICINE** "Studies on molecular detection and epidemiology of canine distemper in dogs".
3	Anand Kumar Pandey	October, 2010	**ANIMAL REPRODUCTION, GYNAECOLOGY & OBSTETRICS** "Hormonal strategies to optimize fertility in buffaloes by modulating antiluteolytic mechanisms".
4	Jaspal Singh Hundal	January, 2011	**ANIMAL NUTRITION** "Role of secondary plant metabolites in mitigating enteric methane production in sheep and goats".
5	Ajeek Kumar	Feburary, 2011	**ANIMAL REPRODUCTION, GYNAECOLOGY & OBSTETRICS** "Studies on gene expression for heat shock protein 70 and identification of sperm membrane proteins in relation to semen quality & fertility in buffalo bulls".
6	Chandrahas	March, 2011	**LIVESTOCK PRODUCTION & MANAGEMENT** "Studies on some managemental interventions for sustainability of beetal goats under stall-fed conditions".
7	Mrigank Honparkhe	March, 2011	**ANIMAL REPRODUCTION, GYNAECOLOGY & OBSTETRICS** "Ovulation synchrony and superovulatory response after synchronization of follicular wave emergence in buffaloes".

Internship program

On completion of course work in nine semesters, the students of B.V.Sc. and A.H. have to complete six months compulsory rotational internship program in different disciplines. In July 2011, fifty nine students successfully completed their degree program in B.V.Sc & A.H. after completing their internship.

Internship students in Large Animal Clinic

All India Study Tour

All India Study Tour of 17 days for the final year B.V.Sc. and A.H. students was organized during Jan. 2011. Eighty three students of 2006 batch visited various Veterinary Colleges, National Institutes, Laboratories and Wild Life Sanctuaries at Mumbai, Goa, Bangaluru, Chennai and Hyderabad.

Final year B.V.Sc. & A.H. students during All India Study Tour

R&V Sqn NCC Unit

1st Punjab R&V Sqn NCC is an integral part of College of Veterinary Sciences, GADVASU, is entrusted with the task of imparting infantry as well as equestrian training to NCC cadets enrolled with this unit. Various NCC training activities performed by the NCC cadets of 1st Punjab R&V Sqn NCC, College of Veterinary Science, GADVASU- Ludhiana during the year 2010-2011, are as under:-

- Five senior division cadets of this institution participated in the Baba Banda Singh Bahadur Horse Show at Fatehgarh Sahib from Sep. 14 – 21, 2010. In this Horse Show various international, national as well as regional events were organized. The rider cadets faired well in the competition.
- Annual Training Camp was attended by 58 Cadets from Oct. 01, 2010 to Oct. 10, 2010 at 1 Punjab R&V Sqn NCC, GADVASU, Ludhiana. During the camp the cadets were imparted rigorous training in horsemanship, drill, physical training, firing etc. Thirteen Senior Division Cadets of this unit attended Combined Annual Training Camp at Farour with 19 Pb Bn NCC, Ludhiana.

Cadets undergoing equestrian training during the camp

Physical fitness training

Cadet being trained for show jumping event

Short Range Firing (Self Loading Rifle) training

- Fifty eight cadets from College of Veterinary Science participated in traffic control rally in Ludhiana on Oct. 8, 2010 in collaboration with Traffic Police, Ludhiana.

Cadets getting tips for Traffic Control Measures in the camp

- During the NCC week, cadets performed in a Horse Show organized by 1 Punjab R&V Sqn NCC, Ludhiana at Khanna on Nov. 18, 2010.
- About 40 Cadets from College of Vety Science participated in 'My Earth My Duty' a tree plantation program organized at 1 Punjab R&V Sqn NCC, GADVASU, Ludhiana, in which cadets planted about 40 saplings of various trees.

'My Earth My Duty' a tree plantation program

- Fifty nine Cadets of this unit appeared in Cert 'B' Examination on Feb. 13, 2011 and 7 cadets on Feb. 27, 2011. Eleven cadets of this unit appeared in Cert 'C' Examination on Feb. 20, 2011 and remaining 23 cadets on Feb. 27, 2011
- Five Cadets of this unit participated in various equestrian activities during Republic Day Camp and Prime Minister Rally 2011 and Cadets brought laurels to the institute by winning Dr Sharma Trophy, 1st runner up trophy for best rider (Boys), one gold medal, three silver medals and one bronze medal.

Cadets of GADVASU team being facilitated by Hon'ble Vice Chancellor for their achievements during RDC-2010

- A Facilitation program was organized on Aug. 17, 2010 in which Vice Chancellor, GADVASU facilitated 5 cadets who participated in Republic Day Camp and 3 Cadets who have been commissioned in Indian Army.

Teaching Veterinary Clinical Complex (TVCC)

The location of different units of veterinary clinics and various clinical departments at one place has provided a well integrated and coordinated approach to the diagnosis and treatment of diseases in small and large animals. The Clincal Complex provides physical facilities for training of undergraduate and postgraduate students, organizes internship program, provides regular ambulatory services to rural areas, organizes training courses for the field veterinarians and animal owners, organize exhibitions at Kisan Melas, Kisan Diwas etc., and mass communication through radio, television and printed literature.

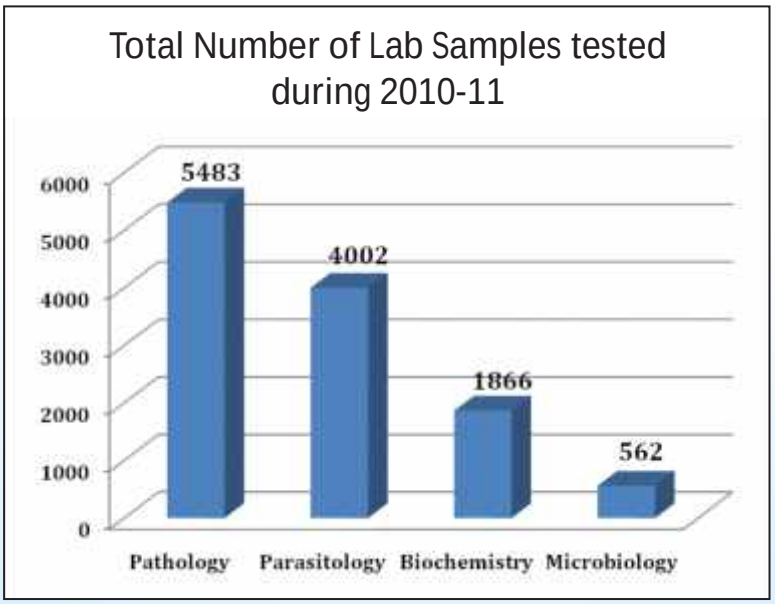
Teaching Veterinary Clinical Complex provides following specialized services for disease diagnosis and treatment of animals:

1. Ultrasonography
2. Computerized Radiography
3. Laparoscopy in small animals
4. Emergency services to the farmers and pet owners round the clock

Small Animal Clinic

Clinical Cases treated in the hospital during 2010-11

	Medicine	Surgery	Gynae	Total
Small Animal	14249	3737	731	**18717**
Large animal	3524	1670	629	**5823**
Total	**17773**	**5407**	**1360**	**24540**



College of Dairy Science and Technology

During the session 2010-11, a total of 29 students have been admitted to first year of B. Tech. (Dairy Technology) program. Among these 83 per cent were male students and 17 per cent were female students.

Scholarships/Fellowships

University merit scholarship/fellowship was provided to 16 undergraduate students. ICAR scholarship was given to five students and two student received minority scholarship from State Government.

Courses Taught

The undergraduate students were offered courses as per the recommendations of 4th Dean's committee constituted by ICAR, New Delhi. The students were offered 15 courses during 2010-11.

NSS Activities

Five days NSS camp was organized between December 13 -17, 2010 in College of Dairy Science & Technology, GADVASU. During the camp various activities were conducted including tree plantation, weeding in lawn, practical training on up-keeping and maintenance of ornamental plants, extempore and debate on various topics viz., role of NSS in overall personality development of youth, woman empowerment, child labour, leadership qualities etc. In addition to these activities a poster making and presentation competition was also organized among the NSS volunteers on the various pre allotted topics viz., AIDS awareness, blood donation, female feticide, rain water harvesting and clean & green environment. The volunteers have shown keen interest in various activities conducted during the camp especially in debating the various burning social issues – drawbacks and their remedies. The main objective of conducting poster making and presentation session was to promote the hidden artistic and oratory talent of students.

College of Fisheries

Total number of students admitted during 2010-11 in various programs of College of Fisheries were 22, which included 20 in B.F.Sc. and one each in M.F.Sc. and Ph.D. Out of these, 11 (50%) were male and 11 (50%) were female students. The percentage of girl students in B.F.Sc. was 55 per cent.

Scholarships/Fellowships

University merit scholarship/fellowship was provided to eight undergraduate and two postgraduate students. ICAR scholarship was given to three undergraduate students.

Courses Taught

The undergraduate students of the college were offered courses as per based on recommendations of the 4th Dean's Committee of the ICAR. The students were offered 22 courses in the Semester I and 24 courses in Semester II. Postgraduate students were offered courses in their respective major, minor and supporting field as approved by the Dean, Postgraduate Studies.

Thesis/Dissertations

M.F.Sc in Aquaculture

Sr. No.	Name	Month & Year of completion	Title of Thesis
1	Vikas Phulia	September 2010	"Effects of Azolla based feeds on growth and flesh quality of carps".
2	Thokchom Ponil Singh	September 2010	"Effects of Duckweed – *Spirodela* incorporated feed on growth and flesh quality of carps".

NSS Activities

Undergraduate students of the college attended one week NSS camp with a solagan "Tandrust Naujawan Tandrust Punjab" ("Healthy Youth and Healthy Punjab") from Oct. 6-15, 2010 and following activities were done:

- Aquatic life conservation campaign at Harike wetland
- Invited lectures on personality development, health care, social service, environment protection and objectives and working of NSS in India.
- Cleanliness campaign
- Poster making competition
- Rangoli making competition
- Essay writing competition
- Mehndi competition
- Tree plantation campaign

School of Animal Biotechnology

During the session 2010-11, a total of 15 students have been admitted; 12 in M.V.Sc./M.Sc. Animal Biotechnology and three in Ph. D. Animal Biotechnology. Out of 15 students, 67% (10/15 students) were female and 33% (5/15 students) were male.

Scholarships/Fellowships

Six students were awarded DBT merit scholarship on the basis of All India Entrance Test. Three postgraduate students received University Merit Scholarship. Senior Research Fellowship of ICAR was awarded to one Ph. D. student.

Courses Taught

Postgraduate students were offered courses in their respective major, minor and supporting field as approved by the Dean, Postgraduate Studies. A total of 21 courses were offered during the year which included one for UG, 15 for Masters and 5 for Ph. D.

Thesis/Dissertations

M.V.Sc./M.Sc. Animal Biotechnology

Sr. No.	Name	Month & Year of completion	Title of Thesis
1.	Syed Mohmad Shah	July, 2010	"Functional characterization of Toll Like Receptor 2 in Buffalo (*Bubalus bubalis*)".
2.	Deepti Vashist	August, 2010	"Cloning, Sequencing and Gene Expression profiling of Toll-Like Receptor 2 in Catla catla".
3.	Swati	August, 2010	"Cloning, Sequencing and Expression profiling of Heat Shock Protein 70 Gene in chickens".
4.	Daljit Kaur	August, 2010	"Cloning and Expression of immunodominant outer membrane protein LIPL32 from *Leptospira interrogans*".
5.	Rupali	September, 2010	"Expression of Bovine Herpesvirus 1 (BHV-1) Glycoprotein C (gC) Gene".

RESEARCH

Undertaking need based research on different aspects related to production and health of various livestock species, poultry and fisheries forms an integral part of the mandate of the university. During the year 2010-11, a total of 50 new project proposals were submitted to various funding agencies, viz. Department of Biotechnology (16), University Grants Commission (7), Punjab State Farmers' Commission (5), Department of Science and Technology (5), State Government (3), Indian Council of Medical Research (2), Indian Council of Agricultural Research (2), International (2), Council of Scientific and Industrial Research (1), NASA-Agro Industries Ltd. (1) and others (6).

During the year 2010-11, a total of 121 research schemes were operational in the university as detailed below:

Non Plan Schemes	40
Plan Schemes	11
ICAR Schemes	15
Revolving Fund Schemes	04
Miscellaneous Schemes	17
RKVY Ongoing Schemes	19
RKVY New Schemes	15
Total	**121**

Research Schemes Operational during 2010-2011

S. No.	Name of the Scheme
Non Plan Schemes	
1.	Animal Disease Research Centre and Strengthening of Diagnostic Facilities and Experimentation
2.	Intensification of Research in Animal Nutrition
3.	Control of Mastitis in Punjab State – A Pilot Project
4.	Research Facilities for Dairy Cattle and Buffalo Breeding
5.	Genetic Improvement of Egg Type Stocks
6.	Establishment of Small Animal Colony at GADVASU
7.	Internal Diseases of Dairy Animals– Their Clinicopathological Diagnostic and Therapeutic Aspects
8.	Nutritional Deficiency Diseases of Dairy Animals- Their Clinicopathological, Diagnostic and Therapeutic Aspects

S. No.	Name of the Scheme
9.	Research on Diagnostic Aid and Surgical Treatment of Musculo Skeletal and Abdominal Disorders in Large Animals
10	Research on Poultry Diseases
11	Establishment of Research-cum-Diagnostic Laboratory for Rabies
12	Toxicity Studies on Insecticides in Livestock
13	Reproductive Disorders in Dairy Animals
14	Recovery, Cryopreservation and Embryo Transfer in Buffaloes and Crossbred Cattle
15	Creation of Facilities for Rearing of Meat Animals i.e. Goat, Pig and Rabbit
16	Germplasm Multiplication of Egg Type Poultry Stocks
17	Physical Facilities to Breed Quails for Meat and Egg
18	Additional Facilities for Modernization of Dairy Operation
19	Advanced Research Centre for Buffalo Reproduction
20	Rearing of Buffaloes Male Calves for Meat
21	Improvement of Buffalo and Crossbred Cattle through Nutrition Effect of Plans of Nutrition on their Growth Rate, Age at Puberty, Pregnancy and Lactation
22	Seed Production in Forage Crops
23	Anatomical, Histological, Histochemical and Electron Microscopic Studies as Related to Hormonal and Biochemical Profile on Female Reproductive Organs in Buffalo
24	Immunological Studies on the Helminthic Diseases of Livestock
25	Immunological Control of Cattle Tick (*Boophilus microplus*)
26	Studies on Viral, Bacterial and Mycotic Infections of Cattle and Buffaloes with a view to Develop Diagnostic Kits and Suitable Vaccines
27	Studies on the Utilization and Popularization of Processed Meat Products Prepared from Buffaloes and Other Species
28	Regional Livestock Research Centre, Bathinda
29	Regional Livestock Research Centre, Kapurthala
30	Research Laboratory for Feed Evaluation and Processing
31	Improvement of Forages and Establishment of Forage Unit
32	Reproductive Biology, Ecology and Management of Birds and Mammals
33	Strengthening of Fisheries Research

S. No.	Name of the Scheme
34	Fisheries Research Scheme
35	Establishment of Fisheries Unit
36	Establishment of Research-cum-Quality Control Laboratory for Livestock/Poultry Farmers and Feed Manufacturers
37	Introduction and Breeding of Naked Neck Rhode Island Red and other Miscellaneous Stock of Poultry
38	Molecular and Cytogenetic Studies on Animals for Faster General Gains
39	Sustainable Aquaculture Technology for Salt-Affected/Water-Logged Areas of Punjab
40	University Administration
Plan Schemes	
1.	Establishment of Regional Research Centre for Nili Ravi Buffalo
2.	Regional Livestock Research Centre for Sahiwal Cattle
3.	Studies on Goat for Meat and Milk Production Under Stall-Fed Conditions in Punjab
4.	Establishment of an Immunopathology Research-cum-Disease Diagnostic Centre in the Department of Veterinary Pathology
5.	Pesticide Induced Adverse Effects: Implication on Livestock Production
6.	Development of Strategies for Production of Safe and Residue Free Animal Food
7.	Integrated Management and Control of Parasitic Diseases in Domestic Animals for Enhancing Livestock Productivity in Different Agro-Climatic Zones of Punjab State
8.	Diagnosis and Control of Brucellosis- A Dreadful Zoonotic Disease in Domestic Livestock for Enhancing Productivity in Punjab State
9.	Establishment of Research Centre and Referral Hospital for Equines
10.	Brood Stock Improvement of Indian Major Carps for Quality Seed Production
11.	Regional Livestock and Poultry Research and Training Centre for Kandi Area
ICAR Schemes	
1.	Network Project on Buffalo Improvement (Main Unit)
2.	Network Project on Buffalo Improvement (Field Unit)
3.	Project Directorate on Cattle Field Progeny Testing Project
4.	All India Coordinated Research Project on Poultry Improvement
5.	AICRP on Improvement of Feed Resources and Nutrient Utilization in Raising Animal Production
6.	Project Directorate on Animal Disease Monitoring and Surveillance

S. No.	Name of the Scheme
7	Sustainable Livestock Based Farming System for Livelihood Security in Hoshiarpur District of Punjab
8	Rumen Microbial Diversity in Domesticated and Wild Ruminant and Impact of Additives on Methanogenesis and Utilization of Poor Quality Fibrous Feeds
9.	All India Network Program on Haemorrhagic Septicaemia
10.	Antiluteolytic Strategies– A Novel Approach to Enhance Fertility in Buffalo
11	Outreach/Network Program on Estimation of Methane Emission Under Different Feeding Systems and Development of Mitigation Strategies
12.	AICRP on Cattle-New Project Sahiwal (Data Recording Unit)
13.	Economic Impact of FMD and Its Control in the Dairy and Meat Value Chains of Selected High Potential Regions of India– A Pilot Study
14.	Modernization of Agricultural University Farms
15.	Inland Aquaculture in Punjab (Niche Area Excellence)
Revolving Fund Schemes	
1.	Processing and Distribution of Milk
2.	Production of Table Size Fish and Fish Seed
3	Resource Mobilization from Poultry Farm
4.	Utilization of Institutional Charges Provided in various Adhoc Research Schemes funded by the ICAR and other Agencies
Miscellaneous Schemes	
1.	Identification of Target Molecule on B Cells which Binds Infectious Bursal Diseases (IBD) Virus and its Regulation for Immunoprophylaxis of IBD in Chicken
2.	Characterization of Antimicrobial Peptide Genes in Buffaloes in Health and Disease
3.	Isolation and Characterization of Sperm Specific Antigenic Protein(s) with Immune-Contraceptive Potential in Dog
4.	Differential Response to Heat Stress and Production of Monoclonal Antibodies against HSP- 70 in Buffalo
5.	Development of a Novel Marker Vaccine for Bovine Herpesvirus-I (BHV-I) and companion Diagnostic test
6.	To Evaluate the *in-vitro* and *in-vivo* Therapeutic Potential of Bacteriophages
7.	Molecular Characterization of Toll Like Receptors (TLR-2,3,4,9) in Indian Major Corp *Catla catla*
8.	Pharmacokinetics-Phamacodynamics Integration and Toxicological Studies of Fluoro-Quinolones and Cephalosporins in Buffalo Species
9.	Open Nucleus Breeding System To Improve Sahiwal Cattle and Nili Ravi Buffalo in the State of Punjab

S. No.	Name of the Scheme	
10.	Isolation and Characterization of Animal Adenoviruses for Development of a Novel Viral Vector for Vaccine Delivery	
11.	Improving Fertility Through Application of Approved Artificial Insemination Technique in Bovine	
12.	Improvement of Dairy Animals through Embryo Transfer Technology at the Institutional Farm and Field Conditions- ETT	
13.	Confirmation of Lactation Performance and Animal Safety of Dairy Animals of the *Bos* sp. and *Bubalus* sp. Treated with Recombinant Bovine Somatotrophin (AHC/ELANCO)	
14.	M.V.Sc. / M.Sc. in Animal Biotechnology	
15.	Utilization of Inland Saline Waters of South-West Punjab for Aquaculture	
16.	Conservation and Improvement of Sahiwal Breed of Cattfle in Punjab– Beetal Goat	
17.	Improvement of Udder Health and Milk Quality through Application of Mastitis Control Program Under Field Conditions	
RKVY Research Schemes		
19.	Processing of Turkey Meat into Value Added Meat Products and Popularization thereof	
20.	Development and Dissemination of Need Based Cost Effective Technologies to Promote Livestock and Fish Production In Punjab	
	A-1	Promoting Fish Production through Bioremediation of Village Ponds and through Integrated Fish-Livestock Farming
	A-2	Processing and Evaluation of Fruit, Vegetable and Cannery Wastes as Livestock, Poultry and Fish Feed
	A-3	Optimizing Reproductive Performance of Dairy Animals for Sustainable Milk Production
	A-4	Hastening onset of Puberty and Economical Rearing of Superior Replacement of Buffalo Heifers
	A-5	Assessing Nutritional Requirements of Quails
	A-6	Strategic Feeding in Lowering the Age of Sexual Maturity in Crossbred Heifers
	B-1	Monitoring and Management of Mineral Profiles for Optimal Animal Health and Production in Different Agro-Climatic Zones of Punjab
	B-2	Development and Adoption of Integrated Parasite Management Strategies for Enhancing Livestock Productivity in Rural Punjab
	B-3	Development of Rapid Diagnostic Protocols and Therapeutic Management of Digestive Disorders in Dairy Animals
	B-4	Studies on Vaccine Failure and on Strategies for Effective Prevention of Foot and Mouth Disease and Hemorrhagic Septicaemia
	B-5	Monitoring and Managing the Re-Emergence of Important Diseases of Livestock

S. No.	Name of the Scheme	
	B-6	Strategies to Mitigate (Prevention and Clinical Interventions) Abdominal Disorders in Dairy Animals
	B-7	Development of Cost Effective Bacteriophages Therapy for Controlling Brucellosis in Cattle and Buffaloes
	B-8	Clinical and Therapeutic Studies on Foot Lameness in Dairy Cattle
	C-1	Processing of Milk into Different Value Added Products (Including Mozzarella Cheese) for Better Economic Returns
	C-2	Studies on Development and Storage of Meat Products Without and With Minimum Refrigeration
	C-3	Pesticides Residues in Foods of Animal Origin and their Impact on Human and Animal Health
	C-4	Pesticide-Mineral Interaction: Effect on the Animal Health and Production
21.	Enhancing Livestock Production in Punjab through Need-Based Research and Development Activities	
	A-1	Management of Udder Health and Clean Milk Production through Immunomodulation and Alternative Strategies
	A-3	Studies on Prevalence of Major Zoonotic Diseases in Punjab and to Develop Appropriate Control Strategies
	A-4	Employment of Immuno-Molecular Diagnostic Tools for Haemoprotozoan Diseases of Livestock in Punjab State
	A-5	Screening of Bulls for Chromosomal Abnormalities and Genetic Disorders to Improve Reproductive Fitness
	A-6	Enhancing Pig Production Under Small Farming System through Application of Improved Management Practices
	A-7	Assessing Nutritional Requirements of Quails
	B-1	Disease Diagnostic and Registry Service
	B-2	Large Animal Health Facilities and Services i) Studies on the Evolution of Reproductive Health Status of Critically Ill Dairy Animals Suffering from Parturient Complications ii) Studies on Use of Intra-Medullary Interlocking Nailing and other Orthopaedic Procedures for Large Animals Diaphyseal Fractures iii) Strengthening of Diagnostic and Critical Care Facilities for Domestic Animals
	C-1	Milk Processing and Manufacture of Value Added Dairy Products
	C-2	Processing of Carp Fishes into Different Value Added Products and By-Products for Enhanced Economic Returns
	C-3	Processing of Buffaloes Milk into Mozzarella Cheese for Better Economic and Health Benefits
	C-4	Development of a Suitable Module for Sustainable Processing and Marketing of Meat and Meat Products to Increase Employment and Income Generation in Punjab State
	D-1	Strengthening of Research on Livestock Health and Production
	D-2	Strengthening of Research on Diagnostic and Therapeutic of Animals

RESEARCH HIGHLIGHTS

College of Veterinary Science

1. Animal Genetics and Breeding

Cattle Breeding

The crossbreeding project for the genetic improvement of cattle maintained at the university dairy farm showed an upward trend in the milk production traits. The average 305-day milk yield and peak yield were recorded as 5149 kg and 26.6 kg, respectively with a wet average of 13.96 kg. The average milk yield of the elite herd used for producing future crossbred bulls was found to be 6027 kg with peak yield of 30.8 kg. The maximum 305-day milk yield and peak yield recorded for an individual cow in the herd was 7496 kg and 40.3 kg, respectively. Five young crossbred bulls were selected for use under collaborative Field Progeny Testing Project of ICAR. For the genetic improvement of cattle population in state; six breeding bulls, 40601 doses of frozen semen and 4422 doses of chilled semen were supplied to the farmers and other dairy development agencies of the state.

