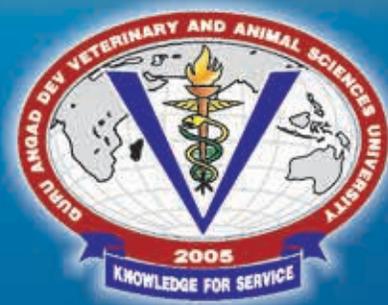


ANNUAL REPORT

2011-12



Guru Angad Dev Veterinary and Animal Sciences University
Ludhiana (Punjab) India

**Annual Report
2011-12**

Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana

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Annual Report

2011-12



Guru Angad Dev Veterinary and Animal Sciences University
Ludhiana (Punjab) India

PREFACE

Guru Angad Dev Veterinary and Animal Sciences University further strengthened its research, academic, extension and infrastructural activities. We got a loan of ₹ 40 crores from NABARD for infrastructure development for College of Fisheries, School of Animal Biotechnology, Directorate of Extension Education, Veterinary Referral Hospital and Experimental Dairy Milk Plant. The State enhanced annual budget sanctioned under Non Plan Scheme by 50%, increasing it from present ₹ 2700 lacs to ₹ 4050 lacs. The university approved various benefits like conveyance allowance, special allowance, ADA installments and revision of pay scales of employees as recommended by the State Govt.

First Convocation of the University was held on December 9, 2011. A total of 237 students were conferred degrees for Ph.D., M.V.Sc./M.Sc., M.F.Sc. and B.V.Sc. & A.H programs. Four gold medals in Master' and two gold medals for B.V.Sc. & A.H were awarded to the meritorious students. Dr. S. Ayyappan, Director General, ICAR, New Delhi during the convocation address lauded the efforts of the University and promised further financial support. The Peer Review Team of ICAR for Accreditation of Universities visited GADVASU and appreciated the performance and developments of the university in teaching, research and extension.

A rapid increase in P.G. admissions for specialized courses was witnessed. During 2011-12, a total of 114 students in Masters and 23 in Ph.D. were enrolled in various disciplines of Veterinary Sciences, Animal Biotechnology and Fisheries. New initiatives were taken to strengthen training and capacity building for faculty. Four young scientists were deputed for 6 months training in USA and Canada in areas of molecular disease diagnosis, vaccinology, functional genomics and value addition of livestock products. Efforts were made to strengthen the existing system and bring efficiency in teaching and training programs so that the future graduates and post-graduates are well equipped to provide specialized services.

An international workshop and a seminar on nanotechnology was organized. University also organized a conference on livestock production management, advance training courses in gynaecology and surgery, a winter school in animal biotechnology, officer's workshop for animal husbandry, dairy and fisheries and training programs for dairy, fish and pig farmers and feed millers/manufacturers. The ICAR has sanctioned three Krishi Vigyan Kendras to be established one each at Taran Taran,



New initiatives were taken to strengthen training and capacity building for faculty. Efforts were made to strengthen the existing system and bring efficiency in teaching and training programs so that the future graduates and post-graduates are well equipped to provide specialized services.

PREFACE

Mohali and Barnala for technology assessment, refinement and demonstration.

Research projects in the fields of disease diagnosis, biotechnology, reproduction and pharmacology amounting to ₹ 310.45 lacs from DBT, UGC, ICMR, PSFC, and Experiential Learning from ICAR were sanctioned. Further ₹ 180 lacs under FIST program 2011 from Department of Science and Technology, Govt. of India was sanctioned for strengthening postgraduate teaching and research in Veterinary Microbiology, Reproduction and Animal Biotechnology.

Successful hatching and rearing of exotic layer variety of ducks (Khaki Campbell) and integrated fish cum duck farming model was demonstrated. Local availability of ducklings will encourage more farmers to take up fish cum duck farming, which is a low input, eco-friendly and sustainable technology for higher economic returns, especially for the small and marginal farmers. First batch

of 50 ducklings were provided to one of the farmers for off campus testing and demonstration.

The students performed extremely well and excelled on all fronts, be it academics, sports or co-curricular activities and brought laurels to the university at national level. University faculty and students organized 6th Foundation Day of the GADVASU, 2nd Inter-College Youth Festival, Independence Day and Republic Day with fervor and gaiety.

We are on a path of realizing our vision and shall collectively achieve breakthroughs in our pursuit for national and global leadership in academics, basic and applied research, delivery of services and dissemination of knowledge and technologies to livestock farming community.

(Vijay Kumar Taneja)

Vice Chancellor



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EXECUTIVE SUMMARY

Guru Angad Dev Veterinary and Animal Sciences University (GADVASU) was established on 9th Aug, 2005 at Ludhiana, Punjab by carving out the Veterinary Science College and related animal farm facilities from the Punjab Agricultural University, Ludhiana, and started functioning from 21st April, 2006. To produce highly efficient and skilled human resource for giving boost to activities of livestock and fishery sectors in Punjab, GADVASU has created College of Fisheries, College of Dairy Science and Technology, School of Animal Biotechnology, and Veterinary Polytechnic. To address issues of zoonoses, food safety and environmental pollutants, through research and collaboration with various agencies, the university has established School of Public Health and Zoonoses. Three Regional Livestock Research and Training centres at Kaljharani (Bathinda), Talwara (Hoshiarpur) and Booh (Taran Taran) have been established for catering to the specific needs of the area. The ICAR has sanctioned two Krishi Vigyan Kendras to be established at Taran Taran and Mohali districts of Punjab for technology assessment, refinement and demonstration. 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 of clinical cases.

University managed to get a Loan of ₹ 40 crores from NABARD for infrastructure development for College of Fisheries, School of Animal Biotechnology, Directorate of Extension Education, Veterinary Referral Hospital and Experimental Dairy Milk Plant. ₹ 1.8 crore under FIST program 2011 from Department of Science and Technology, Govt. of India was sanctioned for strengthening postgraduate teaching and research in Veterinary Microbiology, Reproduction and Animal Biotechnology.

BUDGET

The university received ₹4374.12 lacs from State Government which included ₹4050 lacs for different

research projects under non-plan schemes, ₹236.42 lacs under plan schemes and ₹87.70 lacs for Establishment of Veterinary Polytechnic. Grant received from ICAR was ₹1832.72 lacs which included ₹480.99 lacs for arrears, ₹423.98 lacs as development grant and ₹927.75 lacs for various research projects/schemes. Grant received from other agencies was ₹855.97 lacs which included ₹13.93 lacs under NAIP, ₹408.83 lacs under RKVY and ₹433.21 lacs under various other projects granted by DBT, DST, UGC etc. The total expenditure for the year 2011-12 was ₹7423.40 lacs which included ₹4828.96 lacs for salary, ₹2445.98 lacs for contingencies, ₹128.40 lacs for wages and ₹20.06 lacs for T.A.