Buffalo Breeding

The genetic improvement of buffaloes is being undertaken through progeny testing of bulls under all India Coordinated Research Project on Buffalo breeding operational at the dairy farm since 1971. The average 305-day milk yield for the general herd was found to be 2466 kg with lactation milk yield of 2763 kg and average peak yield 13.6 kg. The correspondingly 305-day milk yield, lactation milk yield and peak yield in elite herd which is used for production of future young sires was 2908 kg, 3343 kg and 14.9 kg, respectively. A record milk production of 4636 kg over 305 days and 6131 kg in second complete lactation was obtained from a Murrah buffalo no. P 2489. The 31441 doses of frozen semen and 2119 ml of chilled semen were supplied to the farmers and other dairy development agencies for improvement of buffalo population in the state. Thirty one buffalo breeding bulls/bull calves were sold to farmers for breeding purposes. The semen of test bulls was also supplied to 24 AI centers adopted under the Field Progeny Testing Project.

Eco-friendly Bio-gas Plant

To generate clean environment and development mechanism (CDM) through the use of renewable non-conventional energy sources under the eco-friendly environmental scheme, a bio-gas plant comprising of two 90 cu m fixed domes type has been constructed at the university dairy farm. Each dome has a diameter of 20', depth 24.5' and wall thickness of 9". This bio-gas plant has a capacity of 4500 kg (daily) of cow dung and poultry droppings. This plant produces 240 kw hours of energy daily and with this much energy a 40 kva bio-gas operated genset is being operated for 6 hours daily to produce electricity. The electricity produced from this genset is being used for chaffing of green fodder, machine milking of animals and to operate fans, coolers and foggers installed in the animal sheds. The total cost of this bio-gas plant along with engine was around Rs 18.00 lacs. The successful running of this bio-gas plant and to produce electricity from generated bio-gas is motivating the dairy farmers of the state. The mechanization of various operations of the dairy farm has increased the need of electricity at the dairy farms. So by producing electricity from bio-gas plant is helping to reduce the electricity cost of a dairy farm and is providing continuous electricity source during power cuts.

Bio-gas Plant under construction

The slurry obtained from bio gas plant is being used as manure in the fields and it has more fertilizing power than conventional farm yard manure. Bio-gas plant is also helping in reducing the environmental pollution by providing methane in bio-gas which is further utilized for various purposes (like cooking, lighting, electricity generations etc.). On the other hand cow dung and poultry droppings accumulated in the pits to form farm yard manure is leading to environmental pollution by emitting methane and other harmful gases to the environment.

Fully constructed Bio-gas Plant

Embryo Transfer Technology

During the period under report 34 elite donor cows (305 day lactation yield more than 5000 Kg) were super-ovulated in the field using pure follicle stimulating hormon "Folltropin-V 200 NIH" given intramuscularly in divided doses over a period of 4 days. A total of 31 (91.1%) donor cows responded to the treatment. Super-ovulation response was accessed by rectal palpation of ovaries on day 7 prior of embryo collection. On an average 13.0 corpora lutea (CL's) developed on the ovaries. Embryos were collected non-surgically using rush catheters and Dulbecco's phosphate buffered saline fortified with bovine serum albumin and antibiotics. On an average 5.84 embryos were recovered with average transferable embryos of 3.06 per donor. Of the 49 transferable embryos, 45 were transferred into 41 recipients non-surgically. Pregnancy diagnosis at two months confirmed 10 pregnancies (24.39%). Likewise, use of frozen embryos showed a 20% success in pregnancy establishment of recipients. A total of 10 elite calves have been born in the field through embryo transfer, during the last one year.

Photographs of some of the elite calves produced in the field through Embryo Transfer

Layer Breeding

White Leghorn

The commercial stock "Satluj Layer" developed at GADVASU has a potential to lay 270-280 eggs in a year with an average egg weight of 57g. The mortality rate is less than 1 % per month. The bird is hardy and suited to small farmers with low inputs. The genetic development over the last five years resulted in improvement in egg production up to 40 weeks age from 98 to 120 and at the same time increase in egg weight from 55 to 58g.

Rhode Island Red

Rhode Island Red (RIR) female is considered to be a hardy and dual purpose bird and thus well suited for small farmers. The birds lay tinted (brown) eggs and are thus popular in rural areas of the state. Therefore to help improve the rural economy the work has been taken up for genetic improvement and multiplication at the university. It lays 250-260 eggs in a year with an average egg weight of 53g. University has developed two strains of RIR and has also synthesized a new egg laying strain Punjab Red keeping in view the need of the farmers and climatic conditions of the state. The strains RIRB, RIRC & PRED have laid 108,105 & 96 eggs respectively to the age of 40 weeks during the current year with an average egg weight ranging from 52 to 55g. Since the birds tend to be heavier at the end of lay, the income from the spent-up hens is also higher than white leghorn females. The RIR birds perform well on comparatively lesser management input. Fertile/ hatching eggs, day old chicks and parent stocks are being made available from the University for supply to farmers.

Broiler Breeding

The commercial broiler (IBL-80) developed in the university has the potential to attain average 6-week body weight of 1600-1700g with a feed efficiency of 1.8 to 1.9 and the mortality of less than 5%. The egg weight remained more or less static but egg production at 52 weeks of age significantly improved from 117 to 133 eggs in the dam line (PB-2). This implied the availability of greater number of chicks per dam for hatchery operators interested to procure parent stocks from the university. The performance of the cross at the Random Sample Tests was also promising and the entry of the university retained first position during all these years amongst the public sector entries at Gurgaon centre. Parent stock and commercial chicks are made available from the University hatchery.

Quail Breeding

Three strains of quail namely Punjab Quail-1, Punjab Quail-2 and Punjab Quail-4 have been developed. Average five week body weight of the commercial crosses was found 240-250g. Another strain with white plumage has also been developed and released at state level under the name "Punjab White Quail". The average egg weight is about 12g and these eggs are used for preparation of pickles. The quail meat contains higher proportions of carbohydrates and vitamin B-12. Quails are less susceptible to common diseases of poultry and need no vaccination against common poultry diseases. The university supplies quail eggs, day old chicks and 5-week old dressed/ live birds.

2. Animal Nutrition

Rumen Microbial Diversity in Bucks

The study was taken up to assess the effect of high and low roughage diet on the rumen microbial diversity in goat bucks. The digestibility of organic matter, total volatile fatty acids production and metabolizable energy availability from low roughage high concentrate (LR-HC) diet were significantly higher as compared to animals fed high roughage low concentrate (HR-LC) diet. The fibre degrading bacteria isolated from the rumen of goats and sheep fed either with HR-LC diet or LR-HC diet were superior to the normally found microbes in rumen. The DNA study of the isolated bacteria is in progress.

Nutritional Evaluation of Baby Corn Husk-A New Feed Resource for Livestock

Baby corn husk (BCH), a waste product, is the outer peels of baby corn cob. The fresh BCH contained 94.25% organic matter (OM), 11.70% crude protein (CP), 62% neutral detergent fibers (NDF) and 24% cellulose as compared to 91.75% OM, 8.65% CP, 68% NDF and 33% cellulose in green maize. The daily dry matter (DM) intake was significantly higher in buffalo calves fed conventional green fodder as compared to chaffed BCH. The digestibility of all the nutrients was higher ($P<0.05$) in fresh BCH as compared to green maize fodder. The N-retained and apparent biological value of protein was high in fresh BCH as compared to green maize fed group. Thus, fresh or ensiled BCH was highly acceptable and palatable as compared to conventional maize fodder.

Assessment of Optimum Levels of Formaldehyde for the Protection of Proteins in Oil Seed Cakes

Oil seed cakes like mustard, deoiled mustard and soybean meal were treated with 0.5 or 1.0% formaldehyde. The digestion kinetic parameters for DM and protein revealed that the effective degradability decreased significantly with the increase in level of formaldehyde. The 1% level of formaldehyde was considered best for the protection of protein.

Fruit and Vegetable Waste as Livestock Feed: Highly Palatable Potential Source of Nutrients

In Punjab approximately 5% of the cultivable area is under fruit and vegetable production, yielding about 2.8mt of vegetables and 1.06mt of fruits/annum. The losses in fruits and vegetables are to the tune of 30% which result in the production of approximately 1.16mt of fruit and vegetable wastes (FVW). At present, only 4% of fruits and vegetables produced in the country are processed. In the organized sector around 0.29mt of fruit and vegetables can be processed/ annum (to produce value added products). State of art processing plants has come up in the organized sector with an installed capacity of 480 t/ d (e.g. Punjab Agro Juices Ltd, Hoshiarpur). Such plants leave a huge quantity of FVW, posing a big problem for their disposal besides threat to environment. The outer peels of baby corn cob, called baby corn husk (BCH) is a waste product. Similarly sarson saag waste, pea pods, tomato pomace, cauliflower leaves, fruit juice waste etc. leave a huge amount of waste during their journey from farm to table and poses threat to the environment.



Babycorn husk

Some of the FVW evaluated in GADVASU revealed excellent potential as alternative/novel feed resource for livestock and poultry. Solar driers should be installed or silo pits should be made in the vicinity of the fruit and vegetable processing plants and the processed FVW can be fed to the animals in the cluster of villages in that region. Animals relish fresh fruit and vegetable wastes as these are very palatable and nutritious, but these have very short shelf life (because of high moisture and high sugar content). So, if dried under sun/ solar drying or ensiled with wheat/rice straw in 70: 30 ratio, the nutrients in these wastes can be conserved.

Specie	g/d
Calves, <6m old	20-30
Milk yield, 5-7 kg/d	50
Milk yield, 7-10 kg/d	60
Milk yield, 11-20 kg/d	100
Breeding bulls	100

Impact:

- Provide nutrients equivalent to conventional feed resources
- Available free of cost
- Economizes dairy farming
- Supplement ever depleting feed basket
- Prevents environment problem (disposal of waste)

Strategic Supplementation of Bypass Nutrients and Chelated Minerals

Thirty six crossbred cattle producing more than 10 liters milk/day were divided into 3 equal groups and supplemented with either chelated Cu and Zn replacing 50% of the inorganic salt of Cu and Zn in the mineral mixture or bypass nutrients i.e. 150-200g inert fat (calcium salts of rice bran fatty oil) along with 150-200g bypass protein (formaldehyde treated soybean meal). The milk yield and milk composition were significantly improved in the group supplemented with bypass nutrients. Best reproductive performance was observed in animals fed chelated minerals followed by animals fed bypass nutrients. The strategic supplementation showed no adverse effect on blood profile of the animals and the physique was improved.

Methane Production Potential of Different Feed Stuffs

Evaluation of different energy supplements revealed that the methane production per gram of digestible

organic matter was lowest in barley, highest in maize followed by wheat. Waste bread had the lowest methane production. In case of protein supplements, the lowest methane production was in tomato pomace followed by cotton seed cake and mustard. Amongst the brans, methane production was lowest in rice bran and highest in deoiled rice bran. Amongst the multi-cut leguminous forages, shaftal had the lowest and lucerne had the highest methane production. Therefore rations should be formulated by using conventional and non conventional feedstuffs with low methane production potential viz. concentrate feed ingredients like barley, waste bread, cotton seed cake, tomato pomace, rice bran; forages like shaftal and straws like moong straw, groundnut straw and soybean straw. Cauliflower leaves had an edge over other fruit, vegetable and cannery wastes.

Quality Evaluation of Oat Silage Prepared in Transparent Tubes

Oat silage was prepared in translucent plastic bag (OSBT) and high-density polyethylene (HDPE) plastic bag (OSbHDPE) and its quality was compared with silage prepared in the pit (OSp) to assess its feasibility for small dairy farms. On the basis of various analytical parameters such as pH, ammonical nitrogen, CP, water soluble phosphorus (WSP), non-fiber carbohydrates (NFC), acid detergent fiber (ADF), NDF and cellulose, it was conducted that oat fodder silage can be prepared in poly bags but the quality of silage prepared in translucent plastic bags was better than that in HDPE plastic bag or pit.

Effect of Formaldehyde on the Quality of Protein Supplements for Ruminants

An experiment was conducted to study the effect of formaldehyde treatment on the protein quality of mustard cake (MC), ground nut cake (GNC) & soybean meal (SBM). The results indicated that formaldehyde treatment at 0.5% & 1% level increased the undegradable protein (UDP) of the cakes. The effect was more pronounced in SBM as compared to MC. Heat treatment of the cakes also increased the UDP level.

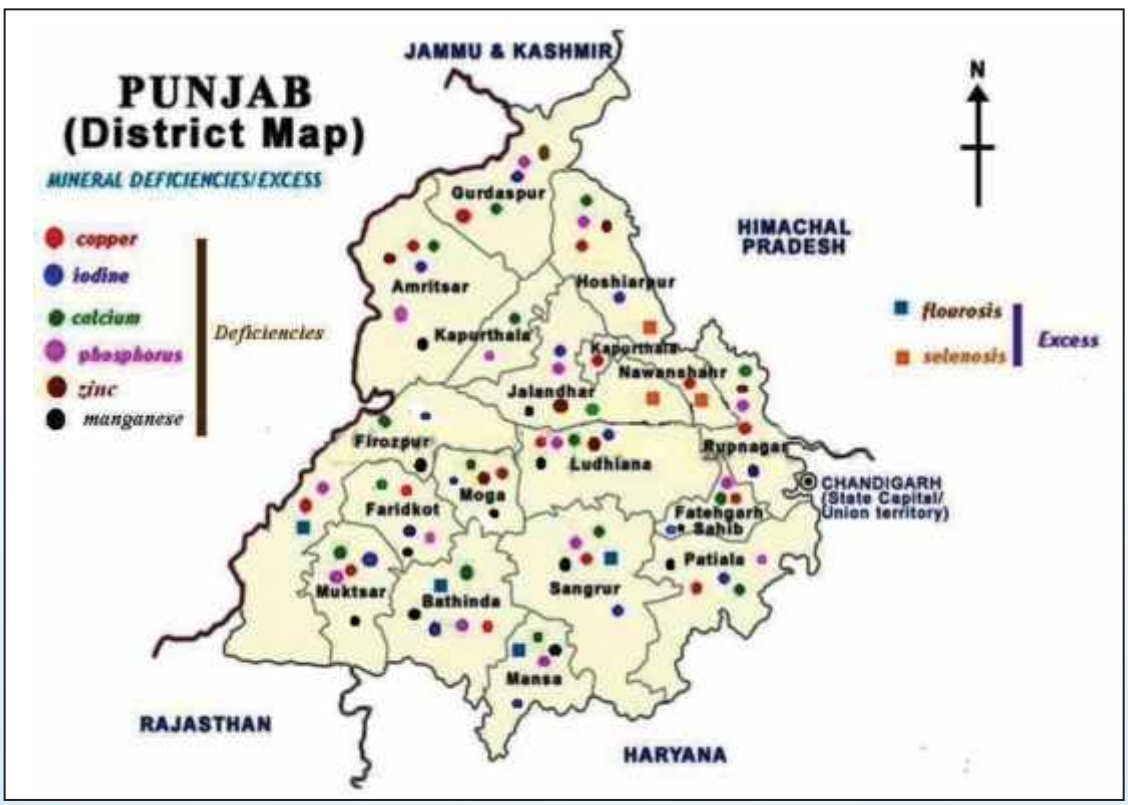
Feed Analysis

During 2010, a total of 205 samples of compounded feeds, feed ingredients & roughages, were received for analysis. Samples constituted 27% cattle feeds, 9% roughages and the remaining were feed ingredients. A lot of variation in the composition of feed ingredients was observed and the farmers were advised accordingly.

3. Clinical Veterinary Medicine, Ethics and Jurisprudence

Mapping of mineral deficiencies in dairy animals in Punjab

Mineral deficiencies have been identified in dairy animals in different zones of Punjab and accordingly area specific mineral mixture has been recommended.

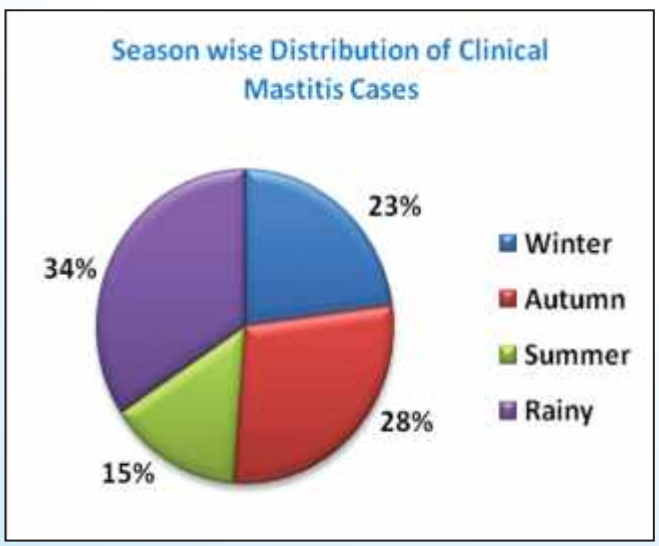


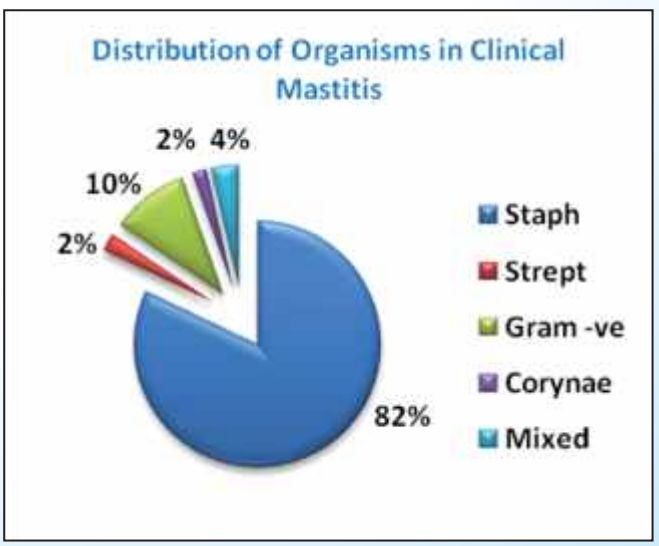
Area Specific Mineral Mixture Recommended

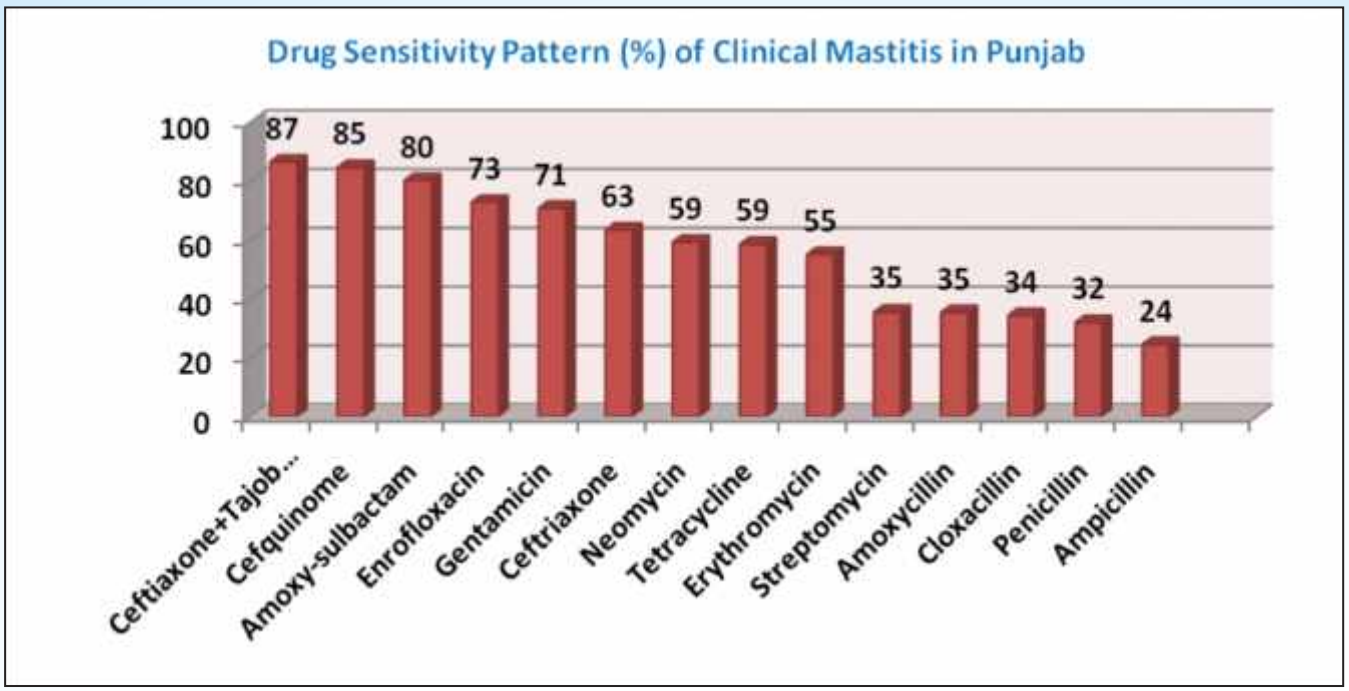
	Kandi Area	Central Districts	South-western Districts
Calcium (%)	24	22	26.3
Phosphorus(%)	11	12	9
Magnesium(%)	4	4	4
Iodine (%)	0.05	0.04	0.05
Copper(%)	0.16	0.14	0.14
Manganese(%)	0.10	0.15	0.15
Cobalt(%)	0.009	0.009	0.009
Zinc(%)	0.64	1.00	0.80
Acid soluble ash (Max.) %	2.4	2.4	2.4
Flourine (Max.) %	0.05	0.05	0.05
Lead mg/kg (Max.)	16	16	16
Arsenic mg/kg (Max)	5	5	5

Culture Sensitivity Pattern of Clinical Mastitis in Punjab

A day to day regular laboratory service is being provided to the visiting farmers throughout the state for culture sensitivity testing of milk samples from mastitic animals. During the period under report 1600 quarter milk samples from animals like cow (1244), buffalo (298), goat (12), bitch (44) and mare (02) were received for mastitis diagnosis and culture sensitivity test. The number of clinical cases reported were maximum during the rainy season from July to September (38%), and minimum during summer from April to June (15%). The *staphylococci* (82%) followed by *E. coli* and others (10%) were found to be the chief isolates. *In vitro* culture sensitivity pattern revealed ceftriaxone-tazobactam (87%) followed by cefquinome (85%), amoxicillin-sulbactam (80%), enrofloxacin (73%) and gentamicin (71%) as the most effective drugs. The ampicillin (24%) was found the least effective drug.





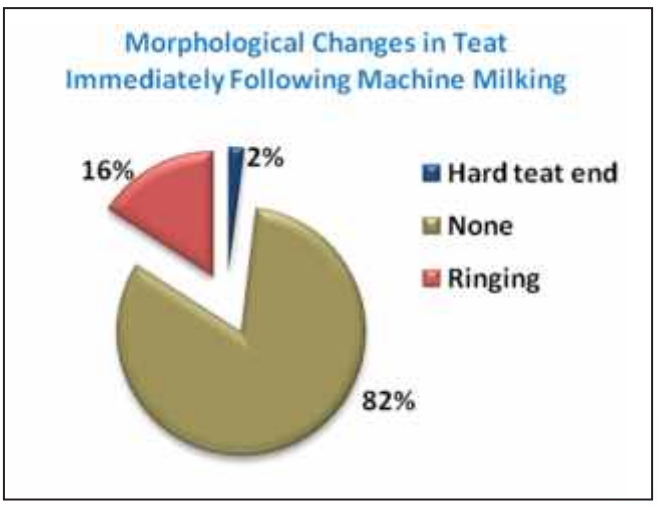


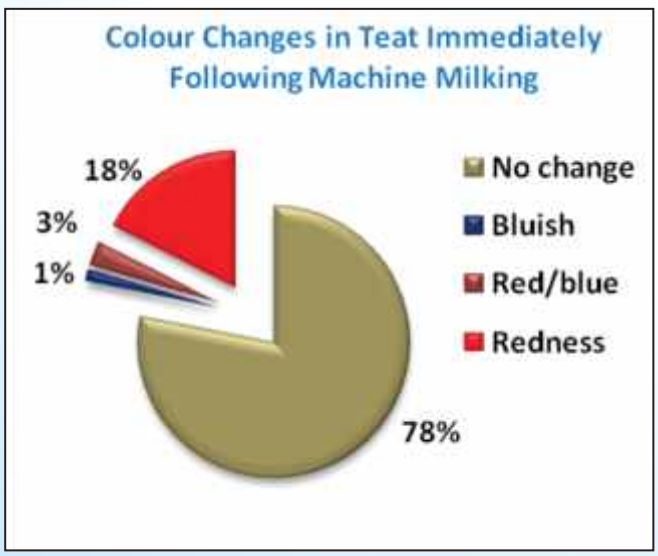
Effects of Machine Milking on Teat Health

Machine milking, when not properly used, may have some untoward effect on udder and teat health. Study involved 872 quarters from 218 lactating cows at 10 machine milked dairy farms. Machine was found to affect the teat health as follows:

Change in Teat Colour and Morphology

The short term changes observed in teats immediately following milking were the changes in colour and morphology. The colour change was seen in 23% of the teats with majority of them (18.0%) showing redness while 3.0% were red/blue and about 1% blue. Teat discoloration immediately after cluster removal indicates impaired circulation and constriction to fluid transfer. The morphological changes were seen in 17% teats. The majority (16.0%) showed ringing at the base, while other were hardened at the teat end or showed both ringing and hardening. The ringing of the base of the teat may be caused by a sustained vacuum in the mouthpiece chamber of the liner, unrelieved during most of the milking time. The firmness of the teat is likely caused by accumulation of fluids in the teat and is suggestive of impaired pulsation.

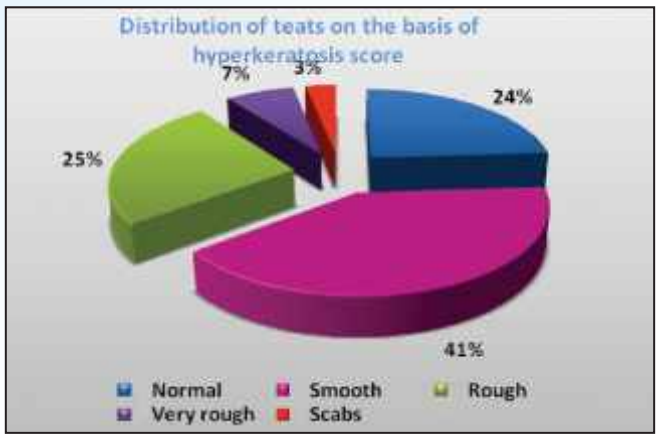




Hyperkeratosis of Teat

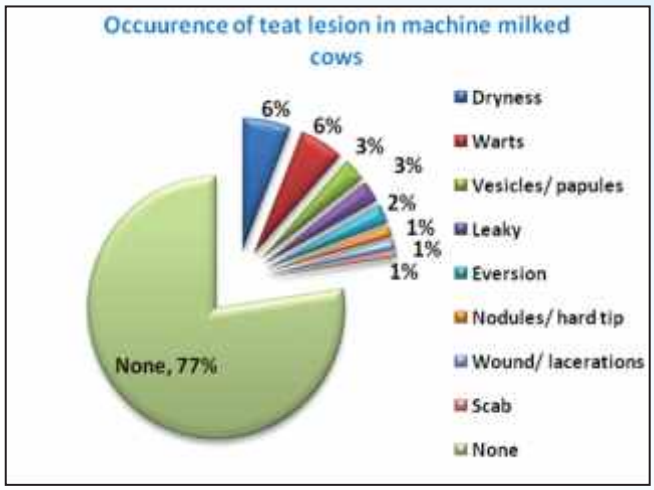
Major long term effect of milking machine on teat health was the hyperkeratosis/ teat end lesions. The distribution of teats with respect to teat end lesions was: no ring (23.96%), smooth ring (40.55%), rough ring (25.35%), very rough ring (7.03%) and open lesions or scabs (3.11%). Front teats depicted significantly ($\chi 2=4.75$; 01 df; $P< 0.05$) higher rough to open lesions

(39.03%) than the rear teats (31.95%). However, the teat side (left or right) and parity did not depict any significant relation with the occurrence of teat end lesions. A significant relationship was observed between the occurrence of teat end lesions and prevalence of mastitis ($\chi 2=12.30$; 01 df; $P< 0.001$).



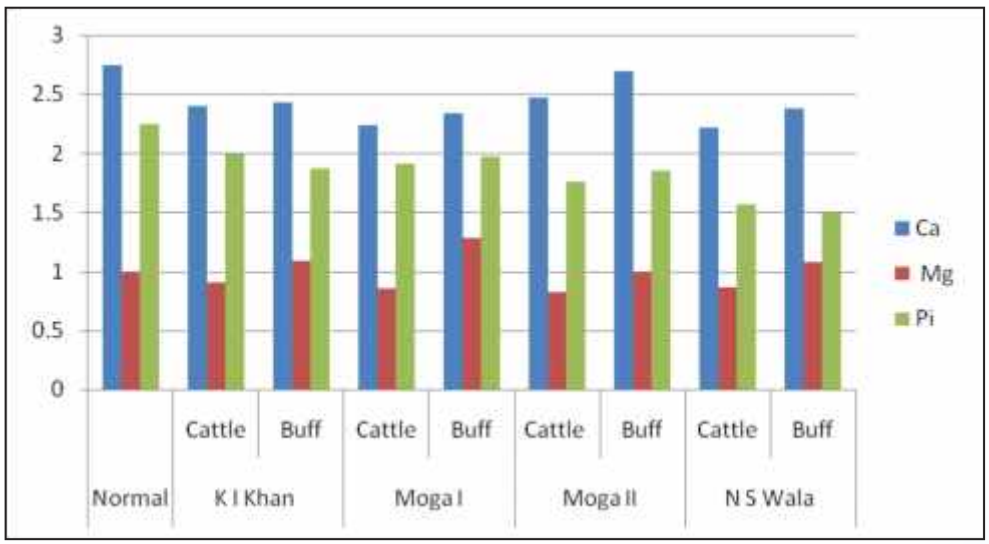
Other Long Term Teat Lesions

The occurrence of udder and teat lesions such as teat warts, dryness, vesicles, leaky teats etc. was observed in 23% of quarters.

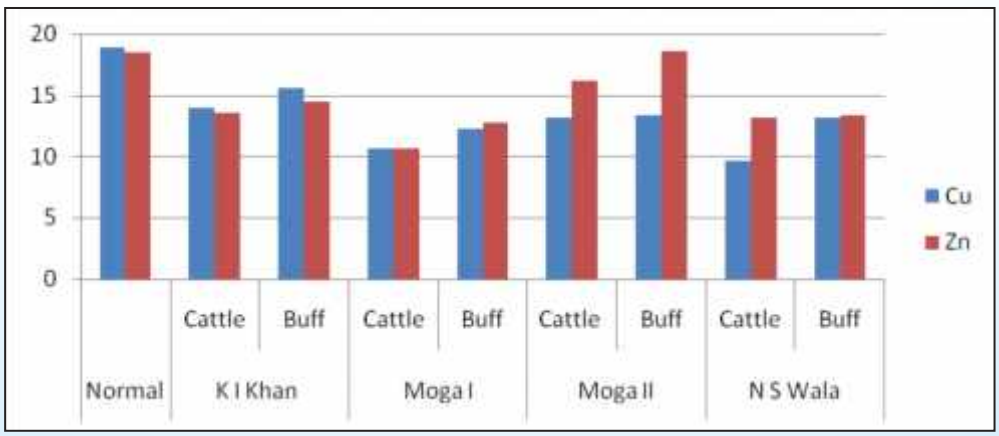


Mineral Status of Dairy Animals in Moga District

Widespread subclinical deficiency of Ca, Mg, P, Cu and Zn was found both in cattle and buffaloes in Moga district.



Plasma Ca, Mg and P levels in cattle and buffalo in different blocks of Moga



Plasma Cu and Zn levels in cattle and buffalo in different blocks of Moga

Lameness in Ruminants

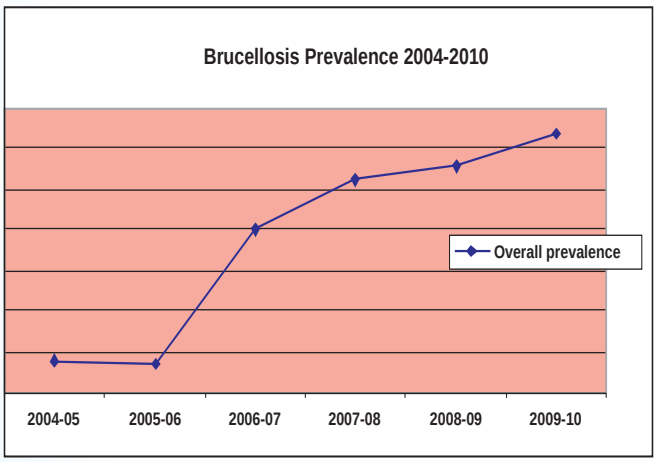
It was inferred that the presence of sole ulcers and/or white line fissures are mainly responsible for causing clinical lameness whereas presence of other lesions like sole avulsions, under run soles, overgrown hooves and heel erosions tends to increase the asymmetry of gait. A significant association exists between locomotion score and rear leg view index. Locomotion scoring and rear leg view index can be used to reliably identify clinical lameness on dairy farms.

4. Epidemiology and Preventive Veterinary Medicine

Disease Prevalence in state

Brucellosis (2004-2010)

Brucellosis has been posing a serious concern for farmers of the Punjab; the prevalence of brucellosis has been continuously rising since 2004, reaching up to overall prevalence of 34% in 2010.

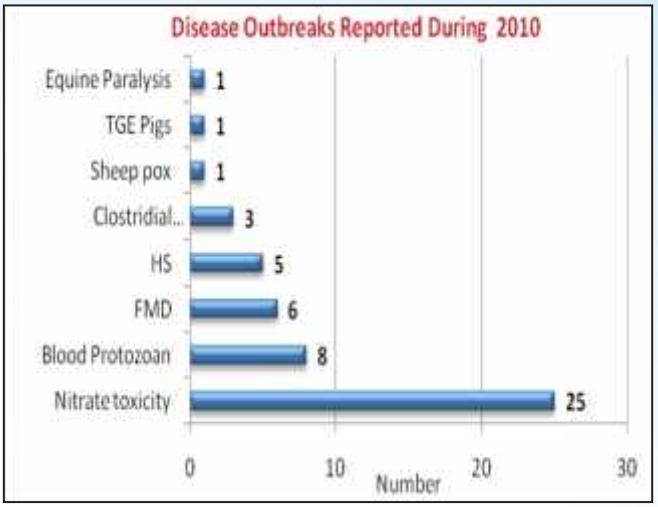


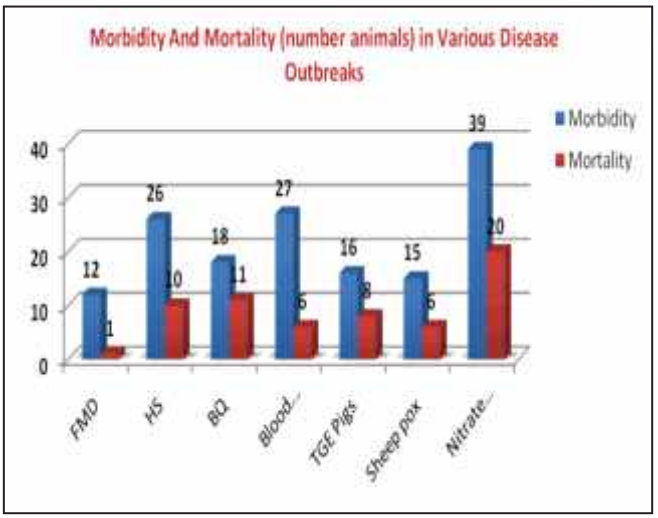
Tuberculosis

Total of 332 animals (259 bovines and 73 goats) were tested for tuberculosis with single intradermal test at various farms in Punjab from April to September 2010. Out of this 17 animals (14 bovines and 3 goats) were found to be positive with an overall prevalence of tuberculosis as 5.1 percent.

Other Disease Outbreaks

During 2010, department attended more than 50 different disease outbreaks throughout the state. Maximum number of outbreaks was reported for nitrate/ nitrite toxicity followed by blood protozoan infections such as theileriosis, babesiosis and trypanosomiasis. The nitrate/ nitrite toxicity in cattle/ buffalo, black quarter (BQ) in calves and transmissible gastroenteritis (TGE) in pigs were observed to be the most fatal outbreaks with more than 50% of affected animals died.





Testing Blood, Fecal and Fodder Samples

The department provided the regular service of testing blood, fecal and fodder samples for diagnosis of various animal diseases/ toxicities. Out of 40 fodder samples tested, 19 (47.5%) were found positive for high nitrate content.

5. Livestock Production Management

- The fan pad system was found more efficient system of cooling for broiler chick production during hot-dry season. The system lowered the ambient temperature by 2.66°C and relative humidity to the level of 9.64% thus enhancing the growth and reducing the mortality rate.
- Supplementation of iron and copper to sows during last week of gestation found beneficial in maintaining normal hemoglobin and total erythrocyte counts in new born piglets. This may

Fan - pad system fitted at poultry shelter, Poultry Farm, Department of Livestock Production Management, COVS,GADVASU

Fan - Fogger system fitted at poultry shelter, Poultry Farm, Department of Livestock Production Management, COVS,GADVASU

help in delaying first injection of iron dextran to 9th day of age thus reduce stress on newborn piglets.

- Disbudding of kids following administration of non-steroidal analgesics (Meloxicam) without applying cornual nerve block may be used as farmer conducive technique. This method led to least rise in stress related hormones, and Kids disbudded after medication had shown minimum pain related behavior compared with other techniques.

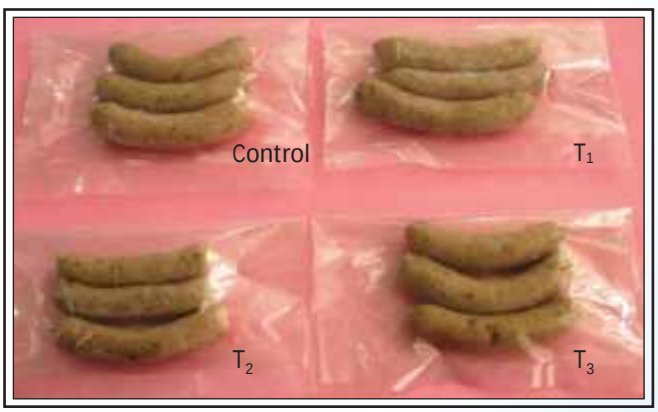
Beetal kids disbudded with hot-iron method with pre-medication of Meloxicam

6. Livestock Products Technology

Development of New Value Added Products

Pork Sausage

Studies were conducted to improve the keeping quality of cooked pork sausages during a refrigerated storage temperature of 4±1°C. The incorporation of L-carnosine at 100ppm plus L-carnitine at 200ppm was found the best choice in respect of maintaining physico-chemical, sensory and microbiological quality of cooked pork sausage at refrigerated storage temperature up to 20 days.



Colour and appearance of cooked pork sausages Control= No added antioxidants; T1-200ppm L-carnosine T2-400 ppm L-carnitine; T3-100ppm L-carnosine+200ppm L-carnitine

Lycopene Rich Pork Patties

Research investigation was envisaged with an objective to assess the efficacy of various tomato variants (tomato puree: TP, tomato pulp: TPP and lyophilized tomato peel: LTP) and pink guava pulp (PGP) as an antioxidant in pork emulsion. It was observed that incorporation of LTP at 6% and PGP at 10% levels to pork emulsion exhibited stronger antioxidant effect than the TP at 10% and TPP at 12.5%

levels in cooked pork patties. However, the sensory quality was found significantly better for pork patties incorporated with TP and TPP than LTP and PGP. The yeast and mold count were also higher in TP and LTP incorporated pork patties. All the products were stable up to 15 days under aerobic refrigerated (4±1°C) storage.

Pork patties with tomato puree and pink guava pulp

Goat Meat Products

The techniques for different goat meat products such as loaves, wadi and mathi were standardized. The goat meat loaves were developed using required quantity of minced goat meat, refined vegetable oil, table salt, sugar, tetra sodium pyrophosphate, sodium nitrite, spice mix, baking powder, refined wheat flour (maida), whole egg liquid, carrageenan and chilled water. Goat meat wadi was developed using various ingredients as for goat meat loaves. Goat meat wadi is cooked and dehydrated ready-to–eat meat product which can be stored at room temperature. The goat meat mathi were prepared by mixing rice floor and meat in the ratio of 3:1 to 1:1. It was found that cooking yield significantly decreased with the reduction of the rice flour level. On sensory evaluation overall acceptability of the products was found to be good to very good.

Goat meat wadi

Chicken croquettes

Chicken croquettes were developed to evaluate effect of sodium alginate, cauliflower floret and cauliflower buds. The cooking yield was increased in the cauliflower floret added batch than sodium alginate added.

Turkey Meat Products

Low cost formulation for turkey meat products such as nuggets, balls and patties were developed by replacing minced turkey meat with texturised soy protein at 30% level with required quantity of other ingredients. The organoleptic evaluation of turkey meat products indicated no significant variation between control and treated batches with the marginally lower sensory score in treated batch which were rated as good to very good by the panel members.

Turkey meat balls Turkey meat patties

Fish Products

The processing technology for the development of fish balls and fish caruncles was standardized and evaluated for its nutritive and sensory quality. The average yield of fish balls was recorded as 75% whereas for fish caruncles it was 40-42%. The proximate composition for fish balls vs. fish caruncles was fat 19.5 vs. 8.5%, protein 14.0 vs. 21.8%, ash 4.1 vs. 4.3% and energy value as 280 vs. 193 Kcal per 100g of product. The sensory panellist rated the products as very good to excellent.

The experiment was envisaged with an objective of extension of shelf life of fish keema under refrigerated (4±2°C) storage. The fish keema was packaged in laminated pouches and gases flushed in concentration of 10% O_2, 20% CO_2 and 70% N_2 and compared with control aerobically packaged in low density polyethylene pouches stored in refrigerator (4±2°C) for 15 days. The evaluation of the storage stability showed that the fish keema aerobically packaged started off smell on 9th day onward whereas MAP samples were stable on 15th day of storage.

Buffalo Mozarella Cheese

The processing parameters and methodology was standardized in the laboratory using Microbial rennet

TN @ 1ml/l as well as chemical rennet @ 0.2ml/l of milk. The product yield was around 15.83%.

7. Teaching Veterinary Clinical Complex

Development of Rapid Diagnostic Protocols and Therapeutic Management of Digestive Disorders in Dairy Animals

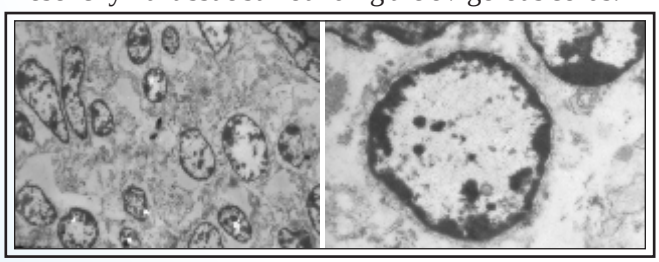
On retrospective analysis of all the cases of cattle and buffaloes presented at the university veterinary hospital during the year 2009, a significant proportion was found suffering from gastrointestinal disorders. As diagnostic indicators, higher TLC counts were observed in peritonitis, omasal impaction, reticular abscess, intestinal obstruction and traumatic pericarditis. Marked left shift was seen in abomasal ulceration, peritonitis and traumatic pericarditis. Total protein concentration was elevated in cases of reticular abscess and traumatic pericarditis. Peritoneal fluid examination was very useful for diagnosis of peritonitis. Therapeutic management with different antibiotic combinations and fluid therapy along with supportive therapy resulted in recovery in more than 50% cases.

8. Veterinary Anatomy

Studies on Prenatal Development of Different Organs in Buffalo

Ovary

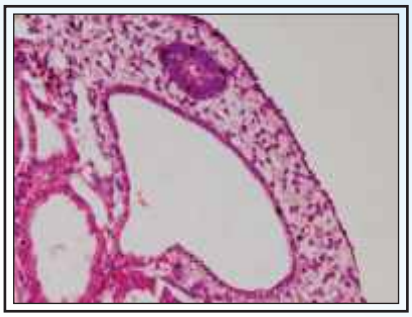
The undifferentiated ovarian cells were visible at 118 days of foetal age. The aggregates of undifferentiated primordial follicles were first observed at 129 days. Fully developed oogonia were observed in the antral follicle of 267 days foetuses. A strong PAS reaction was observed in the basement membrane and mesenchymal tissue surrounding the ovigerous cords.



TEM of ovary at 10 cm CVRL TEM of ovary at 26 cm CVRL

Mullerian duct

The formation and differentiation of the Mullerian duct were studied in 12 buffalo fetuses of 31 to 235 days. The genital ridge was first observed at 31 days. At 42 days, genital ridge differentiated into Mullerian duct and Wolffian ducts. At 51 days, thickening of Mullerian duct and regression of wolffian duct was observed. Folding of the oviductal mucosa started at 130 days and continued till 235 days. The cellular differentiation of the oviductal mucosa into ciliated and secretory cells occurred at 156 days.



Mullerian and Wolffian ducts in undifferentiated gonads

Vertebral Column

The differentiation of vertebrae started approximately at 38 days of foetal age. The intervertebral discs were evident at 42 days. The discs were thicker in the lumbar region than the cervical and thoracic regions. Thirteen pairs of cartilaginous ribs were clearly visible at 44 days. The length of the cervical region decreased and that of lumbar region increased with advancement of foetal age.

Liver

The developing liver of buffalo foetus at 46 days was surrounded by single layered connective tissue capsule. The initial hepatic lobulation was observed at 136 days. The developing portal triad area was observed at 132 days. The kupffer cells appeared at initial stages of gestation. The gall bladder was observed as an enclosed pouch at 64 days and was fully differentiated at 197 days of foetal life.