FACULTY PROFILE

Total present faculty strength in the constituent colleges of the university is 184, out of which 57 are professors or equivalent, 36 associate professors or equivalent and 91 assistant professors or equivalent. About 112 faculty members are in the teaching schemes, 58 in the research schemes and 14 in the extension schemes. On university basis, 20% of the faculty are female, 79% faculty holds doctoral degree and 69% faculty are from Punjab.

STUDENT PROFILE

The present strength of students in various programs of the constituent colleges is 852, out of which 62% are in undergraduate courses, 20% in postgraduate courses, 8% in doctoral program and 10% in diploma course. The percentage of male and female students in the university is 74% and 26%, respectively.

TEACHING

Admission in various undergraduate programs was strictly on the basis of entrance examination conducted by the Controller of Examination. The total number of students admitted for the session 2011-12 was 318, which included 80 in B.V.Sc. & A.H., 21 in B.F.Sc., 30 in B. Tech. (Dairy Technology), 113 in M.V.Sc./M. Sc., 1 in M.F.Sc., 23 in Ph.D program and 50 in Diploma in Veterinary Science and Health Technology. A total of 147 students successfully completed their degrees in different disciplines (100 - B.V.Sc. & A.H., 43 - M.V.Sc./M.Sc., 1 - M.F.Sc.

and 3 – Ph.D.). After completion of course work in nine semesters, 92 B.V.Sc. and A.H. students of 2006 Batch were registered to the six months compulsory internship programme. Twenty students of B. Tech (Dairy Technology) completed their in-plant training from July-December 2011 in various Milk Plants of Punjab.

First Convocation of the University was held on Dec 9, 2011. A total of 237 students were conferred degrees for Ph.D. (17), M.V.Sc. (39), M.V.Sc./M.Sc. in Animal Biotechnology (4), M.F.Sc. (3) and B.V.Sc. & A.H. programs (174). Four gold medals for Masters' and two gold medals for B.V.Sc. & A.H were awarded to the meritorious students.

University Merit Scholarship was awarded to 55 undergraduate students, 27 postgraduate students and 11 doctoral students. Twenty five undergraduate students admitted through All India Entrance Examination were awarded National Talent Scholarship. Junior Research Fellowship of ICAR was bagged by 10 postgraduate students and Senior Research Fellowship by 2 doctoral students. Seven postgraduate students admitted in Animal Biotechnology through All India Entrance Examination were awarded DBT Merit Scholarship. Twenty five 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 2011-12 were offered courses as per ICAR revised course curricula, syllabi and common academic regulations.

All India Study Tour of 15 days for final year B.V.Sc. and A.H. students was organized during Jan. 2012. Fifty three students of 2007 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 2012. Cadets brought laurels to the institute by winning two gold medals and three silver medals. The Cadets of GADVASU participated in various activities during 2011-12 like painting competition and tree plantation program. Cadets

attended Combined Annual Training Camp and appeared in Certificate 'B' and 'C' examinations.

The students of College of Fisheries and College of Dairy Science & Technology participated in summer and winters NSS camps on the theme "Tandrust Naujawan Tandrust Punjab" organized by the University from June 8-14, 2011 and Dec. 7-13, 2011 in which the students were given lectures on important social issues/moral values and were involved practically in various activities of social service. The NSS Unit also organized Blood Donation Camp and observed Road Safety Week. One B.F.Sc. 2nd year student participated in "National Youth Festival and Convention" under NSS at Mangalore from January 8-19, 2012 and one B.F.Sc. 3rd year student participated in Winter Adventure Camp at Bikaner (Rajasthan) as NSS Volunteer from January 19-26, 2012.

Two advanced trainings were conducted for the scientists by Centre of Advanced Faculty Training in collaboration with ICAR, New Delhi. Department of Veterinary Microbiology organized one month training course on Microbiological and Molecular Biological Techniques. A 21 days ICAR-sponsored winter school on "Advanced Molecular Biology Tools used in Animal Disease Diagnosis and Development of New Generation Vaccines" was organized by School of Animal Biotechnology. Department of Livestock Production Management organized National Symposium and XIX Annual Convention of Indian Society of Animal Production and Management (ISAPM) from November 2-4, 2011. Department of Veterinary Public Health & Epidemiology organized workshop on 'Basic Experimental Design: Planning for Good Results and Working with Mice-Basic Considerations and Sample Taking' and seminar on 'Nanotechnology: Its Scope and Perspective in Veterinary Sciences with emphasis on Public Health Issues' in collaboration with University of Saskatchewan, Canada. Trainings on 'Awareness on production of safe meat and value added meat products' and 'Value added milk products with special emphasis on mozzarella cheese' were organized by Department of Livestock Production Technology. Departments of Veterinary Gynaecology and Obstetrics and Veterinary Surgery and Radiology organized training programs on 'Reproductive Ultrasound Procedure for field Veterinarians' and "Ultrasound Procedures", respectively in association with Punjab State Animal Husbandry Department. A 'Dog

Show' was organized by the Department of Veterinary Medicine. Food Festival was organized in the university on Feb 10, 2012.

Faculty participated in international and national conferences, symposia and workshops and presented research papers. The faculty won several awards and honours and published 144 research papers and 6 books, 8 chapters in books, 16 compendium/ proceedings/ bulletins and prepared/revised 26 practical manuals for the undergraduate and postgraduate students.

Teaching and diagnostic laboratories in various departments of constituent colleges have been strengthened and were made fully operational. FRP Carp Hatchery and Water Testing Laboratory under ICAR Niche Area of Excellence Project have been established in College of Fisheries. An endoscopy unit has been made functional and a lameness chute for hoof examination and trimming in dairy animals was designed in Department of Veterinary Medicine. A Bioinformatics Laboratory was started in School of Animal Biotechnology. New hostel has been built in Veterinary Polytechnic & RRTC, Kaljharani. Several other existing infrastructures have been renovated and modern equipments were procured.

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 2011-12, a total of 137 research schemes were operational, which included 49 non-plan/ plan schemes, 20 ICAR schemes, 4 revolving fund schemes, 32 RKVY schemes and 32 miscellaneous schemes. A total of 80 new project proposals were submitted to various funding agencies.