Electron Microscopic Studies

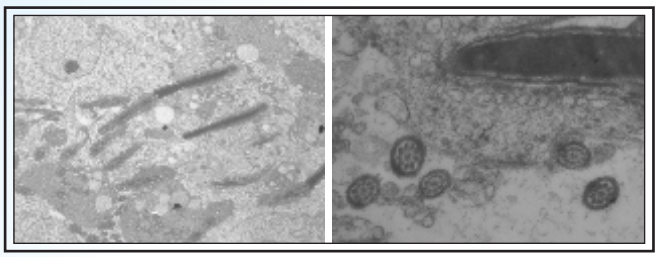
Oviduct of Hen

The histomorphochemical and electron microscopic studies on the different parts of oviduct of hen revealed that the cranial part of infundibulum was highly folded. The lining epithelium was simple columnar with ciliated and non-ciliated cells. The electron microscopic study revealed electron dense secretion granules in the proprial glands of the magnum and isthmus, whereas proprial glands of the uterus contained electron light granules. Histochemically a moderate to strong PAS and AB-PAS reaction was observed in different parts of oviduct for neutral and acid mucopolysaccharides. The micrometrical studies showed that the length and number of mucosal folds was maximum in the cranial part of infundibulum.

Spermatogenesis in Ram

Different stages of spermatogenesis were investigated using transmission electron microscopy in

six testes collected from adult rams. Different stages of spermatogenesis resulted in formation of spermatozoa from spermatogonial cell. Spermatogonial cells were lying on the basement membrane of seminiferous tubule, which divided mitotically and meiotically to form spermatocytes and spermatids. Spermatids were found studded on the luminal surface of Sertoli cells. Spermatozoa with typical nine plus two arrangement of tail were observed in the lumen.

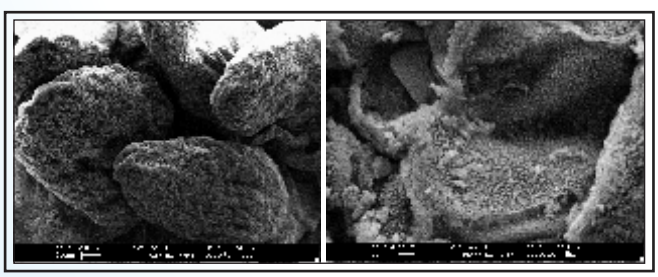


Ultrastructure of Ram Testis

Ultrastructure of Sperm Head and cross section of tail (RAM)

Ruminal Papillae in Goat

Scanning electron microscopic (SEM) study on ruminal papillae of six adult goats revealed that the entire ruminal mucosal surface was expanded by numerous papillae of varied shape and sizes. These papillae varied from short tongue like to large flattened foliate structures. These papillae were heavily grooved over the entire surface giving an eroded appearance to the ruminal mucosa. The ruminal surface was covered with horny cells which showed granulose appearance of cells due to presence of cytoplasmic protrusions.



SEM of Ruminal papillae

SEM of surface of a ruminal papilla

Histological and Histochemical Studies on Guttural Pouch

The guttural pouch of equine fetuses was lined by pseudostratified columnar epithelium with columnar cells, few ciliated cells, basal cells and a few goblet cells. The subepithelial layer consisted of loose connective tissue having collagen fibres, some smooth muscles and elastic fibres. Sero-mucous glands and lymphatic nodules were observed in the lamina propria. Histochemical study revealed a moderate to strong reaction of neutral and acid mucopolysaccharides in epithelial cells, goblet cells and seromucus glands.

Expression of TNFα in Buffaloes Infected with Pasteurella multocida

The expression of Tumor Necrosis Factor alpha (TNF a) was compared in lungs of normal water buffalo and that infected with *P. multocida*. Normally, lungs showed moderate expression of TNFa that increased markedly during inflammation. The strong expression was limited to the alveolar septa, airway epithelium and vascular endothelium in inflamed lungs.

Immunohistochemical staining of inflamed buffalo lung showing expression of TNFα (arrows) in the macrophages.

9. Veterinary Gynaecology and Obstetrics

- Use of hormones (GnRH, PGF2a and progesterone) was found 100% successful for inducing estrus in anestrous buffaloes, but satisfactory fertility was achieved only when progesterone releasing intra-vaginal device was inserted along with PGF2a and GnRH administration.
- Progestagens along with Ovsynch protocols (GnRH- PGF2a- GnRH) were found very much effective in alleviating repeat breeding due to hormonal imbalance and resulted in conception rates of up to 62%.
- Sperm membrane-, epididymal tissue- and luminal fluid-proteins were characterized by SDS-PAGE and dogs were immunized with sperm membrane extracted proteins to detect antigenic proteins in sperm membrane extracts (SME). The proteins with

mol wt of 173, 116, 94, 80, 55, 46, 40, 36, 28, 23, 17 kDa were detected.

- Monensin – an ionophore being used in cows for improving lactation and reproduction was supplemented to buffalo heifers for hastening onset of puberty. Monensin @150mg/day/animal induced ovarian cyclicity in 62% of the supplemented buffalo heifers.
- GnRH and hCG administration as antiluteolytic strategies on 5th day or on 12th day after breeding were found to improve first service conception rate in buffaloes to 71% with GnRH and 47% with hCG as compared to 29% in control group.

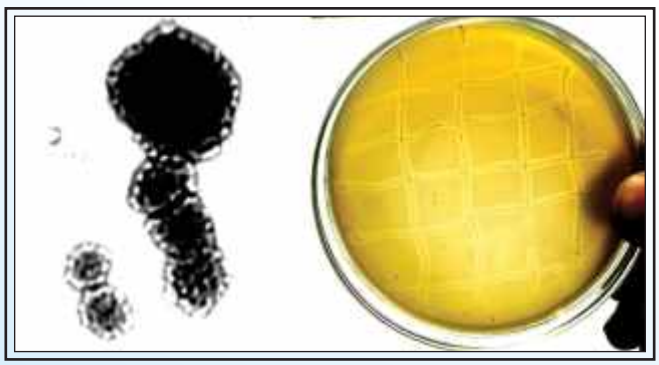
10. Veterinary Microbiology

Identification of the Target Molecule on B Cells which Binds Infectious Bursal Disease (IBD) Virus

Simultaneous expression of CD3 and IBDV binding on T lymphocytes was observed for the first time on activated T cells. The findings in multiple approaches involving LPS, IFN?, TGFß and anti-MHC II suggested the strong possibility of MHC II molecule as the putative target for IBDV on chicken B cells. Protein docking of amino acid sequences of the IBD Virus VP2 and chicken MHC II molecules showed a good fit indicating a possible receptor – ligand type relationship.

Evaluation of Therapeutic Potential of Bacteriophages

A total of six phages against *Salmonella dublin* were isolated using agar overlay technique. Upon physical characterization, it was found that the phages could survive at varied pH conditions with reduction in its numbers. A temperature of more than 50°C and direct sunlight beyond 5 days was found deleterious for survival of phages. Further, electron microscopy and biochemical characterization of phages isolated against locally prevalent *Brucella* organisms was also done.



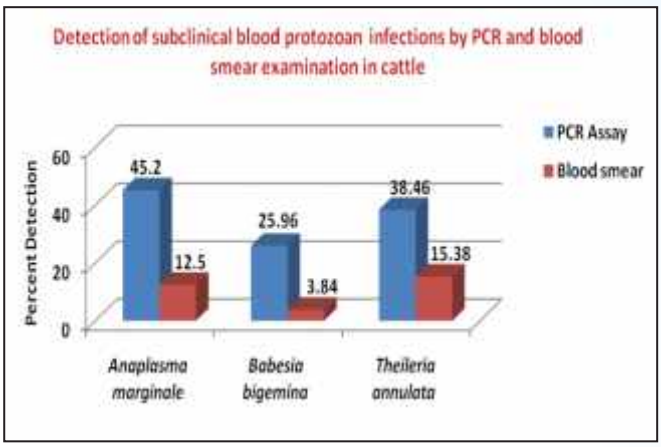
Electron micrograph of a Brucellaphage

Phage mediated lysis of *Salmonella* organisms

11. Veterinary Parasitology

Standardization of PCR Assays for Detection of Subclinical Blood Protozoan Infections in Cattle

The PCR based assay were standardized for the detection of *Anaplasma marginale*, *Babesia bigemina*, *Theileria annulata* and *Trypanosoma evansi* infections in blood of apparently healthy carrier animals. The use of PCR resulted in significantly higher efficacy of detection of blood protozoan infections as compared to microscopic examination of blood smears. The results clearly demonstrate that blood protozoan infections are common and endemic in the state of Punjab and that PCR is the optimal approach for their detection even at subclinical stage.



Studies on Cryptosporidiosis in Neonatal Calves in Peri-Urban Dairies of Ludhiana

The fecal examination from 306 diarrheic neonatal dairy cattle and buffalo calves in peri-urban surroundings of Ludhiana revealed an overall 38.56% prevalence of cryptosporidiosis without any significant species difference. A gradual decline in the prevalence values was seen with increase in the age, highest in 0-30 day's age group (65%), and lowest in 4-5 months age group (12.50%). The highest prevalence (43.51%) of infection was recorded during the monsoon season and the lowest (32.18%) in the post monsoon season. Female calves showed higher prevalence (42.18%) than the male calves (30.52%). The saturated sugar solution floatation staining techniques gave the highest sensitivity of 83.92% as compare to 68.12% for direct fecal smear examination in detection of cryptosporidiosis.

Epidemiology of Gastro-Intestinal Parasites in Naturally Infected Dairy Animals

More than 3500 faecal samples were collected and examined for presence of GI parasites from cattle and

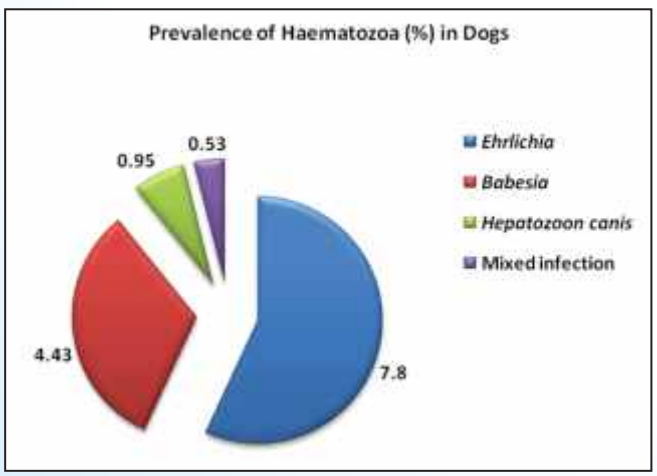
buffaloes (both adult and calves) throughout Punjab. The overall prevalence of GI parasitic infections was found to be 39% in adults and 71% in calves. The *Strongyles* (22%) constituted the predominant parasitic infestations in adult animals where as *Eimeria* (53%) was the main parasite in calves. *Toxocara vitulorum* (7%) was recorded from calves only of less than six months age.

Prevalence of Theileria annulata Infection in Hyalomma Ticks in Punjab

The study was conducted to assess the prevalence of theileria infection in tick vectors collected from healthy animals to record the natural infection level of theileria parasite in the field condition. A total of 156 male and 110 semi-engorged female of hyalomma ticks were collected and examined from cattle and buffaloes. The ticks collected from cattle had a higher prevalence, abundance and intensity (15.15%, 5.38% and 35.53%, respectively) of *T. annulata* infection than the ticks collected from buffaloes (9.58%, 1.74% and 18.13%, respectively). The prevalence of infection was almost two times in female ticks than male ticks. Hot and dry climate of Western semi arid zone of Punjab favoured the development of *T. annulata* sporozoites in ticks.

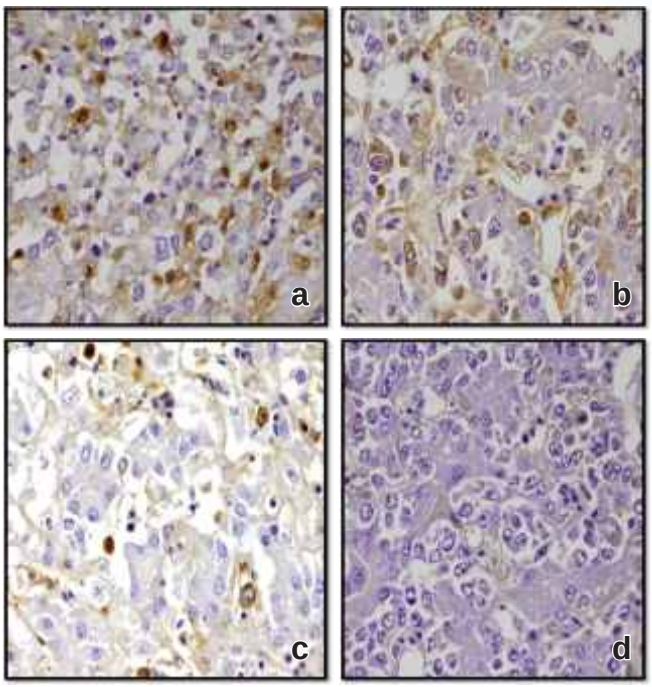
Prevalence of Haematozoa in Dogs

Ehrlichia (*E. canis* and granulocytic *Ehrlichia* spp.) was found the most prevalent haematozoa in dogs. The *Babesia* spp. seen was *Babesia gibsoni* (3.17%), *B. canis* (1.26 %). Anemia, thrombocytopenia and hyper gammaglobulinemia were most common findings in all infections.



12. Veterinary Pathology

- Immunohistochemical techniques were developed to localize viral antigens in tissue sections using specific polyclonal antisera for differential diagnosis of various neoplasms caused by avian oncogenic viruses. Technique could detect mixed infection of Mareks disease virus (MDV), reticuloendotheliosis virus (REV) and avian leucosis virus (ALV) in 16% (4/25) samples; MDV and REV in 12% (3/25), MDV and ALV in 20% (5/25) samples, and REV and ALV in 4% (1/25) samples. Eleven samples were found to be infected singly with oncogenic viruses including six cases of MDV alone (24%), one case of ALV alone (4%) and four cases of REV alone (16%). Thus, immunohistochemical study indicated the high prevalence of mixed infection (52%) than the single infection of MD (24%), RE (16%) and LL (4%).



Immunohistochemical localization of (a) MDV, (b) REV and (c) ALV in the neoplastic cells of liver of adult laying birds. (d) Negative control

- Different techniques were standardized for ante-mortem diagnosis of rabies. Real time PCR was found the most sensitive molecular approach for ante-mortem detection of rabies in skin samples. The sensitivity of other ante-mortem techniques i.e. fluorescent antibody test for corneal impression smears, salivary smears and immunohistochemistry of skin biopsy in comparison with FAT of brain impression smears was found to be 42.86%, 28.57% and 28.57%, respectively. The Sensitivity of different diagnostic techniques i.e. histopathology, immunohistochemistry of brain and immunohistochemistry of skin samples was found to be 84.21%, 94.74% and 35.71%, respectively. The significant finding of the study was establishment of the most feasible approach for

mass epidemiological survey of rabies with molecular detection of rabies in hair follicles of suspected animals.

- Immunohistochemistry work relating to diagnostic and prognostic aspects of canine mammary neoplasia revealed that the diagnostic accuracy of cytology in diagnosing canine mammary tumours was 74.47%, with a sensitivity of 97.22%. Out of different factors used to assess prognosis of animals suffering from canine mammary tumors, presence of inflammation, microcalcification and Her 2/neu in conjunction with EGFR were responsible for poor survival.
- In a study conducted on various fish farms during the period from July 2009 to March 2010, the overall prevalence of skin affections in fish was found to be 27.61 %. *Aeromonas* spp. followed by *Vibrio* spp. was found to be predominant isolates. The drug sensitivity testing revealed chloramphenicol as drug of choice. *Argulus* spp. was the most frequently observed ectoparasite in ornamental fish. While *Saprolegnia* spp. was the most common isolated fungi in superficial saprophytic mycoses of fish.

13. Veterinary Pharmacology and Toxicology

Oral Sub-Chronic Toxicity Study on the Interaction of Fluoride and Fipronil in Buffalo Calves

Chronic oral toxicity of fipronil and sodium fluoride following repeated oral administration at the dose rate of 0.5 mg/kg/day and 6.67 mg/kg/day, respectively for 98 days resulted into toxic signs of salivation, lacrimal discharge, dullness, depression, decrease body weight gain, muscle weakness, alopecia and sunken eyes. Some of the buffalo calves showed brown and black discoloration of teeth. Intensity of clinical signs was severe in buffalo calves exposed to both fipronil and fluoride in comparison to animals receiving fipronil or fluoride treatment alone. Some of the buffalo calves exhibited clinical signs even after withdrawal of treatment. Combined exposure to fipronil and fluoride increased the toxic effects of fluoride particularly on oxidative stress with significant elevation in the levels of whole blood cholinesterase, lactate dehydrogenase, gamma-glutamyl transferase, alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, acid phosphatase, creatine kinase, total plasma proteins, blood urea nitrogen and plasma creatinine, lipid peroxidation and superoxide dismutase and significant decrease in the levels of blood glucose, calcium, cholesterol, blood glutathione, catalase and glutathione peroxidase.

Disposition Kinetics and Bioavailability of Ceftazidime

Plasma ceftazidime disposition was best fitted by a bi-compartmental and mono-compartmental open model with first order elimination after intravenous and extravascular dosing, respectively. After IV administration, distribution was rapid with an area under the serum concentration: time curve of 253.9 ±7.81µg.ml-1.h and a volume of distribution of 0.18±0.01 L.kg-1. Elimination was rapid with a body clearance of 39.5±1.15 ml.kg-1.h-1. and a half life of 3.42±0.21 h. Peak serum concentration and bioavailability were 45.8±2.65 µg.ml-1 and 81.7±5.87%, respectively, after IM administration and 24.1±0.26 µg.ml-1 and 55.0±0.72%, respectively, after SC administration. Urinary excretion of ceftazidime was less than 55% after 36 h of administration of drug. The *in vitro* plasma protein binding of ceftazidime in healthy animals was 13.1±1.07%.

Sub-Chronic Toxicity Effects of Carbendazim Treatment in Male Goats

Carbendazim treatment (50 mg/kg body weight/day for 90 consecutive days) significantly decreased the activity of antioxidant enzymes viz. glutathione peroxidise and catalase, and increased the superoxide dismutase and glutathione-S-transferase activity. The blood concentration of aspartate aminotransferase, alanine aminotransferase, lactate dehydrogenase, gamma-glutamyl transferase, creatinine and albumin was increased whereas alkaline phosphatase and glucose levels were decreased. Treatment with carbendazim induced a mild stress leucogram with decrease in total leucocytes and neutrophils and increase in lymphocyte counts. Histologically, testes of intoxicated goats showed degenerative changes with sloughing of germinal epithelium of seminiferous tubules and pyknosis in leydig cells. There was a complete disorganization of spermatogenic cell rows and vacuolization in seminiferous tubules. Sub-chronic exposure of carbendazim in male goats decreased the testosterone levels, altered the antioxidant status and caused mild liver and kidney dysfunctions.

14. Veterinary Physiology

Improving Reproductive Performance of Summer Stressed Goats by Antioxidant Supplementation

The investigations were made on Beetle goats to study the effects of antioxidant supplementation on conception rate and blood biochemical constituents during heat stress. The animals were supplemented with vitamin C, vitamin E and selenium separately or in

combination. Antioxidant supplementation successfully improved the conception rates from 75% in control (no supplemented) to 83.33% and 100% in vitamin E-Se supplemented group and vitamin C supplemented groups, respectively. The antioxidant status and normal physiological status of goats improved close to pre-summer levels by the antioxidant supplementation.

Physical and Biochemical Characteristics of Cervico Vaginal Mucus vis-a-vis Conception in Murrah Buffaloes

The investigations were made on Murrah buffaloes to study the physical characteristics of cervico-vaginal mucus (CVM) and biochemical constituents of CVM and blood plasma at the time of carrying AI in relation to conception. Correlation analysis revealed significant correlations among various parameters of plasma and CVM during estrus; conception in buffaloes is related not only to systemic levels of ovarian steroids but also their levels in CVM. It was concluded that simple physical and biochemical characteristics of CVM like pH, spinnbarkeit, viscosity and CVM chloride can be used as important indicators for prediction of conception in Murrah buffaloes.

Physiopathology of Induced Endotoxemia in Buffalo Calves

Physiopathology of induced endotoxemia was studied in buffalo calves. Based upon various physiological/pathological parameters it was observed that the treatment with hypertonic saline solution, flunixin meglumine, dextran – 40 and blood was relatively more effective in terms of improving the survival time of the calves after induction of endotoxemia.

15. Veterinary Public Health

Seroprevalence of Human Brucellosis among Occupational Risk Groups

A total of 167 individuals with or without pyrexia of unknown origin (PUO) and suspected cases referred by physicians from various districts of Punjab were tested. Rose Bengal Plate Test (RBPT) revealed 22.75% sero-prevalence. Positive diagnosis was established in 31 (18.56%) individuals.

Studies on Toxic and Heavy Metals in Milk and Water in Punjab

Two hundred fifty one milk samples from various dairy farms/ districts of Punjab were analyzed for toxic and heavy metals. Mean levels for toxic and heavy metals in milk of Punjab were 12.22, 58.51, 755.45 and 1204.8 ppb for arsenic, cadmium, nickel and lead, respectively. The 0.39 and 4.78% samples were above maximum permissible limits as per PFA for arsenic and lead, respectively. Analysis of 250 water samples were collected from various dairy farms/ districts of Punjab revealed mean levels for arsenic, cadmium, nickel and lead as 2.55, 0.7, 5.7 and 20.19 ppb, respectively. The 0.48, 0.48 and 60.97% of samples were above maximum permissible limits as per WHO for arsenic, cadmium and lead, respectively. Levels for toxic and heavy metals were high in Ludhiana especially in industrial area and area around Buddha Nala.

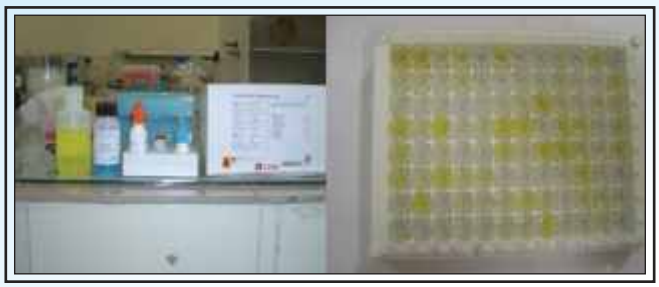
Microbiological Analysis of Food, Food Products and Water

During the year a total of 59 water samples were tested for their portability, out of these 12 samples were found unfit for human consumption. Also 02/43 samples comprising milk, milk products and product ingredients were also tested for was found contaminated with *Staphylococcus aureus*.

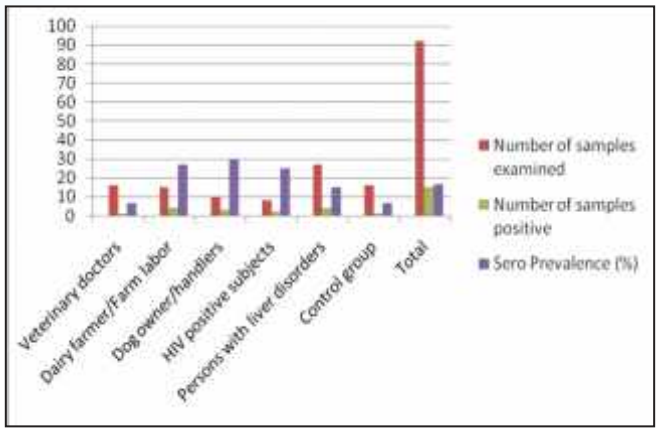
Hydatidosis in Human Beings

Echinococcosis is an important zoonotic disease causing hydatid cysts in food producing animals and man. Sero prevalence of human hydatidosis was determined on 92 patients with liver disorders, dog handlers, veterinarians, dairy farmers, HIV positives and control group visiting civil medical hospital, Ludhiana for other purposes. The IgG-ELISA for serum antibody detection was employed for detection of hydatid cysts. The 15 (16.30%) were positive for human hydatidosis. Highest prevalence was recorded in dog handlers (30%), followed by dairy farmers/farm labour (26.66%), HIV positive subjects (25%). The sero prevalence was highest in persons more than 60 years of age and no subject was found positive in less than 20 years age group. The results indicate emergence of human hydatidosis in north India.

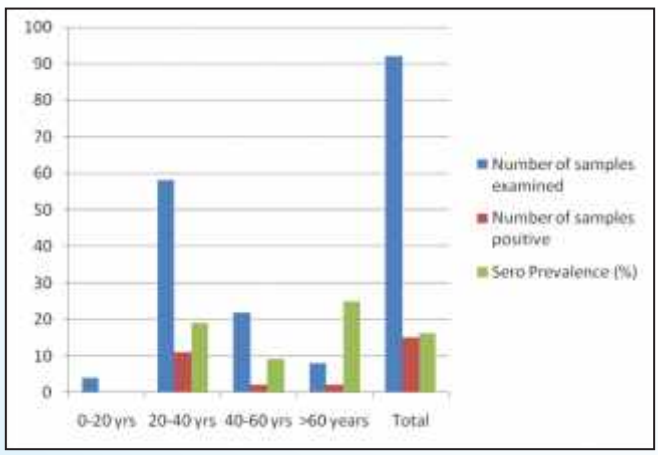
Hydatid cysts in liver of cattle



Detection of human hydatidosis using IgG ELISA a) IgG ELISA kit used for analysis of samples b) ELISA plate showing positive and negative samples



Seroprevalence of human hydatidosis in different occupational groups

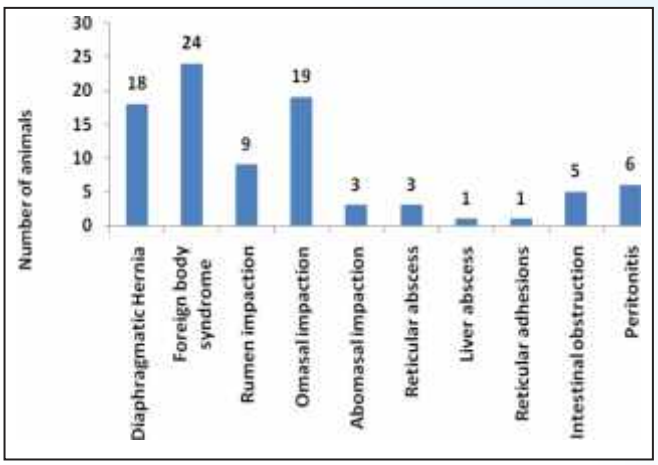


Age wise sero prevalence of human hydatidoses

16. Veterinary Surgery and Radiology

Diagnostic Aids and Surgical Treatment of Musculoskeletal and Abdominal Disorders in Large Animals

A total of 89 cases of abdominal disorders in dairy animals were presented and treated from April 2010 to December 2010. The distribution of cases is as under:

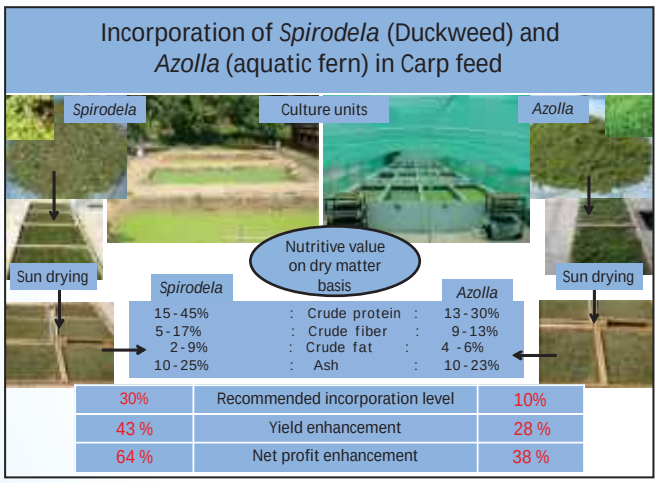


- Radiography and ultrasonography were found good diagnostic tools for diagnosis of abdominal disorders. The thickness of omasal wall on ultrasonography was found reliable indicator of omasal impaction. Reticular abscess could be diagnosed and drained under ultrasound guidance. Ultrasonography helped to identify hepatic congestion and hepatic cysts in bovine. Rounding and dilatation of vena cava along with hepatomegaly was always associated with traumatic pericarditis in cows and buffaloes.
- Blood biochemistry and hematology indicated the severity of the disease.
- In general surgical management of atresia ani resulted in good recovery
- Spinal anaesthetics were found to provide good muscle relaxation and adequate analgesia for long and short term.
- Interlock nailing technique was found very much encouraging for the repair of long bone fractures in bovines.
- Animals with contracted tendons showed good recovery when presented at early stage

College of Fisheries

1. Fish Nutrition

Efficacy of Duckweed (*Spirodela polyrrhiza*) incorporated diets in semi-intensive carp poly culture system was evaluated. Duckweed incorporated diets had no significant effect on water quality parameters, pond productivity and survival of Indian major carps (catla, rohu and mrigal) in a semi-intensive poly culture system. The results revealed that sun dried *Spirodela* can be incorporated in carp diet up to 40% inclusion level for formulating low cost quality diets for higher aquaculture productivity. Maximum yield was recorded @ 30% inclusion level (43.11% higher yield over control). At 30% *Spirodela* inclusion level, rohu registered maximum weight gain followed by mrigal and catla with 16.19%, 19.44% and 12.58% higher muscle protein content, respectively. All the fish species fed with *Spirodela* based diets reflected better condition factor. 30% *Spirodela* inclusion in carp diet resulted in lowest FCR (1.53) and 64.33% higher net profit over control.



Comparative efficacy of *Azolla* incorporated diets containing 10%(D1), 20% (D2), 30% (D3) and 40% (D4) sun dried *Azolla* evaluated in comparision to control diet D1 (rice bran and mustard cake -1:1). *Azolla* incorporated diets had no significant affect on water quality parameters, pond productivity and survival of Indian major carps (catla, rohu and mrigal) in a semi-intensive poly culture system. Among the different species maximum weight gain was recorded in rohu followed by catla and mrigal. Maximum fish yield was recorded with diet D2 followed by D3, D1 , D4 and D5. *Azolla* incorporation resulted in significant increase in muscle protein and moisture content and decline in carbohydrate and lipid content. Best FCR recorded with diet D2 (1.43) followed by D1 (1.53), D3 (1.56), D4 (1.71), D5 (1.86). Maximum net profit was recorded at 10% *Azolla* inclusion level (D2) which was 38.64% higher than the control diet.

Establishment of an Azolla Culture unit

Azolla culture unit was developed for harvesting 2 kg of fresh Azolla daily, at a nominal cost of Rs. 0.29 per kg, from a 16m^2 silpaulin sheet lined pits which is sufficient to supplement feeding in 1 cattle, 1 pig, 80 poultry birds or 50 kg fish daily.

Azolla inoculation

Azolla harvesting

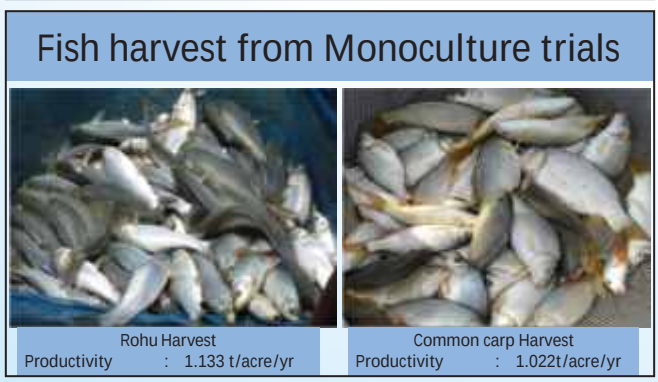
Harvested *Azolla* biomass

2. Utilization of Vermicompost as fish pond manure

Comparative efficacy of cow dung vermicompost (@10,000, 15,000 and 20,000 kg/ha/year) and raw cow dung (traditional manure used @ 20,000 kg/ha/year) as pond manure for semi-intensive carp culture evaluated with respect to water quality (temperature, pH, dissolved oxygen, total alkalinity, soluble phosphates, ammonical nitrogen) and pond productivity (zooplankton & fish production). The results revealed maximum yield in ponds manured with vermicompost @ 15,000 kg/ha/year and the water quality remained within the optimum levels for carp culture which indicates that vermicompost can be used for aquaculture productivity enhancement.

3. Inland saline water aquaculture

On-farm aquaculture trials were conducted in salt affected water logged areas in Fazilka, district Ferozepur to assess the possibilities of fresh water carp culture in inland saline waters. Average productivity of 2.43, 2.55 and 2.83 t/ha achieved through poly-culture of freshwater carps, common carp mono-culture and rohu mono-culture practices, respectively at salinities below 10 ppt. Catla recorded maximum weight (1850 g) followed by rohu (700-1450 g), common carp (150-500 g) and grass carp (100-260 g).



4. Fish breeding and seed production

Catfish breeding

- Captive breeding of Catfish, *Heteropnuestes fossilis* carried out successfully through induced breeding technique without scarifying the male.
- 2.5 – 4.0 cm fry reared in cemented cisterns in net house in 3 months.
- Overwintering of catfish fingerlings under poly house conditions carried out successfully and 9-10 cm fingerlings reared in 4 months.

Ornamental fish breeding

- Breeding and seed production techniques for ornamental live bearing fish - Platy (*Xiphophorus* spp.) standardized.

Platy Brooders

Platy Mother with the laid young ones

5. Value addition in Ornamental fish

Experiments were conducted for colour enhancement in gold fish for higher market price. Wild gold fish, *Carassius carassius* (brass coloured) was fed with pelleted diets containing dried marigold flower petals (natural colour enhancer) @ 1% (MG-1), 2% (MG-2) and 3% (MG-3). Maximum colour enhancement recorded in fish fed with diets containing dried marigold flower petals @ 2%. Control diet (without marigold) and was MG-1, MG-2 & MG-3 diets induced orange red colour development in about 25, 45, 65 & 55% of the fishes, respectively.

6. Waste water management through aquaculture

Livestock waste water recycling through duckweed based bio-remediation model developed for assessment of comparative potential of different duckweed species with respect to nutrient recovery/extraction and nutritive value of duckweed biomass yield thereof.

7. Post harvest processing & value addition in Carps

Meat recovery from different carp species like *Labeo rohita* (rohu), *Cirrhinus mrigala* (mrigal) and *Cyprinus carpio* (common carp) during post harvest processing was evaluated and was found to vary with species and size of fish. On average it was found that 40-45% of fish goes waste in the form head, viscera, fins, scales and skin during processing for meat recovery and about 40-45% is recovered as keema (spine less meat) after removal of spines and back bone from fish meat. However in case of common carp keema recovery was less than 40%. Species wise maximum wastage was recorded in common carp (48.7%) followed by mrigal (41%) and rohu (38.7%).

Inland Saline Water Aquaculture

GADVASU took over the challenge of utilizing inland salt affected/waterlogged zero earning waste lands in the south west districts of Punjab for economic gains through aquaculture. After intensive survey of the affected districts, salt affected waterlogged area in village Shajrana, Block Fazilka (District Ferozepur) was selected and successful aquaculture trials were conducted over a period of 3 years (2007-2010) under the project "Utilization of Inland Saline Water of South West Punjab for Aquaculture" funded by the Punjab State Farmers Commission, Mohali. The results revealed that freshwater carps like common carp, rohu and catla can be reared in inland saline waters if salinity is maintained below 10 ppt with an average productivity of 2.5 tonnes/ha/yr. Another breakthrough achieved was successful rearing of brood stock, breeding and seed production of common carp in inland saline water which is not only expected to be more salt tolerant being produced from saline water reared brood-stock but also to grow fast. The success achieved by GADVASU has not only motivated the villagers to take up fish farming in their salt affected waste lands but also earned them financial assistance for the same from the State Government. It will help in elevating the socio-economic status of the destitute rural population owning this land, who at present are left with no option but to do labour work to earn their livelihood. This breakthrough has also been lauded by the Indian Council of Agricultural Research, New Delhi and has awarded GADVASU with a 3 Crores Niche Area Excellence Project in Fisheries, which is third of its kind at National level. GADVASU has further geared up to take up research for developing complete package for inland saline water aquaculture. Additional infrastructural facilities have been created at Village Shajrana, Fazilka and new management practices and species will be tested to identify high productivity inland saline water aquaculture models for south west districts of the state.

On-farm inland saline water aquaculture trials

College of Dairy Science and Technology

Economics of cost of milk production and its regular monitoring in Punjab

At present, the procurement price of milk is determined arbitrarily without considering costing for inputs to milk production. The realistic cost estimates of milk production are required to be made on the basis of study of comprehensive milk production system through survey of dairy farmers. In order to estimate realistic cost of milk production, Punjab Dairy Development Board (PDDB) sanctioned a project to College of Dairy Science & Technology, GADVASU for working out economics of milk production with following objectives:

i) To study the investment pattern on various dairy inputs by different size categories of dairy farms.

ii) To estimate the region, breed, season and production group-wise cost of milk production.

iii) To estimate the net return from milk production and to suggest measures to enhance profitability.

To achieve the above objectives study was planned area specifically. The Punjab state is divided into three homogeneous agro-climatic regions on the basis of interaction of several factors such as cropping pattern, soil type, water table, underground water quality, rainfall etc. A list of all the districts falling in each zone was prepared separately and 4 districts (One from I & III zone each and two from II zone) were selected.

a) Zone I :- Sub-mountainous zone (92 dairy units)

b) Zone II:- Central zone (162 dairy units)

c) Zone III :- South-western zone (104 dairy units)

A comprehensive schedule has been developed to obtain information on inventory of sample dairy households including investment on animals/dairy sheds, equipments, land holdings, area under fodder crops, education of the farmer, and commercial or mixed dairying. Further information on input and output items related to milk production of cows and buffaloes are being collected from selected dairy farmers at monthly intervals. Cost of milk production has been calculated for Ludhiana and Sangrur districts during winter season (October-March, 2010) and Project report for winter season (October to March, 2010) was submitted to P.D.D.B., Chandigarh. The results revealed that for small farmers (upto 5 animals), dairy farming was not a profit making proposition as they suffered a loss of Rs. 1.0 to 2.0 per day per litre. Small dairy farmers were using their family labour in dairy farm management even then these farmers failed to generate profit due to high cost of inputs and poor quality of milch animals. Data collection has completed in Ludhiana & Sangrur (Central zone), Hoshiarpur (Sub-mountain zone) and Muktsar (South-western zone) districts. The preparation of report for summer season (April- September, 2010) is also under process.

Milk Processing and Manufacture of Value Added Dairy Products under RKVY scheme

Under this scheme college has taken up the research work on new dairy products development. Trials were conducted to optimize the processing parameters for whey based mango drink and Jaljeera drink. Initial trials were successfully completed, detailed study is under progress. Under the same research scheme, research trials are in progress to develop a new functional ice cream.

Experimental Dairy Plant

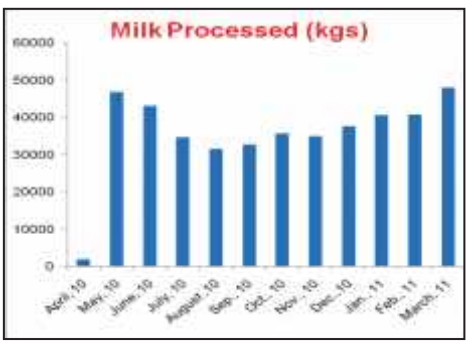
Experimental dairy plant is one of the excellent features of the infrastructure created in the College of Dairy Science & Technology. The main objectives of the experimental dairy plant is to provide best infrastructure for the practical and hands-on training of B. Tech (Dairy Technology) students and to undertake R&D work by the scientists for scaling up of the laboratory concepts of newly developed technologies to the pilot/ semi-commercial scale. Experimental Dairy Plant is having the milk handling capacity of 5000 LPD into a diverse range of dairy products.

Milk Processing in Progress

Campus distribution of processed & packed milk

Activities of Experimental Dairy Plant

Milk processing, packaging and distribution responsibilities were taken over by the College of Dairy Science & Technology w.e.f. 1st May 2010. During the period of 1st April 2010 to 31st March 2011, total 4,28,270 kg of milk was received from the university dairy farm. Out of the total milk received about 98 percent (4,18,938 Kg) were pasteurized, packed and supplied to university employee in the form of liquid milk. Some quantities of milk were also used for products making viz. paneer, lassi, flavoured milk and ice cream etc. during practical classes.



Month wise breakup of milk processed at Experimental Dairy Plant

Facilities available in Experimental Dairy Plant

1. Bulk milk cooler and milk storage tank
2. Liquid milk processing and packaging section
3. Cream separation and standardization of milk unit
4. Butter manufacturing unit
5. Ghee manufacturing and packaging unit
6. Paneer and cheese manufacturing and packaging unit
7. Ice cream manufacturing packaging and storage unit
8. Can washing and sterilization unit
9. Product storage (walk in type cold room) unit
10. Steam generation (Boiler) unit
11. Refrigeration (Glycol based packed type) unit
12. Solar water heating system 3000 LPD

Milk Products Manufactured in Experimental Dairy Plant

1. Pasteurized milk
2. Flavoured Milk
3. Lassi
4. Cream
5. Butter
6. Ghee
7. Paneer and cheese
8. Ice cream
9. Milk cake and Kalakand

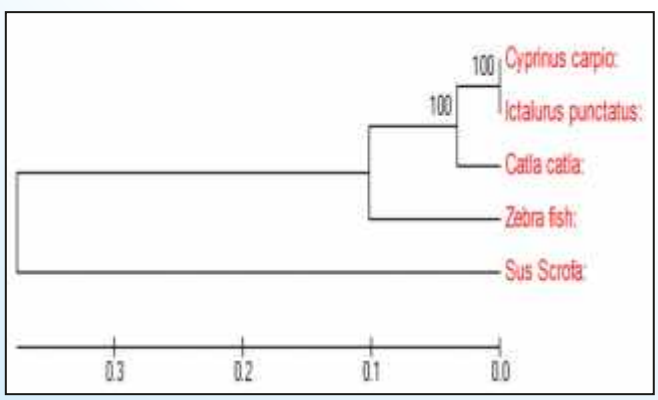
School of Animal Biotechnology

Molecular Characterization of Toll Like Receptors (TLRs – 2,3,4,9) in Indian Major Carp *Catla catla*

Catla catla TLR gene sequences were not available in the Genbank databases. Primers were designed on the basis of available DNA sequences of *Cyprinus carpio*, a close relative of Indian major carp *Catla catla*, by using Primer Express Software (ABI), for PCR amplification of TLR-2, 3, 4 and TLR-9 genes. The total RNA was isolated from the head, kidney, spleen and liver tissue samples by Trizol method and cDNA was prepared by revese transciptase (RT) enzyme. The newly designed primers could successfully amplify a TLR-2 gene fragment. The PCR amplified TLR-2 DNA fragments were gel purified and then cloned into pUCm-T cloning vector. The positive clones were selected and the presence of TLR-2 gene insert in the recombinant plasmids was confirmed by restriction endonuclease Eco RI and Bam HI digestion. The cloned TLR-2 gene fragment was then got sequenced commercially.

PCR amplification of *Catla catla* TLR-2 gene

RE release of TLR-2 gene fragments



Phylogenetic analysis of *Catla catla* on the basis of partial cds of TLR-2 gene

Sequenced data (1787 bp) obtained for the amplified TLR-2 gene fragment was submitted to Genbank and the accession no. GU980870 obtained. Phylogenetic analysis, based on the sequence of TLR-2 gene, revealed a close relationship with *Cyprinus carpio* and *Ictalurus punctatus* with a 93% sequence similarity.

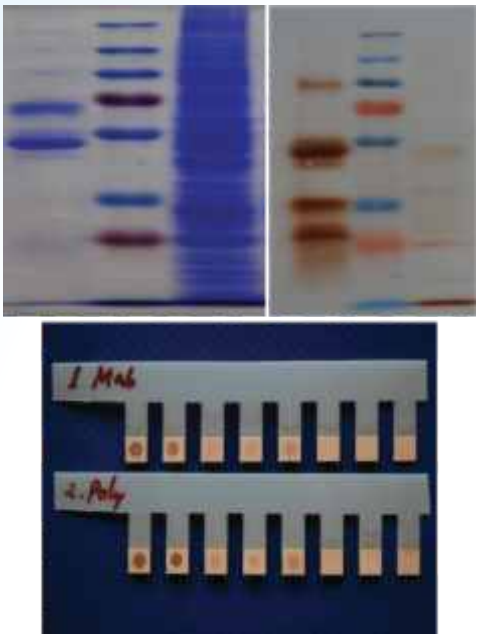
Development of a Novel Marker Vaccine for *Bovine Herpesvirus-1* (BHV-1) and a Companion Diagnostic Test

The BHV-1 gE gene (1729 bp) was successfully amplified by PCR with the newly designed primers using Pfu DNA polymerase from BHV-1 genomic DNA extracted from the cell culture passaged standard virus. The gel purified PCR product (gE gene) was directly cloned (Directional Cloning) into pcDNA 3.1 Mammalian Expression Vector (Invitrogen) and ampicillin resistant clones were grown in LB broth for plasmid purification. Endotoxin free plasmid was prepared. Optimization of transfection with gE recombinant plasmid was carried out in MDBK and BHK-21 cell lines. Cells were sub cultured for several times in presence of G418 to develop transformed MDBK and BHK-21 cell lines constitutively expressing recombinant BHV-1 gE protein. The reactivity of expressed recombinant gE was confirmed by immunoperoxidase test (IPT).

Expression of *Bovine Herpesvirus-1* (BHV-1) Glycoprotein C (Gc) by a Recombinant Baculovirus in Insect Cells

BHV-1 glycoprotein C is immune-dominant and is believed to play a role in initial viral attachment. Here a recombinant baculovirus was constructed by incorporating BHV-1 glycoprotein C (gC) coding gene to characterize the expression of the glycoprotein in infected *Spodoptera fugiperda* (Sf9) cells. The BHV-1 complete gC gene was PCR amplified with specially designed primers to clone into pENTR/SD/D Directional TOPO vector (entry clone). The purified entry clone plasmid was subjected to LR recombination with the linear baculovirus DNA which was then transfected into Sf-9 cells. The recombinant baculovirus carrying the gC coding gene (P1) was selected against gancyclovir in the Sf-9 cells, serially passaged for 2 more generation and the P3 (3rd passage) viral stock was used to infect fresh Sf-9 cells for gene expression study. The reactivity of polyclonal antibody with the Sf-9 cell expressed gC was detected by immunoperoxidase test (IPT).The recombinant gC protein was purified by Ni-

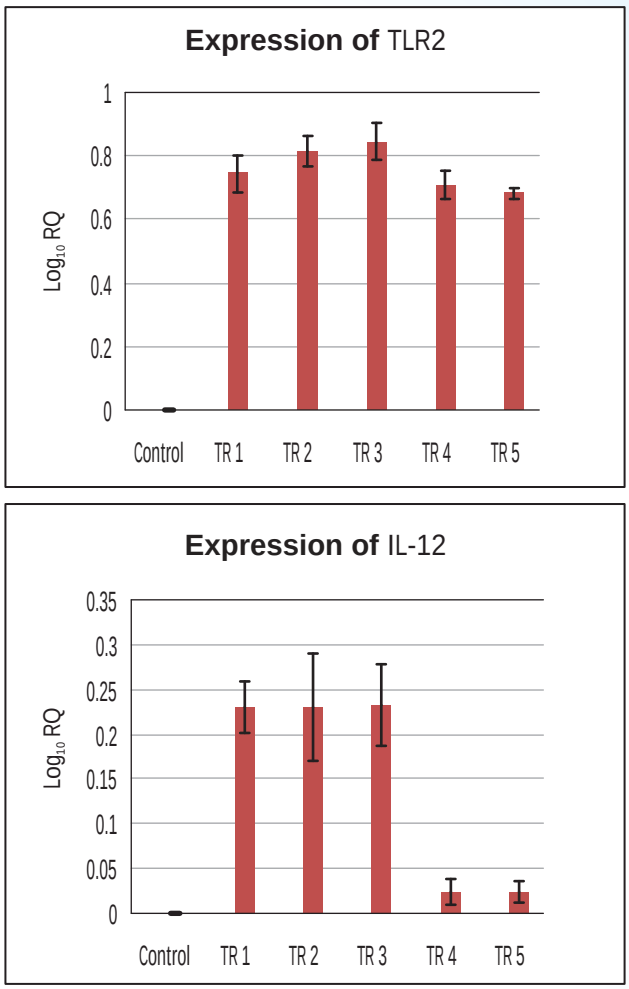
NTA column chromatography and immunoprecipitation and when subjected to SDS-PAGE and Western blot analysis protein bands of MW 54 kDa and 28 kDa were detected consistently with both monoclonal and polyclonal antibodies. Expression of gC gene in the infected Sf-9 cells was further confirmed by dot-ELISA indicating its potential use as a coating antigen in an indirect ELISA.