ANIMAL BREEDING

The crossbreeding project for the genetic improvement of cattle and buffalo maintained at university dairy farm showed an upward trend in all the milk production traits. The complete lactation yield recorded during 2011-12 was 6604 kg in cattle and 2836 kg in buffalo. The maximum 305-day milk yield and peak yield recorded were 7496 kg and 40.3 kg, respectively in a cattle herd. A Murrah buffalo has created a new record at the dairy farm since inception by producing 4636 kg milk in 305 days and 6131 kg milk

in its complete lactation. For the genetic improvement of cattle and buffalo population of the State, breeding bulls, frozen semen and chilled semen were supplied to the farmers and other dairy development agencies.

With the objective of production of dairy animals of high genetic merit through multiple ovulation and embryo transfer (MOET), during last one year, a total of 25 cows were super ovulated in the field which led to an average embryo recovery rate of 5.08 per animal with a transferable embryo recovery rate of 1.92. Of the 23 embryos transferred, 6 recipients became pregnant on rectal basis. The embryo production work was also initiated in elite buffaloes; a total of 05 buffaloes were super ovulated and an average embryo recovery rate of six embryos per animal was achieved. Transferable embryo recovery rate was found to be 3.2 in buffalos.

Studies on age at attainment of semen freezability vis-à-vis semen characteristics and fertility in Murrah buffalo bulls suggested that the breeding bulls should be selected at an appropriate age of sexual maturity i.e. >2.75 years for inclusion in breeding programme.

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. From 2005 to 2012, the egg production upto 40 weeks has improved from 98 to 126 while egg weight improved from 55 to 58 g. Another bird (Rhode Island Red) which lays tinted (brown) eggs and has become popular in rural areas of State. It lays 250-260 eggs in a year with an average egg weight of 53 g. 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 stock is expected to be more popular with the small/ marginal farmers as brown eggs fetch a premium. 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. 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.

ANIMAL HEALTH

Disease Occurrence

Occurrence of various infectious and non-infectious disease outbreaks has been posing a serious concern to the dairy industry in the State. During 2011, a total of 35 disease outbreaks such as hydrothorax (5), anaplasmosis (4), hemorrhagic septicemia (3), nitrite toxicity (3), trypanosomiasis (3), mixed hemoprotozoan (3), babesiosis (2), theileriosis (2) and FMD (1) etc. were reported throughout Punjab.

The common GIT disorders reported in dairy animals included diaphragmatic hernia, foreign body syndrome, rumen impaction, omasal impaction, abomasal impaction, reticular abscess, liver abscess and reticular adhesions etc.

Epidemiological pattern of mastitis differed at machine milked farms from that reported for hand milked farms. The corynebacteria and streptococci constituted more frequent isolates from machine milked dairy cows as compared to hand milked.

Mapping revealed higher incidence of mineral deficiencies in cattle as compared to buffaloes. Sub-clinical deficiencies of Ca, Cu, Zn and Pi in both cattle and buffaloes of Bathinda district existed with maximal deficiency of Cu. The mean plasma Mo level in both cattle and buffaloes was within the safe limit.

The analysis of blood samples from 344 cattle and 162 buffaloes for *Trypanosoma evansi* revealed overall prevalence based on PCR as 4.15%. Apparently more prevalence was seen in cattle than in buffaloes.

Ixodid were found the most prevalent tick in cattle and buffaloes; actual prevalence being about 58%. Among the various agro-climatic zones, highest prevalence rate of *Rhipicephalus microplus* was recorded from zones receiving highest annual rainfall. However, the highest prevalence of *Hyalomma anatolicum anatolicum* was recorded from western region thus indicating that *R. microplus* prefers a hot and humid environment whereas, arid and semi arid conditions are more conducive for *H. anatolicum anatolicum*. Maximum tick infestation was recorded in calves <6 months of age and least in >1 year age group.

Disease Diagnosis

Modified RBPT was found to give better results than the conventional RBPT in diagnosis of brucellosis. The new method was found to minimize erroneous interpretations which may have serious consequences.

Studies on diagnosis of Johne's disease showed that only high degree Ziehl Neelsen test positive animals were detected by molecular (PCR) or conventional culture techniques and sensitivity of PCR was greater than conventional culture methods.

The diagnosis of rabies in natural cases could be achieved up to 100% by immunohistochemistry and 83.33% by histopathology.

Polymerase Chain Reaction (PCR) was standardized for diagnosis of *T. evansi*. The PCR method was found almost twice more sensitive than the conventional parasitological diagnostic techniques viz. wet blood film (WBF), Buffy coat (BC) and thin blood smear (TBS) in terms of detection of *T. evansi* from mice blood.

Diagnostic and prognostic aspects of canine mammary tumours (CMT) were studied. A good correlation (95.74%) of cytology with histopathology with a sensitivity of 97.22% in diagnosing CMT was recorded. Further, Real Time PCR showed that cells expressing BRCA1, Rb and BCL2 markers represent the early cancer stem cells population

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.

Radiography in combination with ultrasonography proved useful tools for diagnosis of abdominal disorders. Blood biochemistry and haematology indicate the severity of the disease.

Identification of the animal species on the basis of morphological and molecular characterization (PCR method) of blood showed that amplification across a variable intron within the highly conserved TP53 tumor suppressor gene produced band fragments of different sizes between species like human at 460 bp, goat 405 bp, cattle 475 bp, buffalo 475 bp and dog 482 bp.

Disease Management

For effective FMD control, animals should be revaccinated after every 4 months, and ensure that vaccine contains proper antigenic mass and inactivation of the virus. Sodium carbonate 4 % solution could be used best to kill the FMD virus at affected farms.

The measure of serological response to rabies vaccination in dogs revealed rabies virus specific antibodies (above 0.5IU/ μ l) in 71.16% cases. The antibody level was directly proportional to the number of vaccine shots.

Deworming of pets before undertaking rabies vaccination results in better protection through higher antibody titre (8.878 IU/ μ l) than non dewormed ones (4.01 IU/ μ l).

Bacteriophage therapy showed promising results in *in vitro* killing the field isolates of *B. abortus* thus indicating future role in controlling brucellosis. Area specific mineral mixture is effective in improving plasma Cu concentration. Area specific mineral mixture improves milk yield ranging from over 1.5 liters to 6 liters by 60th day post treatment.