Characterization of Recombinant Glycoprotein C (gC) by SDS-PAGE, Western Blotting and ELISA

Functional Characterization of Toll Like Receptor 2 (TLR2) in Buffalo (*Bubalus bubalis*)

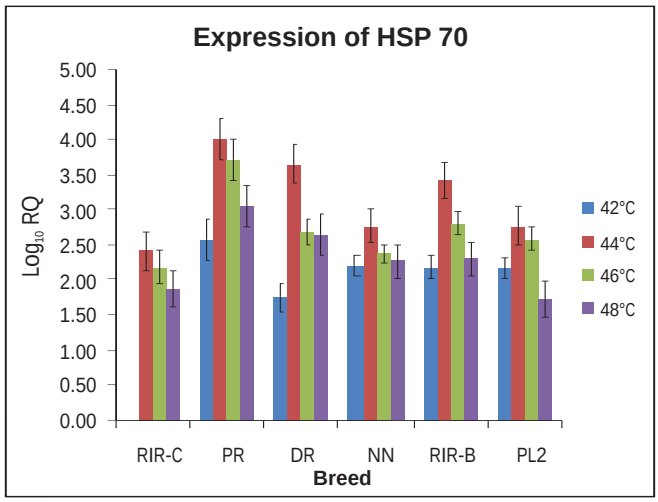
The study was conducted for functional characterization of TLR2 in 6 immuno-competent adult Murrah buffaloes. EST of the TLR2 gene of Murrah buffalo was cloned, sequenced, characterized and its signalling cascades were activated upon induction by sPGN to study the Th1 and Th2 type cytokine responses. The nucleotide as well as the deduced amino acid sequences of the TLR2 gene were analyzed for sequence homology, nucleotide/ amino acid substitutions and for construction of phylogenetic trees to study its evolutionary divergence or relatedness with different species viz., *Bos taurus, Bos indicus, Ovis aries, Boselaphus tragocamelus, Sus scrofa, Eqqus caballus, Canis lupus familiaris, Felis catus, Capra hircus* and *Gallus gallus*. When incubated for 12h, at higher concentrations of sPGN, the pattern of cytokine induction shifted towards the net Th1 type from Th2 type as was observed for 3h incubation periods. IL-12, IFN- ? and TNF-a were found to be more positively maintained than IL-4 and IL-10. The data obtained was analysed by RQ study software provided with the PCR instrument (7500 ABS) which uses the comparative CT method (2-ΔΔCT) of relative quantification to create gene expression plots. These plots show the expression level or fold difference (RQ values) of the target sample relative to the calibrator (control).



Cloning, Sequencing and Expression Profiling of Heat Shock Protein 70 Gene in Chickens

Chickens are very sensitive to high ambient temperatures as compared to other species as most of these birds have difficulties in dissipating heat. HSP70 proteins are the most abundant, ubiquitous and temperature sensitive of the all HSPs and its expression is suggested to be an indicator of acquired thermo-tolerance and in the induction of innate and adaptive immunity in both eukaryotic and prokaryotic cells. The present study was conducted to clone, sequence HSP70 gene and then to compare it with other species. The expression of HSP70 was also studied under normal growth condition and during different heat-stresses

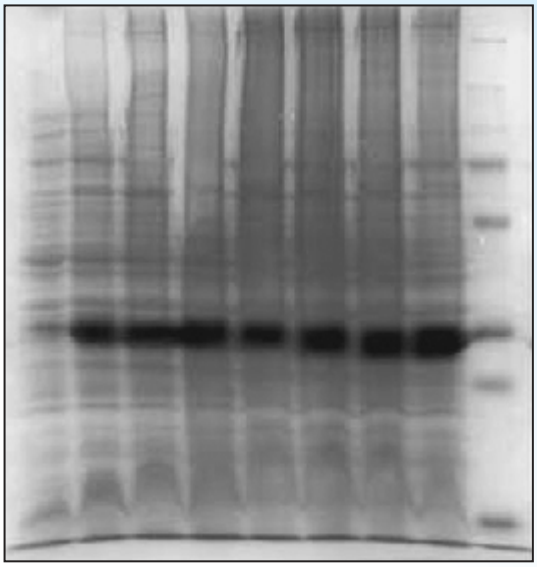
(42^{0}C-48^{0}C) for 30 min in different breeds of Indian chickens along with its relation with two of the most potent pro-inflammatory cytokines TNF-α, IL-1 using Real Time PCR. Total RNA was extracted from chicken leukocyte and cDNA was synthesized by reverse transcription. HSP70 gene was amplified from cDNA using specific primers, then cloned and sequenced. On its comparison, it was found to be very similar to that of other organisms suggesting that HSP70 are one of the highly conserved proteins. Further it was observed that the expression of HSP70 increased at 44°C which was much higher than at 42°C. However there was a gradual fall in their expression level at 46°C and it was least at 48°C. Breed wise, it was observed that RIR C was having the least expression of HSP70 while expression of HSP70 in PR was found to be the highest, even more than its parental breeds, RIR-B and Dahlem Red. It was also observed that high expression of HSP70 induces pro-inflammatory cytokines like TNF-α, IL 1.



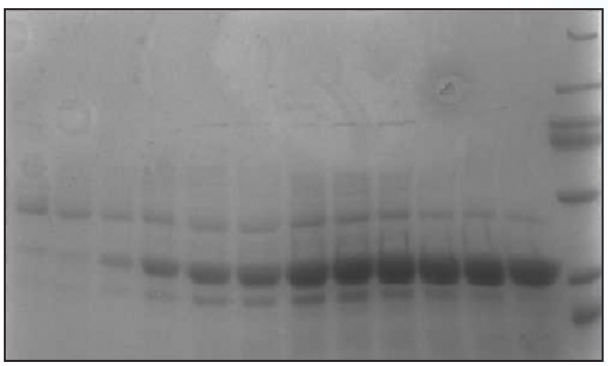
Cloning and Expression of Immunodominant Outer Membrane protein LIPL32 from *Leptospira interrogans*

PCR based on immunodominant outer membrane protein gene LipL32 and 16SrRNA gene for rapid diagnosis of leptospirosis from clinical samples has been developed. LipL32 complete ORF has been cloned and sequenced (NCBI - Accession No. HM026175).

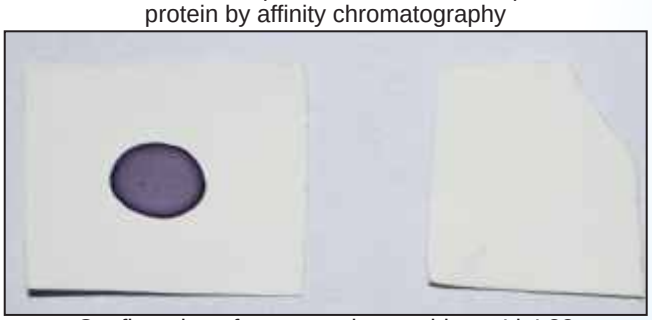
PCR for rapid diagnosis of Leptospira spp



Expression kinetics of recombinant LipL32 protein



Purification of expressed recombinant LipL32 protein by affinity chromatography



Confirmation of expressed recombinant LipL32 protein by DOT blotting

Confirmation of expressed recombinant LipL32 protein by western blotting

EXTENSION

The Directorate of Extension Education geared up extension activities through its wings like Farm Advisory Service, Training and Visit to villages. In order to transfer the new technologies evolved by the university, training courses were organized for the farmers, field veterinarians and scientists from other universities. Faculty published about 130 extension publications and delivered 32 TV talks and 24 radio talks.

Training programs

Name of the training program	Duration (days)	No. of trainings held	No. of participants
Specialized Dairy Farming Training Course	2 week	3	88
Specialized Pig Farming Training Course	1 week	1	22
Specialized Poultry Farming Training Course	2 week	1	18
Training on Balanced and Quality Feed Manufacturing	3 days	6	412
Training Course of Field Veterinarians	3 days	21	180
Training Course of Field Veterinarians	5 days	16	200
Training Course on Value Added Milk Products for Women Entrepreneurs	2 days	1	14
Workshop on Value Addition of Freshwater Fish	2 days	1	20
Training on Aquaculture Technologies for Higher Economic Returns	1 day	1	11
Training on Ornamental Fish Culture and Breeding	2 days	1	19
Training on *Azolla* Cultivation for Livestock Feed	1 day	1	70
Training on Farmers Training and Credit Delivery Program – Haryali Ganga	1 day	1	24
Training on Ornamental Fish Culture and Breeding	1 day	1	35
Training on Fish Farming for Farmers from Una (HP)	5 days	1	12

GLIMPSES OF TRAINING PROGRAMS

Three–day training program for Veterinary Officers organized by Department of Livestock Production Management on " Clean Milk Production"

Participants of Five days training program for field Veterinarians on "Professional efficiency development program on the requirement of meat and milk industry related to veterinary profession"

Two days training program for the women farmers/ entrepreneurs on the "Value Added Milk Products with a special emphasis on Mozzarella Cheese" under Rashtriya Krishi Vikas Yojna program

Specialized training courses for the farmers

Workshop on 'Value Addition of Freshwater Fish'

GLIMPSES OF TRAINING PROGRAMS

Training on “Aquaculture technologies for higher economic returns”

Training on Ornamental fish culture and breeding

Training program on “*Azolla* cultivation” for livestock feed to officers of Animal Husbandry (fodder section)

Five days training program on fish farming organized for fish farmers from Una district (H.P.)

Pashu Palan Melas

Guru Angad Dev Veterinary and Animal Sciences University organized Pashu Palan Mela at Ludhiana on March 18-19, 2010 & September 14-15, 2010. In these melas the departments of constituent Colleges of the University arranged exhibition stalls to show the new technologies/innovations developed for the farmers. On this occasion, other private and Government agencies involved in animal welfare work also displayed their exhibits much of the importance to the farmer community. A large number of farmers visited the melas and discussed their problems with the experts of the university. Extension literature on animal welfare in the form of folders was prepared for distribution among farmers at Pashu Palan Mela. The University also participated in the Kisan Melas at Regional Research Stations of PAU for the benefit of the Livestock farmers.

GLIMPSES OF PASHU PALAN MELAS

Animal welfare camps

The University organized 14 animal welfare camps in the rural areas of Punjab for the treatment of sick animals. In these camps the farmers and the field functionaries were advised/made aware of the recommended animal health practices.

Technical guidance

The faculty members delivered extension lectures to the farmers in collaboration with the other animal welfare agencies of the state like Department of Animal Husbandry, Dairy Development, Nestle India, Smith Klime Beecham, Punjab & Sind Bank and in the trainings organized by the Krishi Vigyan Kendras and department of Extension Education, PAU, Ludhiana. On these occasions, demonstrations regarding the collection, dispatch and transport of clinical material like blood, mucous discharge and faeces from the animals were carried out and farmers were made aware of correct method of milking, teat dip, heat detection, acaricide drug application, silage making and computation of ration.

Dairy show

The faculty of university actively participated in different events of 4th PDFA International Dairy Expo organized jointly by the GADVASU and PDFA in the month of February, 2011. The faculty provided technical support for holding and judging of various events in the dairy show.

Farmers Associations

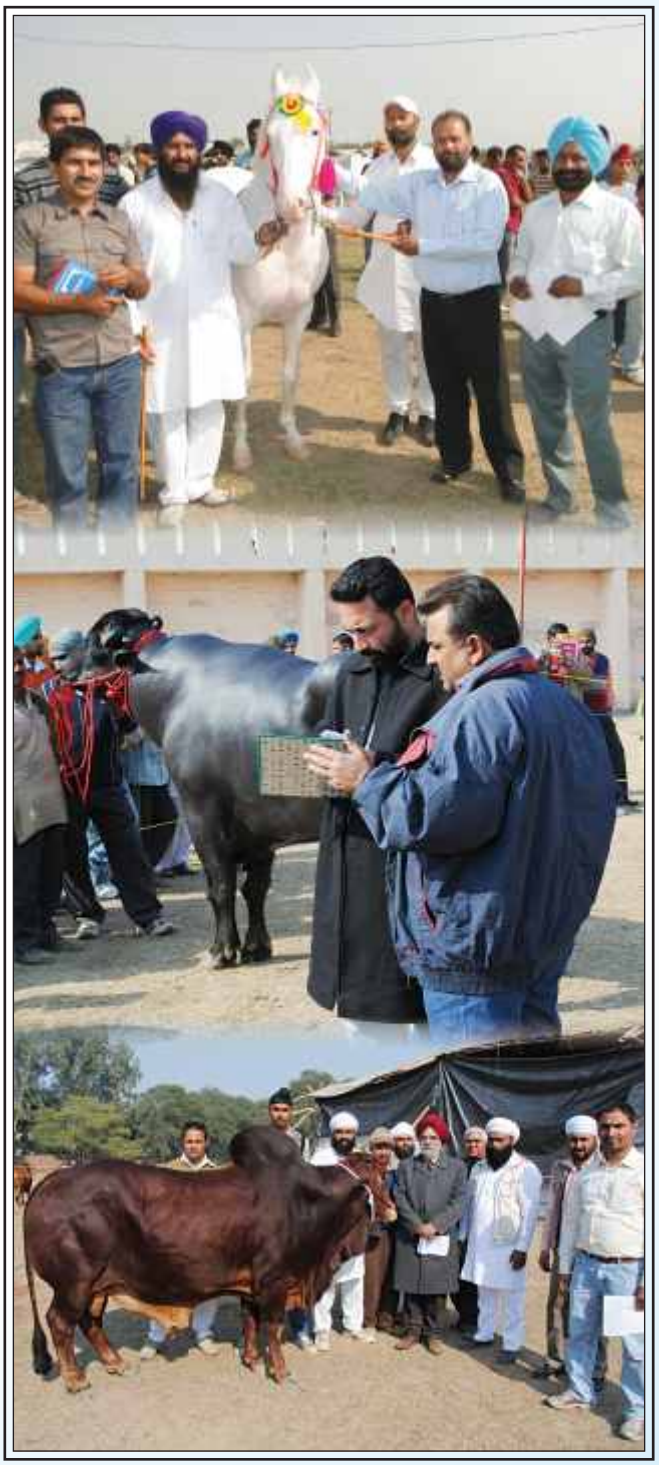
The University is engaged in regulating the activities of different associations viz. Progressive Dairy Farmers Association, Innovative Fish Farmers Association, Progressive Piggery Farmers Association, and Punjab Goat Farmers Association. The regular meetings/seminars of these associations are held at GADVASU under the technical guidance of university experts.

Farmers Advisory Services

The telephonic helpline in the department of Veterinary and Animal Husbandry Extension has been established for attending the queries of livestock owners regarding the animal health and management problems. The farmers have also been given technical advice during their visit to the University and their queries were answered through postal letters as well.

National and Zonal Livestock Shows

The faculty of the university participated and provided support in judging various events in the Livestock Championship Shows organized by Department of Animal Husbandry, Governemt of Punjab at Fatehgarh Sahib, Moga, Tarn Taran, Bathinda and Mukatsar..



Faculty of GADVASU participated in judging of various events in the Livestock Championship Shows

Animal Welfare Centre, Gureh

To bridge the knowledge gap regarding scientific rearing of animals and to develop it as a model livestock village, an animal welfare centre was established by the University at Village Gureh (District Ludhiana) for undertaking various welfare activities for its development. Team of experts is regularly visiting this animal welfare centre for the examination of the sick animals and provided on the spot diagnosis and treatment.

Animal Husbandry Officers Workshop

Animal Husbandry Officers Workshop was organized by GADVASU, Ludhiana on 20th January, 2011 which was inaugurated by Smt. Usha R Sharma, Secretary, Department of Animal Husbandry, Dairy Development and Fisheries, Punjab. About 250 officers from Animal Husbandry, Dairy Development and Fisheries participated in this workshop. Information on different aspects of animal husbandry was disseminated with the officers.

World Veterinary Day

The University organized World Veterinary Day on April 23, 2010 under the theme "One World, One Health: More Co-operation between Veterinarians and Physicians". Dr. K. Dua, Senior Scientist-cum-Head Department of Clinical Veterinary Medicine delivered a lecture on the topic "Role of Veterinary Medicine in One Health". On this occasion, free anti-rabies vaccination and deworming was given to the pet animals.

World Rabies Day

World Rabies Day celebrated in GADVASU on Sept. 27, 2010 to highlight the dreadfulness of this disease, its prevention and control. On this occasion, an anti-rabies vaccination and deworming camp was organized in the Teaching Veterinary Clinical Complex. A slide show regarding control and prevention of rabies for the benefit of pet owners was also organized.

Anti-rabies Vaccination and Deworming Camp

Utility Services

The following utility services are provided at a very nominal rate for livestock farmers.

Information services

Preparation as well as sale and distribution of the following university publications:

- A book on Package of Practices for Livestock Health Management
- Vigyanak Pashu Palan (Monthly Punjabi Magazine)
- Hand book on Infectious Animal Diseases
- Veterinary Punjabi Shabad Kosh
- Dairy Farming
- Goat Farming in Punjab (English & Punjabi)
- Fish Farming
- GADVASU Hand-book
- Vet Alumnus
- GADVASU News Letter
- Poultry Farming
- Pashu Palka de Ghareloo Totke

Technical services

- O.P.D. /Indoor services for sick animals.
- Surgical treatment of animals

- Blood/faeces/urine/mucous/milk testing
- Feed and fodder evaluation
- Testing of water sample of farmers ponds

Input services

- Mineral mixture.
- Uromin lick
- Semen : Cattle bull semen: Frozen semen doses- 40601, Liquid semen- 4422; Buffalo bull semen: Frozen semen doses- 31441, Liquid semen- 2119
- Breeding bulls/calves: Cattle- 6, Buffalo- 31
- Mastitis Kit
- Disease outbreaks
- Sale of carp seed and ornamental fish seed, table size fish
- Maintenance of Aquaria

Chartered services

- Animal Welfare Camps/days
- Expert lectures (on campus/field)
- Training programs for farmers, field functionaries (on campus/field)Tailor made courses (on campus/field)

Value Added Livestock Products

- Preparation and sale of various meat products including more than 250 kg of chicken products (patties, balls, nuggets, pickle etc.) and 40 kg goat products, 25 kg turkey products, 12 kg pork products and 16.25kg quail egg pickle under Revolving Fund Scheme
- Provided free facility for checking of adulteration in milk and milk products

Regional Research and Training Centre Kaljharani, Batinda

Training Programs

Name of the Training Program	Duration (days)	No. of Trainings held	No. of Participants
Dairy farmers training	10	01	20
Dairy farmers training	15	01	15

Animal Welfare Camps

Two Animal Welfare Camps were organized on Mar. 13, 2010 and May 7, 2010 in the surrounding areas of the centre in which treatment was given to the diseased animal and technical information was provided to farmers.

Pashu Palan/ Kisan Melas

The faculty participated in the Kisan Mela organized by the PAU, Ludhiana on Sept. 24, 2010 at Regional Reseach Station Bathinda and provided the technical information to the farmers.

Regional Livestock and Poultry Research and Training Centre, Bhatoli, Talwara

Pashu Palan Mela

Firstever Pashu Palan Mela was organized at Regional Research and Training Centre, Bhatoli, Talwara on April 9, 2010 to create awareness among the farmers. In this mela, demonstartions and exhibitions were organized and literature was distributed among the farmers.

Awareness Camps

Thirteen awareness camps were organized in the operational area of RRTC, Talwara. Impact of different interventions is being analyzed. Extension services are being provided to the farmers of the Kandi areas for livestock rearing, poultry farming and fish farming for economic uplifting of the rural youth. Farmers are being trained for making bamboo products in collaboration with NAIP.

Vice-Chancellor Dr. V.K. Taneja Inaugurating Pashu Palan Mela at Talwara

NATIONAL AGRICULTURAL INNOVATION PROJECT

Sustainable livestock based farming system for livelihood security in Hoshiarpur District of Punjab

i) Improvement in Animal Productivity and Enhancement in Family Income

Deliverables like mineral mixture, uromin licks, fodder blocks, animal dewormers, vaccines, etc. were made available to the beneficiary farmers of the NAIP Sub-Project for improving their family income through improved animal production.

	Mineral Mixture feeding	Uromin Lick feeding	Fodder blocks
No of households covered	566	241	54
No. of Animals covered	1210	300	220
Average Increase in milk yield per animal/ day (ltrs)	0.51 liter		
Increased Average income from sale of surplus milk per family per day	Rs 15/-		

Fodder seeds like Napier bajra, bajra, guinea grass, oats, rye grass, berseem, maize fodder etc. were also provided to the beneficiary farmers for increasing their fodder production. An additional area of 6.83 hectares was brought under cultivation.

ii) Improvement in Animal Health

All the goats of the beneficiary farmers of the operational area were dewormed with oxyclozanide against flat worms. A total of 796 dairy animals of 354 beneficiary farmers were dewormed against internal round worms with either albendazole or fenbendazole. 856 animals of 247 beneficiary farmers were vaccinated against FMD, HS and BQ diseases. There is no report of any incidence of these infectious diseases in the operational area of the project.

A total of 116 sick animals were provided requisite treatment through 14 NAIP welfare camps held in the operational area during the period under consideration. 14 adult animals were operated for string halt.

iii) Improvement in Animal Breed

Bucks of improved breed from Goat Farm of the University were distributed to the beneficiary farmers of the area for improving their goat germplasm.

iv) Improvement in Crop Productivity

Seeds of cereals (4685 Kg), pulses (592 Kg) and oil seed crops (134 Kg) and vegetables (300 kits) were distributed to the beneficiary farmers for improving their crop production.

v) Improvement in Area under Medicinal and Orchard Plants

Agro forestry plants (3781) like bamboo, tun, simbal, kachnar, dek, mehndi, sagwan ; medicinal plants (1125) like bhel, reetha, karonda, jamun, harrar, neem, amla, fig, bahera and orchards plants (2300) like kinnow, baramasi lemon, mango, galgal were provided to the beneficiary farmers.

vi) Demonstrations

Demonstrations of silage making in polythene bags, urea treatment of wheat straw (12 No.) were given.

vii) Guided Visit of Beneficiary Farmers/Women

Four guided visits (Total 102 beneficiary farmers) were conducted to the Pashu Palan/Kisan Melas during the period under consideration.

viii) Income Generation Activities

Income generation activities like rope-making, bee-keeping, stitching & embroidery, tie and dye of dupattas, candle making, vermicelli making, nugget & papad making etc. were demonstrated.