Analysis of milk samples from clinical mastitis in dairy animals revealed staphylococci as the main pathogen. The ceftriaxone-tazobactam (86.96%), enrofloxacin (76.28%), cefquinome (72%) and gentamicin (69.54%) were found the most effective drugs *in vitro* against the mastitis pathogens.

Supplementation of vitamin C in chlorpyrifos toxicity cases helps in partially ameliorating the degenerative changes in various organs such as kidneys.

The pharmacokinetic studies of pazufloxacin, a third generation fluoroquinolone, in buffalo calves showed that drug could be used at dose of 5mg/kg repeated at 24 hours interval against the microorganisms having MIC of up to 0.07 μ g/ml without any adverse effects.

Clinical Interventions

- Midline approach surgery in treatment of diaphragmatic hernia.
- Correction of thoracic trauma, atresia-ani and perineal hernia in buffaloes.
- Hernioplasty using indigenous nylon mesh and polypropylene mesh.
- Use of butorphanol and ketamine for general anesthesia in buffaloes showed fast recovery over traditional combination.
- Use of spinal anesthesia in management of hind leg affections of dairy animals.
- Transfixation, cross pinning and hanging pin cast techniques in management of long bone fractures in large animals.
- Intermedullary interlocking and bone plating in bone fractures.
- In surgical management of equine colic, postoperative intravenous administration of lignocaine helped in achieving gastrointestinal motility. Placement of Foleys catheter as a drain tube in the abdomen helped in managing postoperative peritonitis.

ANIMAL NUTRITION

Tomato pomace (TP) a by-product of vegetable processing industry that was found to have 20-22% crude protein (CP) and 9-11% ether extract (EE) could be incorporated in diets of commercial broilers at graded levels up to 5% of ration during starter phases and up to 10% of ration during finisher phase without affecting performance.

The *in vivo* studies in beetal kids showed that indigenously prepared zinc and copper lysine chelates could be used as effectively as inorganic mineral mixture.

The supplementation of wheat straw with cinnamaldehyde; an essential oil, at 2% of substrate dry matter (DM) results in reduced methane production, better digestibility of true organic matter (OM) and neutral detergent fibre (NDF) and increased volatile fatty acids production. Similarly, supplementation of wheat straw with saponin from MP Biologicals at the rate of 2 to 3% of substrate proved a better nutrient.

In terms of low methane production, Napier bajra, berseem-wheat straw or wheat straw based crude fibers (CFs) were found better as compared to other roughage based CFs.

The feeding of rumen undegradable or by-pass protein either alone or in combination with molasses improved the dry matter intake, body weight, average daily gain (ADG), food conversion ratio (FCR) and protein efficiency ratio (PER) in kids. By-pass protein feeding also mitigated the vagaries of summer stress, and helped in the production of lean red meat by reducing the body fat deposition.

The feeding of broiler chicks on diets containing flaxseed meal up to 10% results in better FCR, PER and enhanced alpha-linolenic acid content in the broiler meat.

The probiotics supplementation of *Lactobacillus acidophilus* (P_L) and *Saccharomyces cerevisiae* (P_S) at 0.2% of BW improved the dry matter intake, body weight gain, FCR and PER in beetal kids. The probiotics feeding also improved the appearance as well as overall acceptability of cooked chevon.

ANIMAL REPRODUCTION

Flax seed supplementation (300g/100Kg body wt) in buffaloes attenuated luteolytic signal and improved post insemination luteal profile. This resulted in higher conception rate of 66.7% as compared to 31.3% in control group buffaloes.

Supplementation of glucogenic diet and by pass fat during pre partum period in buffaloes was beneficial to prevent post partum loss in body condition and enhanced the post partum reproduction efficiency.

Follicular wave emergence can be synchronized in buffaloes with trans-vaginal ultrasound guided follicle ablation or with administration of estradiol-17-beta.

Computer-Assisted Sperm Analysis (CASA) based individual motility and expression for heat shock protein (HSP) 70 in buffalo bull sperm could be used for the differentiation of good fertility buffalo bulls from poor fertility. The 130 and 43 kDa proteins were not found in poor fertility buffalo bull sperm indicating a role in conception.

Immunization of dogs with native PH-20 and Lactate dehydrogenase C (LDHC) sub units revealed their immune-contraceptive potential to reduce the fertility as sperm parameters of immunized dogs remained significantly different than the recommended values for fertile dog semen. Immuno-contraceptive effect of PH-20 and LDHC sub units were also noticed in bitches.

Basic studies

A histological study on serial sections of buffalo ovary during different seasons indicated significantly more number of primordial and primary follicles in autumn. The incidence of atresia of follicles ≥ 1 mm was maximum in summer (75.62 %), followed by spring (72.89 %), rainy (71.25 %), winter (69.79 %) and autumn (68.73 %) seasons.

Developmental anatomy on spinal cord of buffalo foetii revealed that neural tube of early spinal cord was present in 35 days fetus. At 57 days, the mantle and marginal layers began to differentiate into gray and white matters. Ultimately at 133 days buffalo foetus, all the lamina of gray matter appeared. Another study conducted on large intestine of buffalo fetuses showed that mucosal projections appeared in large intestine during early stages of development whereas villi were first observed at 119 days in rectum. The goblet cells appeared at 144 days. The intestinal glands were fully differentiated at 198 days.

Electron microscopy studies on uterus of buffaloes showed that there were distinct structures on caruncular and non caruncular areas. The caruncular area was thrown into highly branched villous tree which possessed many fine microvilli. The non caruncular areas possessed many endometrial glands opening at the surface.

LIVESTOCK PRODUCTION MANAGEMENT

The use of fenugreek seed, @ 0.1% of BW significantly improved the milk, feed, fodder, dry matter intake, body weight, ADG and FCR in beetal kids. Also, the enteric problems like diarrhoea were significantly reduced.

The pre- disbudding medication with local anesthetics (Lignocaine, 2% @ 1 ml/bud) or non-steroidal analgesics (Meloxicam @ 0.25 mg/kg BW) in kids reduced the pain related behaviors during and after disbudding.

Correlation of coat colour on productive performances of beetal goats under stall-fed conditions showed that daily milk, creep feed and concentrate intake was significantly higher in black goats as compare to tan/brown or spotted goats.

LIVESTOCK PRODUCTS TECHNOLOGY

Various value added livestock products such as moisture chicken nuggets, chicken meat biscuits, chicken meat caruncles, chicken meat noodles, chicken gizzards pickles, low-fat paneer and buffalo mozzarella cheese with good sensory attributes, higher nutritive value and long shelf life were developed.