Twenty rope-making machines were distributed in eight villages. A total of 29 beneficiary farmers got benefit from these machines. These machines are easy to operate either with electric motor or manually. These machines helped the beneficiary farmers to generate additional income (On an average Rs 2000/-per month) by utilizing their free time. By operating these machines, the beneficiary farmers made 50-60 kg of superior quality rope per month (by utilizing their free time during morning or evening hours) from waste materials like lemon grass.

ix) Creation of Self Help Groups (SHGs)

Self Help Groups concerning dairy farming (Seven SHG having 94 farmers), goat farming (Five SHG having 46 farmers), pig farming (Two SHG having 20 farmers), poultry (One SHG with 8 farmers), bee-keeping (One SHG with 9 farmers), medicinal plant especially *Aloe vera* (One SHG with 7 farmers), mushroom cultivation (One SHG with 6 farmers), bamboo plantation (One SHG with 9 farmers), rope making (Six SHG having 29 farmers) have been created in the operational area.

x) Construction of Water Harvesting Structures

Construction of three types of water harvesting structures in the operational area is in progress.

xi) Visit of team from Project Implementation Unit (PIU) of National Agricultural Innovation Project (NAIP), New Delhi

Team headed by Dr Deepak Raj Rai, Head TFT, CIPHET, Ludhiana visited the project area on 10.2. 2011. Team inspected the work done under the project area. Team visited different blocks and check the demonstrations and developments. Team show the satisfaction about the progress made under the project.

Silage Making in Bag

Treatment of Sick Animal at NAIP Welfare Camp

NAIP Book released by worthy Vice Chancellor Dr V.K. Taneja

Ladies SHG at NAIP Stall

Income generation activity- Detergent prepration

NAIP Stall at Pashu Palan Mela

UNIVERSITY LIBRARY AND NETWORKING

The University Library having state-of-the-art infrastructure and ultra-modern facilities has been supporting the education and research goals of GADVASU through knowledge dissemination and knowledge application. The library is fully automated of its operations. It allows open access to its collections.

The library purchased 260 books on the different disciplines of Veterinary and Animal Sciences, Fisheries, Biotechnology, Dairy Sciences and other allied subjects worth Rs.2,50,000/-. The library subscribed to 35 foreign Journals and 13 Indian Journals at a subscription cost of about 23.92 lacs during 2010. Library also subscribed to two databases i. e. Veterinary Science Database and Indiastat.com. Library also subscribed to 13 newspapers and 7 magazines.

The library provides the facility of Online Public Access Catalogue (OPAC) not only inside the library but throughout the campus vide intranet. The library facilitates access to 2000+ e-journals in the broad spectrum of Agricultural Sciences including about 600 Journals in the disciplines of Veterinary Sciences, Animal Husbandry, Livestock Management & Poultry Sciences, Fisheries and Aquaculture, Dairy Technology, Biotechnology, Animal Nutrition, Feed, Feed Additives & Manufacture and allied subjects.

The library also provides CD server facility to its members. The CD storage –cum- network facility has helped to create mirror of CDs/DVDs which are stored centrally in the network inside the digital storage system and hence providing access to CDs/DVDs by multiple users simultaneously. This is also helping in storing the backup and other valuable data like lectures, references, journals, books etc. and the problem of discs lost, scratch and damaged gets eliminated.

The library is in the process of establishment of Integrated University Management System (IUMS). SRS of all the modules have been completed and the development is at the advanced stage. This may automate most of the University processes like financial accounting, human resource management, pay-roll, admission, academics, examination, livestock farm management, veterinary hospital management, assets, inventory and estate management, etc. hence the operational efficiency in administration, teaching, learning, research, extention education and evaluation etc. is likely to improve. .

The University Website has been totally restructured keeping in view the addition of new colleges, institute and school and many other new features. The new website has besides administration, academics, colleges/ institute, research, extension, library and students' welfare components. It has several new features including farmer's helpline, frequently asked questions (FAQ), discussion forum, photo galleries both at the university and college levels, directory, useful links, web mail, intranet, placement cell, RTI, downloads, banner display, notice board and news.

The University organised a two-day book exhibition at the premises of College of Veterinary Science on 14-15th February, 2011. The exhibition was inaugurated by Dr. Simrat Sagar Singh, Dean College of Veterinary Science at the Examination hall of the College of Veterinary Science on 14th February at 11:00 AM. The University officers, heads of the departments, faculty and students stopover various stalls and expressed intense attention to the latest published literature in respective areas. Around 19 renowned book sellers/ publishers from various parts of Northern India including New Delhi, Lucknow, Jaipur, Jodhpur, Rohtak and Ludhiana displayed around 5,000 books on the different disciplines of Veterinary, Animal Sciences, Dairy Technology, Fisheries, Biotechnology and allied areas. Besides strengthening the library collections, the exhibition was aimed at stimulating the reading interest among the students and faculty of the university and benefited the stakeholders to update themselves with recently published reading material. This was the fourth book exhibition organised by GADVASU.

Website : www.gadvasu.in

SPORTS AND CO-CURRICULAR ACTIVITIES

Guru Angad Dev Veterinary & Animal Sciences University got affiliation from the Association of Indian Universities for its Sports and Youth Activities from the academic year 2006-07. The University has created enough facilities to promote the sports activities among the students. Large numbers of students (both boys and girls) from different constituent colleges have shown keen interest in Sports Activities. National Sports Organisation (NSO) program is being run by this university and students of College of Dairy Science and Technology and College of Fisheries opt for this program of two years.

North Zone Intervarsity participation in the session 2010-11

- Handball (M) team of GADVASU participated in North Zone Inter-University Handball (M) Tournament held at Chaudhary Charan Singh University from Sept. 25 – 30, 2010 for the session 2010-11.
- The GADVASU Badminton (M&W) team participated in North East Zone Inter Varsity Badminton (M&W) Tournament held at P.U, Chandigarh from Oct. 14 – 21, 2010 for the session 2010-11.
- Basketball (W) team of GADVASU participated in North East Zone Inter-Varsity Basketball (W) Tournament held KIIT University Bhubaneswar (Orissa) Oct. 19 – 25, 2010 for the session 2010-11 and reached in the pre-quarter final of the tournament.
- The GADVASU Football (M) team participated in North East Zone Inter Varsity Football (M) Tournament held at Chaudhary Charan Singh University, Meerut from Oct. 28 – Nov. 2, 2010 for the session 2010-11.
- The GADVASU Table Tennis (M) team participated in North Zone Inter Varsity Table Tennis (M) Tournament held at SCUTU, Dehradun from Jan 10 – 13, 2011 for the session 2010-11and reached in the pre-quarter final of the tournament.

12th All India Inter Agricultural University Sports & Games Meet at Kerala Agricultural University, Vellanikkara Thrissur, Kerala from Feb. 16-20, 2011

Approximately 1200 players from 35 different Universities from all over India participated in the meet. GADVASU contingent got overall 3rd position. In athletics, GADVASU (W) team won overall 2nd position. Table Tennis (M) team won Gold Medal. In athletics, Gold Medalist were Gurinder Singh Chahal in 800mt and Karanpreet Kaur in 800mt (W); Silver Medalist were Gurinder Singh Chahal in 1500mt, Priyanka Rana in 400mt and 200mt, Ramneet Kaur in 100mt, and Harshdeep Joshi, Gurinder Singh Chahal, Rajandeep, Daljit Pal Singh and Ravinder Singh in 4 x 100mt Relay (M); Bronze Medalist were Karanpreet Kaur in 400mt, Navjot Kaur in Javelin Throw, Priyanka Rana, Gurjeet Kaur, and Ravneet Kaur, Navneet Kaur and Rohni Bhardwaj in 4 x 100mt Relay (W).

Gold Medal winning Table Tennis (M) Team of GADVASU

All India Inter Veterinary colleges' Badminton (M&W), Table Tennis (M&W) and Professional Quiz Competitions at GBPUAT, Pantnagar from 23 to 25 March 2011

The students of College of Veterinary Science participated and brought laurals to the university by winning overall 1st runner up trophy. The Table Tennis (M) won the gold medal and Badminton (M&W) won the silver medals.

Annual Athletic Meet of GADVASU

5th Annual Athletic meet of GADVASU was successfully conducted on Feb. 9, 2011. In the meet, Gurinder Singh Chahal and Priyanka Rana were declared best athletes in men and women sections, respectively for the session 2010-11. Rajandeep and Taranjot Kaur Sran were the runner ups.

Independence Day Celebration

63rd Independence Day was celebrated at Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Ludhiana with great enthusiasm. Dr. VK Taneja, Vice–Chancellor, GADVASU unfurled the National Flag in the University premises. He inspected the 1st Punjab R&V squadron of NCC Cadets. Dr.Taneja, firstly paid rich tributes to all those who fought for country's freedom. He said that we all must remember and salute them.

On this occasion the members of GADVASU Green Club distributed toys, gifts items and cash money to the inmates of SBG Children's Home of Mullanpur, Distt. Ludhiana.

Teej Festival Celebration

Mrs. Aruna Taneja wife of Dr. V.K.Taneja, Vice Chancellor graced the Teej festival celebrated at College of Veterinary Science. Highlighting the need to curb female foeticide menace she said everyone participating in such festivals must vow to protect girl child so as to rekindle the true spirit of Teej. A large number of girls gathered at GADVASU campus to enjoy this cultural festival and participated in number of competitions organized.

Republic Day Celebration

Dr. V.K. Taneja, Vice-Chancellor GADVASU unfurled the National Flag and highlighted the importance and spirit of the Indian Constitution for the development and prosperity of people. R&V Sqn. NCC cadets of GADVASU presented the guard of Honour. Students & invited artists filled colours, emotions and rhythm with their performances in the function.

ESTATE ORGANIZATION

The Estate Unit continued to look after the construction of new buildings, renovation of existing buildings, landscaping, security and maintenance. Projects for certain new buildings e.g. Vice-Chancellor's residence, farmers and scientist hostels etc. are also being taken in hand shortly. The following projects relating to construction/repair/ renovation works in GADVASU Campus have been completed by GLADA:-

- Construction of boundary wall from milk plant adjoining Sidhwan Canal.
- Repair and renovation of administration block.
- Construction of Cafeteria in Animal Science building.
- Lecture Hall in Silver Jubilee Block.
- Construction of Cafeteria in Silver Jubilee Block.
- Three phase electrical supply in College of Dairy Science and Technology.
- Construction of Girls Hostel.
- Construction of Boys Hostel.
- Provision of Kota Stone in corridor of College of Vety. Science.

The following projects relating to construction/ repair work in GADVASU are under Planning/progress with GLADA:-

- Construction of Poultry Shed in Deptt. of Livestock Production & Management.
- Construction of Animal Biotechnology building.
- Construction of Auditorium.
- Construction of canteen in Boys Hostel
- Construction of Farmers Hostel
- Construction of Scientist Hostel.
- Construction of Guest House (ground floor)
- Construction of Vice Chancellor's Residence.
- Construction of advanced diagnostic unit in Veterinary Teaching Hospital
- Renovation of Silver Jubilee Block and Radiology Hospital.
- Providing internal electrification in 2nd floor.
- Construction of roads.
- Construction of milk plant in College of Dairy Science & Technology.
- Upgradation of University Dairy Farm.

Infrastructure Developed/Renovated and Strengthening of Laboratories

College of Veterinary Science

Department of Animal Genetics and Breeding

- Establishment of three kuccha paddocks for comfort of crossbred cows, modern machine milking parlour for milking of 12 animals (cattle) with electronic recording, milk sampling, pipeline milk collection, improved milking machine for buffaloes and bulk milk cooling tank.
- A new feed store with facilities of feed grinding and mixing has been constructed. Milking parlour building and animal sheds have been renovated.
- New instruments like bio gas generator set, generator set 82.5 kva (105 bhp) capacity, fodder cart, dung cart, wheel barrows, one nikon trinocular research microscope model E-200 and Accucell bovine photometer for measurement of sperm concentration have been purchased to strengthen various laboratories.

Department of Clinical Veterinary Medicine

- Renovation of endoscopic and mineral Laboratories.

Department of Epidemiology and Preventive Veterinary Medicine

- New instruments like Iono- Meter for toxicological analysis of Nitrate, Lead, HCN in fodder samples/blood sample/ water sample and Spectrophotometer for quantification of toxicities have been purchased to strengthen Toxicology Laboratory.
- Bacteriology laboratory has been strengthen by Nano drop for quantification of DNA in molecular work, Bio safety Cabins and Vertical laminar air flow.

Department of Livestock Production Technology

- Multi port magnetic stirrer, Lovibond Tintometer, Humidity cabinet deluxe make, Electronic balance (SORTORIUS), SOCS plus, Fibra plus, Rotary evaporator, Moisture analyzer, Ice flaking machine, PBI Densensor 3 Gas mixer, Flame photometer, Smoke rite oven, Promarks vacuum tumbler, Texture analyzer, Kenwood Dough maker and poultry processing equipments for establishment of Poultry Processing Plant have been purchased.

SOCS Plus and Fibra Plus

Texture Analyzer

Department of Teaching Veterinary Clinical Complex

- A new Lecture hall has been constructed with a sitting capacity of 118 students in the Silver Jubilee Block and is in use from this semester. It is equipped with Audio-Visual Aid facility.

Newly Built Lecture Hall

- Small Animal Hospital (Medicine Wing) has been renovated and has come in use since the last week of July 2010.
- Ace Fork Lift has been purchased for lifting the recumbent animals in the Hospital
- Computerized radiography system has been established for Veterinary use

Renovated Medicine Wing of Small Animal Clinic

Computerized Radiography System

Department of Veterinary and Animal Husbandry Extension Education

- The audiovisual laboratory has been renovated.

Department of Veterinary Gynaecology and Obstetrics

- Reproduction-Nutrition Laboratory has been renovated and a Color Doppler Ultrasound system has been purchased.

Department of Veterinary Microbiology

- Two biosafety laboratories have been established.
- Immunology laboratory has been renovated.
- New instruments like Lyophilizer, Gradient PCR, Deep Freezer, Refrigerators and Ultracentrifuge have been purchased to strengthen various laboratories.

Department of Veterinary Pathology

- Rabies diagnostic laboratory has been renovated.
- Auto Staining Equipment BioGenex i6000 Infinite System has been added in the immunopathology laboratory.

Rabies Diagnostic Laboratory

Department of Physiology and Biochemistry

- Renovation of undergraduate laboratories
- Purchase of fully automatic biochemistry analyzer

Veterinary Public Health

- Renovation of Pesticide residue analysis laboratory fully renovated

College of Fisheries

- Establishment of:
  - o Water quality lab under ICAR Niche Area Excellence Project
  - o Poly-house for catfish brood-stock rearing and over wintering
  - o Fish cum duck integrated farming unit
  - o Field store
  - o Feed mill room for installation of feed pelletizer
  - o Bio-remediation model for recycling of animal shed waste water through duckweed bioremediation
  - o *Azolla* culture unit for livestock feed production
- Renovation of Catfish and Ornamental hatchery

Fish cum Duck Integrated Farming Unit

Azolla Culture Unit

College of Dairy Science and Technology

- Establishment of lecture hall with LCD projector and interactive board.

School of Animal Biotechnology

- Upgradation of laboratories with 2-D Electrophoresis System, Biosafety Hood Class II, Biosafety Hood Class III and Multimode Reader

Regional Research and Training Centre, Kaljharani, Bathinda

- Establishment of Veterinary Polytechnic at Kaljharani and renovation of dairy sheds.

Conferences and Trainings Organized

1. One month "Training course in Microbiological and Molecular Biology Techniques" organized by Department of Veterinary Microbiology from June 02-July 02, 2010.

2. FAO sponsored training program on "Laboratory Techniques for Diagnosis of Infectious Diseases" organized jointly by Department of Veterinary Microbiology and Veterinary Pathology from Aug.16-27, 2010.

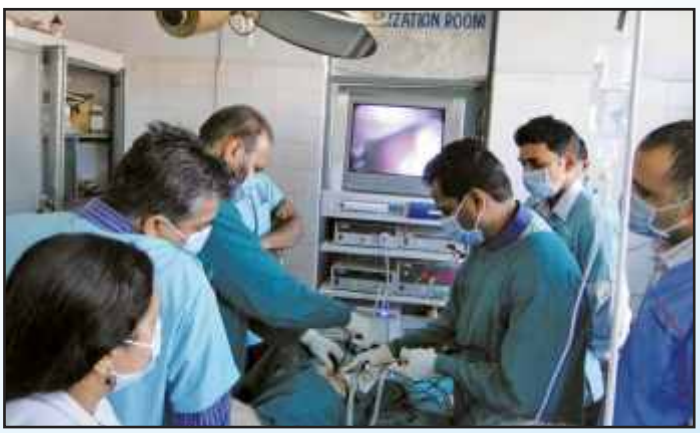
Participants of FAO Sponsored Training Program

3. ICAR Sponsored Winter School on "Recent Concepts in Veterinary Laboratory Diagnostics" organized by Veterinary Pathology from Oct.12-Nov.01, 2010.

Inaugural address by Dr V.K. Taneja, Vice-Chancellor, GADVASU

Release of Compendium by Dr A.K. Gahlot, Vice-Chancellor, Rajasthan University of Veterinary and Animal Sciences, Bikaner

4. Two days Workshop on "Clinical Application of Laparoscopy and Endoscopy in Small Animal Practice" organized by Department of Veterinary Surgery and Radiology from Nov.29-30, 2010.



Dr V.M. Chariar, Director Academy of Veterinary Endosurgery, Mumbai imparting training to the faculty

5. Animal Husbandry, Dairy and Fisheries Officer's Workshop organized by Directorate of Extension Education, GADVASU, Ludhiana from Jan.20, 2011.

Dr H.K. Verma, Head Department of Veterinary and Animal Husbandry Extension Education addressing the participants of the workshop

Compendium of Lectures of the workshop being released by Sh. PK Sood, Director and Warden Fisheries, Dr. V.K. Taneja, Vice-Chancellor, GADVASU, Ms. Usha R Sharma (IAS) Secretary, Animal Husbandry, Dairy Development and Fisheries, Dr H.S. Sandha, Director, Animal Husbandry and Sh. Inderjit Singh, Director Dairy Development Department, Punjab

6. International Workshop on Environmental Pollutants and their impact on Human and Animal Health organized by Department of Veterinary Public Health, GADVASU, Ludhiana and University of Saskatchewan, Saskatoon, Canada on Jan. 24, 2011.

Dr. John Gordo, Director of Canadian Center for Health and Safety in Agriculture, Dr. Baljit Singh Gill, Associate Dean Research, Western College of Veterinary Medicine, University of Saskatchewan, Canada, Vice-Chancellor Dr VK Taneja and other University Official in the International Workhop

Dr. Baljit Singh Gill and Dr. John Gordo delivering technical lectures in the workshop

7. National level advanced refresher training course on "Diagnostic and Surgical procedures in Veterinary Patients" organized by Department of Veterinary Surgery & Radiology from Feb. 11 – March 3, 2011.

8. Three-week advanced training course on "Advances in Applications of Diagnostic Techniques in Veterinary Theriogenology" organized by Department of Veterinary Gynaecology and Obstetrics from Feb. 16 – March 8, 2011.

Awards and Honours

Name of the Faculty/ Student	Award/Honour
COLLEGE OF VETERINARY SCIENCE	
Animal Genetics and Breeding	
Dr. Simarjeet Kaur	Best Poster Presentation award by Society for Conservation of Domestic Animal Biodiversity (SOCDAB)
Clinical Veterinary Medicine, Ethics and Jurisprudence	
Dr. S.N.S. Randhawa	Vice president of Indian Society for Veterinary Medicine
Dr. B. K. Bansal	Fellowship of National Academy of Veterinary Sciences
Dr. Rakesh Ranjan Dr. Dhiraj Gupta	Members of Executive Committee of Indian Society for Veterinary Medicine
Dr. Kirti Dua	Nodal officer of Punjab for making district level contingent plan for the Northern States
Epidemiology and Preventive Veterinary Medicine	
Dr. Ashuma	Best poster presentation award by Indian Association of Advancement of Veterinary Parasitology
Livestock Production Management	
Dr. Chandrahas	Best paper presentation award for research by Indian Society of Animal Production and Management (ISAPM)
Dr. A. S. Sirohi	Outstanding participant of winter school organized by Division of Dairy Economics Statistics and Management at NDRI, Karnal, Haryana
Livestock Products Technology	
Serlene Joseph Dr M.K.Chatli	Best research poster Award by Indian Meat Science Association
Teaching Veterinary Clinical Complex	
Dr. Vandana Sangwan	Gold Medal for best paper presentation in the Equine Surgery Session by Indian Society of Veterinary Surgery
Veterinary Anatomy	
Dr. Opinder Singh Dr. R. S. Sethi	Dr K S Roy award for best paper by Indian Association of Veterinary Anatomists
Dr. Devendra Pathak Dr. Neelam Bansal	• Dr C Vijayragvan memorial award for best paper by Indian Association of Veterinary Anatomists • Silver jubilee award for best poster presentation by Indian Association of Veterinary Anatomists
Veterinary and Animal Husbandry Extension Education	
Dr. J.S. Bhatti	Honour by Progressive Dairy Farmers Association (PDFA). The award was given by Mr Guljar Singh Ranike, honourable Minster of Animal Husbandry Dairy and Fisheries at Jagraon, Ludhiana

Name of the Faculty/ Student	Award/Honour
Dr. Navdeep Singh	Gold Medal in Equine Session by Indian Society of Veterinary Surgery
Veterinary Gynaecology & Obstetrics	
Dr. M. Honparkhe	Fellowship to undertake collaborative research under Graduate Student Exchange Program at University of Saskatchewan, Saskatoon, Canada
Dr. S. P. S. Ghuman	'Best paper Presentation Award' by Indian Society for the Study of Animal Reproduction (ISSAR) 'Best Poster Presentation Award' by Indian Society for the Study of Animal Reproduction (ISSAR)
Dr. Ranjna S Cheema	'Best paper Presentation Award' by Indian Society for the Study of Animal Reproduction (ISSAR)
Dr. A. K. Singh	'Best paper Presentation Award' by Indian Society for the Study of Animal Reproduction (ISSAR)
Dr. A. K. Pandey	'Young Scientist Award' by Indian Society for the Study of Animal Reproduction (ISSAR)
Dr. V. K. Gandotra	Vice-President of the Indian Society for the Study of Animal Reproduction (ISSAR)
Veterinary Microbiology	
Dr. H. M. Saxena	• Global Health Travel Award funded by the Bill and Milinda Gates Foundation for participation in Keystone Symposium on Immunological Mechanisms of Vaccination at Seattle, Washington, USA. • Fellow of Indian Society for Veterinary Immunology & Biotechnology • RR Shukla Award of Indian Association for the Advancement of Veterinary Research
Dr. H. M. Saxena, Dr. Gurpreet Kaur, Dr. Krishan Kumar Dr. Mudit Chandra	FM Burnett Gold Medal Award for team research by Indian Society for Veterinary Immunology & Biotechnology
Dr. N. S. Sharma	Scientists award by Indian Society for Veterinary Immunology & Biotechnology
Dr. A K Arora	Best Poster Presentation Award by Indian Society for Veterinary Immunology & Biotechnology
Veterinary Pathology	
Dr. Amarjit Singh	• Shiksha Rattan Purskar by India International Friendship Society. • Member of Editorial Board of Indian Journal of Veterinary Pathology
Dr. B.S. Sandhu	Savithree Jibachch Sinha Best Poster Award by Indian Association of Veterinary Pathologists
Dr. N.K. Sood	• Member of the examination committee of Indian College of Veterinary Pathologists • Chaired one of the sessions on “Environmental and toxic pathology” in XXVII Annual Conference of IAVP, Nov. 25-27, 2010, Chennai.