Functional based chicken nuggets, patties and balls were developed with added fat at 5% level, 40% replacement of sodium chloride with potassium chloride and addition of fiber enriched non-meat ingredient (Dalia at 2% level). It was found that reduction of fat level, replacement of sodium chloride and addition of fiber have positive impact on product quality besides improvement of nutrition value of developed chicken meat products.

In preparation of chicken gizzards pickles with appropriate pH, acidity, better texture profiles and higher sensory quality, the best recommended acetic acid level was found to be 12 %

The low-fat mozzarella cheese, prepared from 2% milk fat and by using 0.3 % sodium alginate resulted in better acceptability with up to 10 days storage life at 4°C under aerobic packaging conditions.

PUBLIC HEALTH

Contaminated feed and fodder being the established source of entry of pesticide residues into animal body can lead to contamination of animal products intended for human consumption. Pesticide residues were detected in 93% of green fodder, 100% of concentrate feed and 83% of wheat straw. Results revealed that residues of β HCH exceeded

MRLs in 5% fodder samples, 8% feed samples and 5% wheat straw samples while residues of total DDT and HCH exceeded the MRLs in 8% of concentrate feed samples and 29% of the wheat straw samples, respectively.

A study undertaken to ascertain the levels of pesticide residues in market fish, fish feed and pond water showed alarming presence of pesticide residues. Among various pesticides, HCH was found to be the most predominant pesticide detected in farm and market fish samples comprising on an average 35 and 33% of total pesticide residues, respectively. The pattern of contamination in fish, fish feed and pond water was almost similar.

The microbial analysis of raw and ready to eat fish products revealed contamination levels with different microbes as 21.73% *Aeromonas* spp, 47.82% *E. coli* and 29.89% *S. aureus*.

The overall prevalence of hydatid cysts in animals was found to be 1.59%; species wise being cattle (5.39%) buffaloes (4.36%), pigs (3.09%), sheep (2.23%) and goat (0.41%). Among different occupational risk groups, comparatively higher prevalence was recorded in dog handlers (30%), followed by dairy farmers/farm labor (26.66%), HIV positive subjects (25%), persons with liver disorders (14.81%), veterinary doctors (6.25%) and control group (6.25%).

FISHERIES

Azolla culture trials in silpaulin lined pits (16m²) were carried out at different harvesting frequencies to assess monthly productivity trends under local climatic conditions of the State. The result revealed higher productivity of *Azolla* during May to July & September to November as compared to other months. Higher biomass production with harvesting frequency of 3 kg/day was recorded, which produced 103.52 % higher *Azolla* biomass as compared to harvesting frequency of 2 kg/day.

Preliminary freshwater prawn culture trials in inland saline water at Fazilka conducted successfully. 0.5 to 1.5 g Juveniles were stocked in the pond. Male prawns recorded higher final body weight (23-67 g) as compared to female prawns (3-16 g) in 80 days. However, freshwater carp (mono- & poly-culture) and murrel culture trials under different stocking densities are under progress.

Comparative efficacy of fish meal based diets in comparison to plant based diets was evaluated with respect to water quality, productivity, survival, growth,

gonadal maturity and flesh quality of Indian major carp, *Labeo rohita*. Fish meal based diets were found to induce higher growth, improved gonadal development, egg size and fecundity as compared to plant based diets.

Successful breeding trials of catfish, singhi (*Heteropneustes fossilis*) carried out (without scarifying the male) in flow through FRP troughs by using a synthetic inducing agent 'ovaprim' with an average fecundity/g body weight and hatching percentage of 278 (185 – 448) and 75 % (40-100 %), respectively. An average survival of 40-50% (from hatchling to fry stage) achieved during indoor rearing of fry.

Hatchlings of singhi were reared on different diets (live food, egg diets, liver diets, dry powdered diets) under indoor conditions to work out the comparative efficacy of different diets in terms of survival and growth. Maximum survival was found when fed on diet containing mixture of zooplankton and egg yolk followed by diets having egg albumin, egg custard and formulated dry diets.

Experimental trials were conducted to study the effect of stocking size and stocking density on growth performance and survival of giant freshwater prawn, *Macrobrachium rosenbergii*. The study revealed higher stocking size (>5.0 g) and stocking density of 50,000 to 60,000/ha resulting in better growth performance and survival of giant freshwater prawn.

A study was conducted to see the effect of unilateral and bilateral eye stalk ablation on the growth rate of *M. rosenbergii*. Unilaterally ablated group recorded higher weight gain as compared to control (non-ablated) group. Significantly higher survival was also obtained in unilaterally ablated group (93.3%) in comparison to non-ablated control group (73.3%), whereas in bilaterally ablated group, prawns died within 22 days. The results of present study suggested that unilateral eye stalk ablation might be helpful for obtaining better growth performance and survival of giant freshwater prawn.

Layer variety of ducks, Khaki Campbell were reared successfully in an integrated fish cum duck farming unit for the first time in GADVASU. In 8 months of rearing period, the ducks attained an average body weight of 1.28 kg and produced 1800 eggs, whereas the fish attained an average weight of 350 gm. Proximate analysis of duck eggs was carried out to evaluate its nutritive value. It constituted 12.35% shell, 52.10% albumin, 32.59% yolk, 1.25% ash, 72.06% moisture, 11.74% fat, 14.18% protein.

Sensory evaluation was also carried out to assess its relative acceptability in comparison to poultry eggs. Successful preliminary hatching trials for production of ducklings of Khaki Campbell at GADVASU were also carried out at the poultry farm hatchery of COVSc. A set of 50 ducklings was provided to one of the progressive farmers of Punjab for establishing fish cum duck farming unit for demonstration and off campus testing.

An off-campus fish cum duck farming unit has also been established in inland saline water aquaculture trial ponds in village Shajran, district Fazilka in the month of May, 2011. Ducks not only survived the saline conditions but also produced eggs at an expected rate of 200-250 eggs/bird/year.

Zero wastage technology for processing of carp fish for development of value added products from deboned fish meat and by products from the processing waste has been standardized. The preliminary studies revealed 116% higher economic returns from processed fish as compared to un-processed fish.

Stock of fresh water pearl mussel, *Lamillidens marginalis* was collected from Una district, Himachal Pradesh and preliminary trials for rearing it under local climatic conditions have been initiated. A cage aquaculture unit, consisting of 2 cages was established in 1 acre production pond for demonstration and experimental rearing of high value species like catfishes and murels for higher economic returns. Rearing of high value candidate species (*Channa spp*) in cage is in progress.

ANIMAL BIOTECHNOLOGY

Sex chromosome specific microsatellite loci were studied to investigate the genetic polymorphism in three breeds (PL2, PB2 and PR) of chicken and to associate the polymorphism with growth and egg production traits. The number of alleles in the different microsatellite loci studied varied from 8 to 10 among the different germplasms, indicating high degree of polymorphism. Some of the traits (body weight at 5 weeks and 40 weeks of age, egg number at 40 weeks, egg mass, age at sexual maturity and egg production rate) were significantly ($P < 0.05$) different among the different genotypes identified for the specific microsatellite loci.

The genetic variability in three breeds (PB2, PL2 and PR) of chicken and association of the genetic polymorphism with growth and egg production traits using

five microsatellite markers (Ms-13, -14, -18, -19 and -20) was carried out. The observed number of alleles in different microsatellite loci studied varied from 5 (in Ms-14) to 8 (in Ms-13) among different germplasms, indicating high degree of polymorphism. Some of the traits (egg weight at 40 weeks of age and egg mass) were differing significantly ($P < 0.01$) among the genotypes identified for the specific microsatellite loci.

The genetic polymorphism in two strains (Black and White) of Japanese quails was investigated using Microsatellite loci (GUJ0008, GUJ0034, GUJ0041, GUJ0056 and GUJ0070) and the polymorphism was associated with body-weight at 5 weeks of age trait.

Glycoprotein D of BHV-1 represents a major component of the viral envelope and is a dominant immunogen. gD encoding gene of this virus was expressed in a baculovirus-insect cell system to produce recombinant protein. The recombinant gD protein was further confirmed by dot-ELISA indicating its potential as a coating antigen in gD-based diagnostic ELISA.

A total of 75 samples (25 each of serum, nasal and conjunctival swabs) from 25 dogs suspected for CD were processed for virus isolation in MDCK cells. Virus could be detected from 76%, 72% and 64% of cell culture harvests from serum, nasal and conjunctival swabs, respectively. Pairwise nucleotide divergence of one of the isolate revealed 99%, 97.5% and 97% homology with Onderstepoort, Indian isolate and Lederle strain, respectively.

For rapid detection of *Brucella* from clinical samples, PCR was carried out by using published primers based on immune-dominant outer membrane protein gene *omp31*. A new set of primers based on *omp31* gene were subsequently designed to differentiate *B. abortus* and *B. melitensis*. *omp31* gene was amplified, cloned and sequenced from a clinical isolate of *B. abortus*. *Omp31* protein was successfully expressed, purified and recombinant protein was confirmed by DOT and Western blotting.

Studies carried out to see the effect of exposure of mice to chicken barn air showed that chicken barn air can affect major lung epithelial cells, and there is a role of TLR9 in regulation of some of these responses.

EXTENSION

In order to transfer the new technologies evolved by the university, training courses/programs (37) were organized

for the farmers, field veterinarians and scientists from other universities. Faculty published about 128 extension publications in various magazines, journals, news papers etc. in order to disseminate information important to farmers. The faculty members of different departments delivered 52 TV talks and 24 Radio talks on the topics assigned by the Directorate of Extension Education. It constitutes a very good medium to educate farmers and is very popular among farmers.

Animal welfare camps (15) were organized in the rural areas of Punjab for treatment of animals. Farmers and field functionaries were advised/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 Development, Govt. of Punjab, Fish Farmer's Development Agencies, Punjab, Nestle, 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, 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 Melas were organized, each in the months of March and September. 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. University also organized inaugural function of its Veterinary Polytechnic at Kaljarani, Bathinda. Training courses and awareness camps were organized by Regional Research and Training Centre, Kaljarani, Bathinda, Regional Research and Training Centre Bhatoli, Talwara and Regional research and Training Centre Booh, Tarn Taran 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 Development, 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.

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.

Services for Fisheries: 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. A total of 53 women farmers were trained for bee-keeping, knitting and stitching & embroidery. Three women SHGs were linked with Banks for financial management. One women-SHG got FIRST PRIZE for best stall at Regional Kisan Mela organized at Kandi Regional Research Station, Ballawal Saunkhri (District SBS Nagar), Punjab.

Dr Bangali Baboo National Director (NAIP), and Dr A P Srivastava, National Coordinator (Component-III, NAIP) visited the operational area of the project on 07.04.2011 and had first hand experience from the beneficiary farmers. The team also reviewed the project on 09.04.2011 at the University Campus. A World Bank mission carried out the Tenth Implementation Support Mission (ISM) of the NAIP

from December 7-14, 2011. The mission held extensive discussions with senior officials of the Indian Council of Agricultural Research (ICAR), Project Implementation Unit (PIU), and the consultants working on internal audit and procurement. The mission also made field visit to the operational area of NAIP Sub-Project project in Hoshiarpur district on 09.12.2011.

The concerned farmers expressed their satisfaction about the working of the project and demanded similar additional activities in the area.

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 university 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 January 17-18, 2012. Around 22 renowned book sellers/ publishers from various parts of Northern India including New Delhi, Lucknow, Jaipur, Jodhpur, Rohtak and Ludhiana displayed books on the different disciplines of Veterinary, Animal Sciences, Dairy Technology, Fisheries, Biotechnology and allied areas. ICAR provided funds worth ₹ 50 lacs to University Library for purchase of books for students and faculty and for other purposes.

The library subscribed to 19 foreign Journals and 12 Indian Journals at a subscription cost of about 12 lacs during 2011. Library also subscribed to 13 newspapers and 9 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 2900 journals, has been installed. The online access to foreign journals was also provided. The library also provides CD server facility to its members.

The University Website (www.gadvasu.in) has been totally restructured and was released on March 04, 2011. 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. University Library has a video conferencing system and

two Asus monitors have been introduced to facilitate video conferencing. The National Informatics Centre (NIC), Govt. of India has provided the connectivity of 100 Mbps and equipment and 15 IP addresses for connectivity under the National Knowledge Network (NKN) project. The data inputs of GADVASU in National Information System on Agricultural Education Network (NISAGENET) have been initiated.

The library is in the process of establishment of Integrated University Management System (IUMS) for instant single point access to information and data retrieval through a secure medium.