Name of the Faculty/ Student	Award/Honour
Veterinary Pharmacology & Toxicology	
Dr. H.S. Sandhu	STOX/ASAW Surajben Jethalal Thaker Prakruti Mandir Gold Medal for the year 2010 in recognition of his distinguished and dedicated services to prevent cruelty to animals by minimizing the use of animals in research and development and promoting alternative procedures by Society of Toxicology, India
Veterinary Physiology & Biochemistry	
Dr. Rajesh Jindal	• "Best Poster Presentation Award" at International Buffalo Conference, held at New Delhi • Chairman of Session on Physiology & Reproduction at International Buffalo Conference, Feb. 2010 at New Delhi; • Peer Reviewer for the course Veterinary Physiology-III under TANUVAS – NAIP Scheme on "Development of e-Course for B.V.Sc. & AH degree program
Dr. D.V. Singh	Convened a session on systemic, cardio-respiratory and digestive physiology at the SAPI Silver Jubilee International Conference, November, 2010 at IVRI, Izatnagar, Bareilly (U.P.)
Veterinary Public Health	
Dr. J.P.S. Gill	Nominated a member of ICMR – ICAR Joint Working Group on Zoonosis
Dr. J.S. Bedi	Awarded common wealth Split – Site Scholarship for doctoral research at University of Sussex, U.K.
Veterinary Surgery & Radiology	
Dr. N.S. Saini Dr. J. Mohindroo Dr. S.K. Mahajan Dr. M. Raghunath Dr. V. Sangwan Dr. A. Anand Dr. N. Singh	Gold medal for the best research paper in the Equine surgery session for the paper "Third Degree Perineal Laceration in Mares" by Indian Society of Veterinary Surgery (ISVS)
Dr. Ashwani Kumar	• World Buiatrics Association (WBA) Scholarship for attending the international congress and travel grant from DST • Dr. Rishendra Verma Young Scientist Award by Indian Association for the Advancement of Veterinary Research
Dr. Narinder Singh Saini	Fellow of Indian Society for Veterinary Surgery
Dr. Vikas Sharma Dr. J. Mohindroo	Dr M.K. Bhargava memorial gold medal for best research paper published in Indian Journal of Veterinary Surgery for the research paper entitled "Comparison of three methods to diagnose hip dysplasia in dogs"
Dr. Chandan Singh	'INSPIRE' fellowship by Department of Science and Technology, Ministry of Science and Technology, Government of India
SCHOOL OF ANIMAL BIOTECHNOLOGY	
Rupali	"Young Scientist Award" by Indian Society of Veterinary Immunology & Biotechnology

Participation of Faculty in Conferences/ Symposia/ Workshop/ Trainings

Faculty of GADVASU participated in various national and international conferences, symposia, workshops, trainings etc.

International

S. No.	Name of the Conference/ Symposia/ Workshop/ Training	Name of the organizing agency and place	Dates during which held
1	First International Course on "Descriptive Veterinary Pathology"	Sponsored by Armed Forces Institute of Pathology and C L Davis DVM foundation USA and organized by VIMTA Labs. Hyderabad, India	April 02-06, 2010
2	2nd European Symposium on Porcine Health Management	European College of Porcine Health Management, Hannover, Germany	May 26-28, 2010
3	Prairie Infectious Immunology Conference	Immunology and Infectious Disease Research Group, University of Saskatchewan, Canada	June 16-18, 2010
4	International Symposia on Pk-PD modelling	Royal Veterinary College, London	July 19-23, 2010
5	International symposium on biotechnologies for optimization of reproductive efficiency of farm and companion animals to improve global food security and human health.	G.B. Pant University of Agriculture and Technology, Pant Nagar, Uttrakhand, India	Nov.10-12, 2010
6	34th Annual Congress of ISVS and International Symposium	Indian Society of Veterinary Surgery at Pondicherry, Pondicherry	Dec.08-10, 2010
7	Keystone Symposium on Immunological Mechanisms of Vaccination	Keystone Symposium at Seattle, USA	Oct.27-Nov.01, 2010
8	XXVI World Buiatrics Congress	World Buiatrics Association at Santiago, Chile	Nov.14-18, 2010
9	Workshop on Diagnosis of Brucellosis	FAO/OIE/APHCA at Thialand	Nov.20-25, 2010
10	XVII Annual Convention of ISVIB and International Symposium on "Increasing role of Biotechnology in conserving biodiversity and livestock development for food security and poverty alleviation"	Indian Society of Veterinary Immunology and Biotechnology (ISVIB) at Rajasthan University of Veterinary and Animal Sciences, Bikaner, Rajasthan	Dec.29-31, 2010
11	Three month's Training in the area of Molecular Diagnosis (Animal Sciences)	NAIP Program of ICAR University of Tennessee, Knoxville, Tennessee state (TN) USA	Aug.16-Nov.15, 2010
12	EPS Global 1st International Pathology Forum	Changsha, Hunan, China	Sep.17-18, 2010
13	International Conference on Physiological Capacity Building in Livestock under Changing Climate Scenario	Division of Veterinary Physiology and Climatology, IVRI, Izzatnagar, Bareilly	Nov.11-13, 2010

S. No.	Name of the Conference/ Symposia/ Workshop/ Training	Name of the organizing agency and place	Dates during which held
14	26th World Buiatrics Congress	World Association for Buiatrics at Santiago, Chile	Nov.14-18, 2010
15	10th three day Waltham Leading Veterinary Workshop 2010 on "Emergency and Critical Care in Small Animal Practice"	Waltham at New Delhi. The training was imparted by Emergency and Critical Care Specialist Dr. Rebecca Kirby, DVM, DACVIM, DACVECC under the MARS Continuing Veterinary Professional Development Courses (MCVPD)	Dec.01-03, 2010
16	34th Annual Congress of ISVS and International Symposium	Indian Society of Veterinary Surgery at Pondicherry	Dec.08-10, 2010
17	XVII Annual Convention of ISVIB and International Symposium on "Increasing role of Biotechnology in conserving biodiversity and livestock development for food security and poverty alleviation"	Indian Society of Veterinary Immunology & Biotechnology (ISVIB) at Rajasthan University of Veterinary and Animal Sciences, Bikaner, Rajasthan	Dec.29-31, 2010

National

S. No.	Name of the Conference/ Symposia/ Workshop/ Training	Name of the organizing agency	Dates during which held
1	Continuing Medical Education on Migraine	Association of Physiologists and Pharmacologists of India at DMC and H, Ludhiana	April 24, 2010
2	Annual Review Meeting (2008-09) of PD-ADMAS	PD-ADMAS (ICAR) at COVS, Assam Agricultural University, Guwahati, Assam	April 23-24, 2010
3	National workshop on "Issues and Roadmap for Dairy Education and Research in India"	National Academy of Dairy Science in collaboration with NDRI, Karnal	June 01, 2010
4	National Seminar on Advances in Animal Cancer Research in India: Diagnosis, Treatment and Clinical Management	IVRI, Izatnagar	June15-16, 2010
5	Training on "Technology Forecasting Methodologies" under NAIP	Indian Agricultural Statistical Research Institute (IASRI), New Delhi	July 13-17, 2010
6	Training on Guava Easycyte Flow Cytometer	Inkarp Instruments Pvt. Limited, New Delhi	July 27-28, 2010
7	Strengthening Statistical Computing for NARS	NDRI, Karnal	Aug.02–Sep.08, 2010
8	Symposium of Compound Livestock Feed Manufacturers Association (CLAFMA) at Chandigarh	Compound Livestock Feed Manufacturers Association, Chandigarh	Aug.30-31, 2010
9	National Conference on "Recent Trends in Biotechnology"	DAV College, Amritsar	Sep.01, 2010

S. No.	Name of the Conference/ Symposia/ Workshop/ Training	Name of the organizing agency	Dates during which held
10	"Entrepreneurship Development and Management" under ICAR	Dr. Punjabrao Deshmukh Krishi Vidyapeeth (PDKV), Akola (Maharashtra)	Sep.15-Oct.05, 2010
11	XXVII Annual Conference and National Symposium of Indian Poultry Science Association (IPSACON2010)	Department of Poultry Science, Madras Veterinary College, Tamil Nadu University of Veterinary and Animal Sciences, Chennai	Sept.16-18, 2010
12	Technical Support for Consortia Based Research in Agriculture	National Institute of Agricultural Extension Management (MANAGE), Hyderabad	Sep.17-23, 2010
13	Winter School on "Recent Concepts in Veterinary Laboratory Diagnostics"	Department of Veterinary Pathology GADVASU, Ludhiana	Oct.12-Nov.01, 2010
14	Mid-term Review Workshop of NAIP Sub-Project on "Sustainable livestock based farming system for livelihood security in Hoshiarpur district of Punjab"	GADVASU, Ludhiana	Oct.27, 2010
15	XXVth Annual Conference and National Symposium of Indian Association of Veterinary Anatomists	Rajiv Gandhi College of Veterinary and Animal Sciences, Puducherry	Oct.27-29, 2010
16	National conference on Livestock and Environment	Veterinary College, KVAFSU, Hebbal, Bengaluru	Oct.28-29, 2010
17	Workshop on "Laparoscopy for small animals" organized by Karl Storz Company in association with Veterinary Faculty	Department of Veterinary Surgery and Radiology, GADVASU, Ludhiana along with Karl Storz Company	Oct.29-30, 2010
18	Convocation-cum-Convention of National Academy of Veterinary Science	NAVS, NDRI, Karnal	Oct. 30, 2010
19	Training Program on "Soft Computing Techniques in Animal Bioinformatics"	National Bureau of Animal Genetic Resources, Karnal	Nov.08-12, 2010
20	26th Annual Convention of Indian Society for the Study of Animal Reproduction (ISSAR) on "Biotechnologies for optimization of reproductive efficiency of farm and companion animals to improve global food security and human health"	ISSAR at Gobind Ballabh Pant University of Agriculture and Technology (GBPUA&T), Pantnagar (Uttrakhand)	Nov.10-12, 2010.
21	Winter school on "Dairy Entrepreneurship Development for Economics and Social Change"	Division of Dairy Economics Statistics and Management at NDRI, Karnal, Haryana	Nov.10-30, 2010
22	XVIII National Symposium on "Technology Management, visioning and upscaling for accelerating Livestock Production of Indian Society of Animal Production and Management (ISAPM)ISAPM	Indian Society for Animal Production Management (ISAPM) at AAU, Guwahati, Assam	Nov.11-13, 2010

S. No.	Name of the Conference/ Symposia/ Workshop/ Training	Name of the organizing agency	Dates during which held
23	Annual Review Meeting (2009-10) of PD-ADMAS	PD-ADMAS (ICAR) at COVS, Bengaluru	Nov.11-13, 2010
24	National Symposium on Optimizing Forage Production from Arable and Non Arable Lands for Increasing Livestock Production	Indian Grassland and Fodder Research Institute, Jhansi, UP	Nov.12-14, 2010
25	IMSACON-2010 "Strategies for sustainable meat production and processing for nutritional security and employment generation"	Division of Livestock Products Technology, Indian Veterinary Research Institute, Izatnagar	Nov.19-20, 2010
26	"Advances in Dairy Production Management for Precision Output in Reaction to Environment and Trade" under ICAR	Southern Regional Station, NDRI (Bangaluru)	Nov.22-Dec.14, 2010
27	XXVII Annual Conference of Indian Association of Veterinary Pathologists, National Symposium and CL Davis Foundation Satellite Seminar	Department of Veterinary Pathology, College of Veterinary Science, Assam Agricultural University, Guwahati, Assam	Nov.25-27, 2010
28	First Annual Convention of Indian College of Veterinary Pathologists (ICVP)	Department of Veterinary Pathology, College of Veterinary Science, Assam Agricultural University, Guwahati, Assam	Nov.28, 2010
29	XIX National Symposium on Resource Management Approaches Towards Livelihood Security	University of Agricultural Sciences, Bengaluru, Karnataka.	Dec.02-04, 2010
30	Xth Annual Conference of Indian Society of Veterinary Pharmacology and Toxicology (ISVPT)	Veterinary College, Jabalpur (MP)	Dec.02-04, 2010
31	All India Dairy Husbandry Officers' Workshop	NDRI, Karnal	Dec.03-04, 2010
32	30th Annual Conference of STOX	Jamia Hamdard, New Delhi	Dec.09-11, 2010
33	7th Annual Conference of Animal Nutrition Association on Animal Nutrition Strategies for Evironment Protection and Poverty Alleviation	Animal Nutrition Association, Orissa University of Agriculture and Technology Bhubaneswar	Dec.16-18, 2010
34	Training on "Data Analysis Using SAS"	NDRI, Karnal	Dec.18-24, 2010
35	Animal Husbandry, Dairying and Fisheries Officers' Workshop	Directorate of Extension Education, GADVASU, Ludhiana	Jan.20, 2011

Visitors to the University

April 20, 2010

Delegates from Water Sisulu University (WSU) of South Africa led by Prof. P.N. Luswazi former Registrar and Director, Centre for Rural Development and other members of delegatation included Prof. S.P. Songca, Maggie Kisaka and Mzolisi Payi

May 26-27, 2010

UGC team led by Dr. A. K. Srivastava, Director, NDRI, Karnal

July 5-15, 2010

Mr. Jules Brummelhuis a PUM expert in the field of Dairy Technology from Netherland to extend technical help for improvement/upgradation of experimental Dairy Plant.

Nov. 1, 2010

Dr. A.K. Gahlot, Vice-Chancellor, Rajasthan University of Veterinary and Animal Sciences, Bikaner

Nov. 25, 2010

FAO Expert Team led by Dr. Leo Loth, Chief Technical Advisor on Highly Pathogenic Avian Influenza. Other members of the team were Dr. David Castellan, Regional Veterinary Epidemiologist, Bangkok and Dr. M. V. Subha Rao, National Project Consultant, India to strengthen the Field Veterinary Epidemiology Training Programme (FETP-V) for Epidemiology of Transboundary and Emerging and Re-emerging Infectious Diseases in the Country.

Nov. 30, 2010

Mr. Alferd Wahl, General Manager and Pig expert, Polar Genetics, Canada and Ms. Penny Jones, Logistic manager, Polar Genetics, Canada to deliver technical lectures in seminar for members of Progressive Piggery Farmers Association organized by Department of Veterinary and Animal Husbandry Extension Education, GADVASU, Ludhiana.

Nov. 30, 2010

Dr. S.S. Johal, Former Vice Chancellor, Punjabi University, Patiala and Former Chairman, State Planning Commission.

Dec. 23, 2010

S. Parkash Singh Badal, Hon'ble Chief Minister of Punjab interacting with staff and students at RRTC & Veterinary Polytechnic, Kaljharani, Bathinda.

Dec. 28, 2010

Dr. Gayanendra N. Gongal, Scientist (VPH) on Disease surveillance in Epidemiology, WHO. Visited in connection with Zoonotic Diseases

Jan. 20, 2011

Mrs. Usha Sharma, IAS Secretary to Government Punjab Animal Husbandry, Dairy Development and Fisheries Department

Jan. 24-25, 2011

Dr. John Gordo, Director of Canadian Center for Health and Safety in Agriculture and Dr. Baljit Singh Gill, Associate Dean esearch, Western College of Veterinary Medicine, University of Saskatchewan, Canada

National and International Linkages

- The University Grants Commission (UGC), New Delhi, declared GADVASU eligible for receiving central assistance under rules framed under section 12(B) of the UGC Act, 1956.
- Guru Angad Dev Veterinary and Animal Sciences University (GADVASU) Ludhiana and University of Saskatchewan, Canada has taken up a collaborative research project under International partnership fund program for $300,000 in which both the institutes will equally contribute. The inter-disciplinary theme areas of public health, zoonoses and environmental toxicology have been identified for this partnership for their strategic research need for Punjab.

PUBLICATIONS

Research Publications

1. Alam H M, Kaur A, Jyoti, Singh N K , Haque M and Rath S S (2010) Molluscicidal effects of methanolic extract of *Azadirachta indica* (neem) on snails *Lymnaea auricularia* and *Indoplanorbis exustus*. *Indian Journal of Animal Research* 44(3): 178-182.
2. Alam H M, Kaur A, Jyoti, Singh N K, Juyal P D and Rath S S (2010) Molluscicidal effects of aquous extract of *Azadirachta indica* (Neem) on experimentally reared snails *Lymnaea auricularia* and *Indoplanorbis euxstus*. *Annals of Biology* 26(1): 13-22.
3. Ansal M D, Dhawan A and Kaur V I (2010) Duckweed based bio-remediation of village ponds: An ecologically and economically viable integrated approach for rural development through aquaculture. *Livestock Research for Rural Development* 22(7): http://www.lrrd.org/lrrd22/lrrd22.htm.
4. Anuradha, Bansal N and Uppal V (2010) Influence of lead toxicity on dehydrogenases of liver in buffalo- An Experimental study. *Indian Journal of Animal Sciences.* 80 (6): 536-38.
5. Arora R, Singh N K, Juyal P D, Jyoti and Ghosh S (2010) Immunoaffinity chromatographic analysis for purification of specific diagnostic antigens of *Paramphistomum epiclitum. Journal of Parasitic Diseases* 34(1): 57-61.
6. Athar H, Mohindroo J, Singh K, Raghunath M and Kumar A (2010) Comparison of radiography and ultrasonography for the diagnosis of diaphragmatic hernia in bovines. *Veterinary Medicine International doi:* 4061/2010/939870.
7. Athar H, Mohindroo J, Kumar A, Singh K and Sangwan V (2010) Diagnosis and surgical management of reticular abscess in bovines. *Indian Journal Veterinary Surgery.* 31: 33-36.
8. Athar H, Mohindroo J, Singh K, Kumar A and Randhawa C S (2010) Clinical, haematobiochemical, radiographic and ultrasonographic features of traumatic reticuloperitonitis in bovines. *Indian Journal of Animal Sciences.* 80: 608–12.
9. Athar H, Mohindroo J, Singh K, Singh T and Singh O (2011) Diagnosis and surgical management of abomasal impaction in bovines. *Indian Veterinary Journal* 88: 36-38.
10. Banga H S, Brar R S, Deosi H S and Chavhan S G (2010) Prenatal cerebrospinal nematodiasis in aborted Lambs. *Indian Vet. J.* 87: 305-306.
11. Banga H S, Chavhan S G, Singh N D and Brar R S (2010) Bovine lymphomatosis in the heart of a buffalo bull. *Indian Veterinary Journal* 87: 307.
12. Banga H S, Deshmukh S, Brar R S, Gadhave P S, Chavhan S G and Sandhu H S (2010) Intra-Nasal Hemangioma and Concurrent Tetracycline Induced Ulcerative Gastritis in Dog- A case report. *Toxicology International* 17(1): 33-36.
13. Bansal N and Uppal V (2010) Histogenesis of ventricular system and choroids plexus of brain in buffalo foetii. *Indian Journal of Animal Sciences.* 80 (5): 431-32.
14. Bansal N, Uppal V and Pathak D (2010) Prenatal and postnatal development of tassels in the goat. A histomorphological study. *Indian Journal of Animal Sciences* 80(12): 1185–86.
15. Bansal B K, Bajwa N S, Randhawa S S, Ranjan R and Dhaliwal P S (2011) Elimination of erythromycin in milk after intramammary administration in cows with specific mastitis: Relation to dose, milking frequency and udder health. *Trop Anim Health Prod* 43: 323-329.
16. Bansal B K, Hamann J and Lind O (2010) Determination of somatic cells in buffalo milk using DeLaval cell counter DCC. Proceedings 5th IDF International Mastitis Conference, "Mastitis Research into Practice" Christchurch, New Zealand, March 21-24, 2010, pp 489-493.

17. Bansal N, Saigal R P and Uppal V (2010) Status of buffalo ovary during follicular and luteal phases of reproductive cycle: a histomorphological study. *Indian Journal of Veterinary Anatomy* 22 (1): 31-35.
18. Bansal N, Uppal V, Pathak D and Brah G S (2010) Histomorphometrical and histochemical studies on the oviduct of Punjab white quails. *Indian Journal of Poultry Science* 45 (1): 88-92.
19. Bhardwaj R K and Randhawa C S (2010) Chronic trypanosmiasis in crossbred cattle. *Indian Veterinary Journal* 87: 408.
20. Bhardwaj R K, Randhawa C S and Randhawa S S (2010) Clinico-hematological profile in chronic anemia of crossbred cattle. *Indian Journal of Animal Sciences* 80 : 220-224.
21. Bhardwaj R K, Randhawa C S and Randhawa S S (2010) Study on incidence of iron deficiency anemia in crossbred calves raised on pucca floor. *Indian Journal of Animal Sciences* 80: 1037-1040.
22. Chand N and Pandey N N (2010) Serum immunoglobulin concentration in calves fed colostrum. *Indian Veterinary Journal* 87: 183-84.
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M.L. Mehra, Puneet Malhotra and Simarjeet Kaur	Breeding and Management	Training Compendium Department of Animal Genetics and Breeding
V.S. Malik, Narinder Singh and Joga Singh	Embryo Transfer Technology Training	
Faculty of Deptt Clinical Veterinary Medicine	▪ Disaster Management ▪ Nutritional and trace mineral deficiency / toxicity ▪ Veterinary Ethics & Jurisprudence	Training Compendium Department of Clinical Vety. Medicine
	▪ 'Lameness in dairy animals' ▪ 'Mineral Deficiency diseases'	Chapters in Package of Practice of GADVASU
A.L.Saini, H.K. Verma and Jaswinder Singh	Kandi Ilake Vich Pashu Palan	Book in Punjabi Department of Livestock Production Management
A.L. Saini, A.S. Sirohi and Daljeet Kaur	Role of Small Ruminants in Food Industry	Training Compendium Department of Livestock Production Management
A.L. Saini and D.S. Malik	Clean Milk Production	

Name of Authors	Title	Other details
J. Sahoo, D.K. Sharma and M.K. Chatli	Practical Handbook on Meat Science and Technology	Published by Daya Publishing House, New Delhi. Department of Livestock Production Technology
M. K. Chatli, P. Singh, J. Sahoo	Value added milk products (Punjabi)	Published by Department of Livestock Production Technology under RKVY project
J. Sahoo, M. K. Chatli and A. K. Biswas	Professional efficiency development program on the requirement of meat and milk industry related to veterinary profession	Training Manual Department of Livestock Production Technology
M. K. Chatli, J. Sahoo and A. K. Biswas	Professional efficiency development program on the requirement of meat and milk industry related to veterinary profession	
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H. M. Saxena	Manual of FAO Training course on laboratory techniques for diagnosis of infectious diseases	FAO Training Manual Department of Veterinary Microbiology
N.K. Sood and B. S. Sandhu	Manual of FAO Training course on laboratory techniques for diagnosis of infectious diseases	FAO Training Manual Department of Veterinary Pathology
N. K. Sood and C.K. Singh	Compendium of ICAR-sponsored Winter School on “Recent Concepts in Veterinary Laboratory Diagnostics”	Compendium of Lectures Department of Veterinary Pathology
R.S. Aulakh	Studies on insecticide residues in chicken and eggs. Its public health significance	Book published by Lap Lambert Publishing Company, Germany. Department of Veterinary Public Health
Faculty of Veterinary Public Health	Residual effects of chemicals, pesticides and fertilizers on domestic animals	Training manual Department of Veterinary Public Health
N.S. Saini, J. Mohindroo, S. K. Mahajan and M. Raghunath	Ultrasound	Proceedings of training course Veterinary Surgery and Radiology
J. Mohindroo, Tarunbir Singh and Pallavi Verma	Diagnostic and Surgical Procedures in Veterinary Patients	
Asha Dhawan, Ajit Singh and Meera D. Ansal	Macchi Palen - Ek Maragdarshika (Hindi)	Training Compendium Department of Aquaculture, College of Fisheries

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