SPORTS AND CO-CURRICULAR ACTIVITIES

During the period under report, university has created enough facilities to promote the sports activities among the students. Large number of students (both boys and girls) from various 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 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. The Table Tennis (M) team won the gold medal and Basketball (M) team won the silver medal in 13th All India Inter Agricultural Universities Sports and Games Meet held at Akola (Maharashtra) from Feb. 16-19, 2012. 6th Annual Athletic Meet of GADVASU was successfully conducted on March 14, 2012. In this meet, Ms Ramneet Kaur and Ms. Rubal were declared Best Athlete and 2nd Best Athlete, respectively in women section. Mr. Rajandeep and Mr. Ravinder Singh Chahal were declared Best Athlete and 2nd Best Athlete, respectively in men section.

2nd Youth Festival of the university was successfully conducted from Oct.7-14, 2011. The Cultural Activities Wing of the University also organized functions to celebrate Independence Day (Aug. 15, 2011), Republic Day (Jan. 26, 2012) and Birth Day Anniversary of Shri Guru Angad Dev Ji (April 18, 2011). The cultural contingent of GADVASU participated in 27th North Zone Inter University Youth Festival held from Nov. 22-26, 2011 at Lovely Professional University, Jalandhar and won prizes in various events.

ABOUT THE UNIVERSITY



Guru Angad Dev Veterinary and Animal Sciences University (GADVASU) was established on 9th Aug, 2005 at Ludhiana, Punjab by carving out the Veterinary Science College and related animal farm facilities from the Punjab Agricultural University, Ludhiana, and started functioning from 21st April, 2006. The university was created to act as a centre of excellence for teaching, research and learning in animal health and production.

Recognizing the importance of livestock sector and development in ensuring livelihood security, and 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 College of Fisheries, College of Dairy Science and Technology and Veterinary Polytechnic.

School of Animal Biotechnology was established in September 2010 with the mandate to integrate and strengthen the research in various facets of molecular biology with the aim of improving livestock productivity and health.

School of Public Health and Zoonoses was established in December, 2011 after upgradation of Department of Veterinary Public Health for addressing the issues of zoonoses, food safety, environmental pollutants, through research and collaboration with various agencies. School has International collaborative research project with University of Saskatchewan, Canada under International Partnership Fund Program to study impact of environmental pollutants on human and animal health. for teaching and research on diagnostic and prevention of zoonotic diseases, food safety and quality control; environmental hygiene and pollutants; and food borne pathogens and their toxins.

Three Regional Livestock Research and Training centres at Kaljharani (Bathinda), Talwara (Hoshiarpur) and Booh (Taran Taran) have been established for catering to the specific needs of the area. The ICAR has sanctioned two Krishi Vigyan Kendras to be established at Taran Taran and Mohali districts of Punjab for technology assessment, refinement and demonstration.

The University got accreditation 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

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 17 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.

Animal Disease Research Centre (ADRC) was started in year 1970. Thereafter the Department of Epidemiology and Preventive Veterinary Medicine came into existence in the year 1998 following inclusion of Epidemiology division from Department of Veterinary Public Health and Epidemiology and Preventive Medicine from the Department of Veterinary Medicine in addition to ADRC as per VCI Regulations 1994. Following the new guidelines of VCI 2008, the component of Veterinary Epidemiology has been merged with the Department of Veterinary Public Health, now renamed as Department of Veterinary Public Health and Epidemiology, and the component of Preventive Veterinary Medicine has been merged with the Department of Clinical Veterinary Medicine, Ethics and Jurisrudence, now redesignated as Department of Veterinary Medicine. The Animal Disease Research Centre has again started functioning as an Independent Unit. The centre is involved in investigation of outbreaks, disease forecasting, surveillance, monitoring and recommending a suitable line of control.

The Department of Veterinary Public Health has been upgraded to School of Public Health and Zoonoses on 30.12.2011 for teaching and research on diagnostic and prevention of zoonotic diseases; food safety and quality control; environmental hygiene and pollutants; and food borne pathogens and their toxins. The School has well equipped Residue Analysis Laboratory, Zoonoses lab, Food Safety and Quality Control Lab, Water testing lab, Brucellosis diagnostics laboratory. School has International collaborative research project with University of Saskatchewan, Canada under International Partnership Fund Program to study impact of environmental pollutants on human and animal health.

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 for 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 for B.V.Sc. & A.H. Regulations, 2008 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.	60 (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	105	Based on merit
Ph.D. in 15 subjects	40	Based on merit

COLLEGE OF DAIRY SCIENCE AND TECHNOLOGY



The College of Dairy Science and Technology has been established in 2008 at Ludhiana to meet the manpower requirements for milk processing sector and for evolving and transfer of appropriate milk processing technologies. Presently, the college is offering a 4-year degree program - B.Tech. (Dairy Technology). It is a unique job oriented course for the total development of highly professional dairy specialists through the value based education,

research and training in dairy science and technology for meeting the requirements of industry, research and development. The graduates during industrial training 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.

Objectives:

- To produce quality human resource through its undergraduate degree programme.
- To develop new technologies in the field of milk processing and dairy product development.
- To conduct training programmes 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 programme.

- 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
	2 (Nominees from other states which do not have colleges of Dairy Science and Technology (against additional seats)	Nomination by the State Government

COLLEGE OF FISHERIES



The College of Fisheries at Ludhiana was established in April, 2008 and is well equipped to undertake 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 practicals in aquaculture technologies, fishery resource management, fishery biology, post harvest processing, fisheries’ economics, marketing and extension. Project/thesis is the integral part of the program. The curriculum of Ph. D. in Aquaculture is also based on ICAR recommendations. Professional degree in Fisheries entitles the students for better job opportunities in the State Fisheries Departments/FFDAs, SAUs, Fishery colleges, Fisheries Research Institutes, KVKs, hatcheries and private fisheries sector including processing and export industries.

Goals and Objectives

- To develop professionally qualified human resource in fisheries and aquaculture by imparting comprehensive, quality and in-depth education.
- To undertake basic, applied and adaptive research to develop technologies for augmenting fish production from both fisheries and aquaculture resources.
- To provide technical service/consultancy to fish farmers, entrepreneurs, industry, government, semi-government, allied agencies and NGOs.
- To conduct need based vocational trainings in fisheries.
- 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.
- 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)	3	Merit based on qualifying exam
	2 (ICAR nomination)	Based on entrance test conducted by ICAR
Ph.D. (Aquaculture)	2	Merit based on qualifying exam
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)	6	Merit based on qualifying exam
	2 (ICAR nomination)	Based on entrance test conducted by ICAR
	6	JET of JNU, Delhi
Ph.D. (Animal Biotechnology)	4	Merit based on qualifying exam

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 for imparting Diploma in Veterinary Science & Animal Health Technology in 2010. 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

Program	Intake Capacity	Mode of Entrance
Diploma in Veterinary Science & Animal Health Technology	50	Merit based on qualifying exam

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 and training centre (RRTC)

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 centre 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.

REGIONAL LIVESTOCK AND POULTRY RESEARCH AND TRAINING CENTRE, BHATOLI (TALWARA)

A regional livestock and poultry research and training centre was established 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 managerial 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".

REGIONAL RESEARCH AND TRAINING CENTRE, BOOH (TARN TARAN)

With conservation and proliferation of Nili Ravi as one of its priority areas for research and development, GADVASU established one Regional Research and Training Centre for conservation, improvement and proliferation of Nili Ravi buffaloes in their natural habitat at Booh, district Tarn Taran. The specific objectives of the centre are:

- To conserve Nili Ravi buffaloes
- To improve its genetic production and reproduction potential
- To proliferate Nili Ravi germplasm through conventional and modern technology
- To enhance dairy production and improve socio-economic status of the farmers.

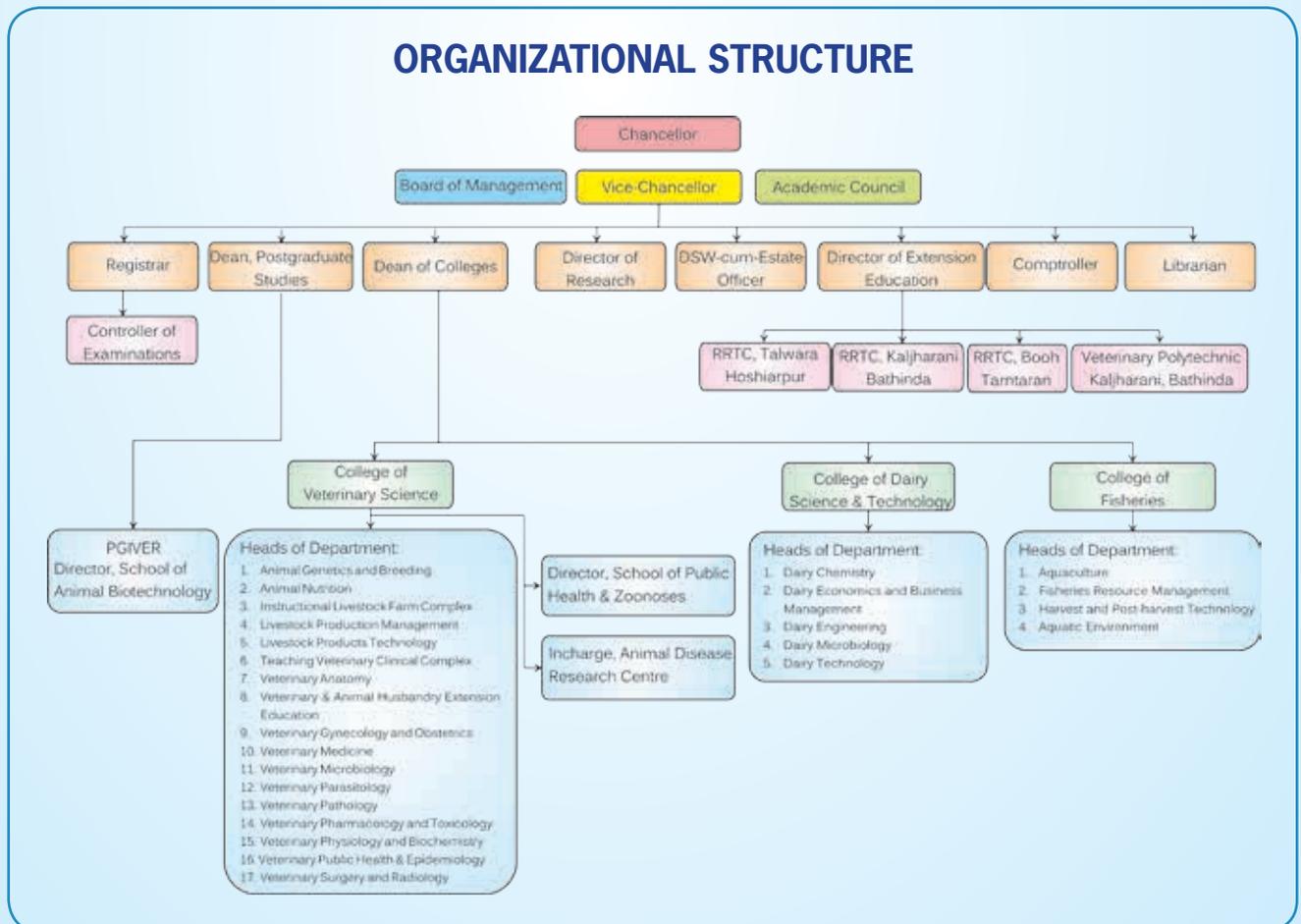
ORGANIZATIONAL SETUP OF THE UNIVERSITY

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.



ADMINISTRATION

BOARD OF MANAGEMENT

Honorary Chairman

- Shri Shivraj V Patil, His Excellency Chancellor and Governor of Punjab, Chandigarh

Working Chairman

- Dr. V.K. Taneja, Vice-Chancellor, Guru Angad Dev Veterinary & Animal Sciences University, Ludhiana

Ex-officio Members

- Sh. S.C. Agarwal, IAS, Chief Secretary to Govt. Punjab, Chandigarh-160 001
- Sh. N.S. Kang, IAS, Financial Commissioner (Dev.) & Principal Secretary to Govt. Punjab, Chandigarh
- Sh. Karan Bir Singh Sidhu, IAS, Principal Secretary to Govt. Punjab, Department of Finance, Chandigarh
- Sh. G.S. Sandhu, IAS, Financial Commissioner Department of Animal Husbandry, Dairy Development & Fisheries, Punjab, Chandigarh
- Dr. Harjinderjeet Singh Sandha, Director of Animal Husbandry, Punjab, Chandigarh
- Sh. Inderjit Singh, Director of Dairy Development Punjab, Chandigarh
- Sh. B.K. Sood, Director and Warden of Fisheries, Punjab, Chandigarh
- Dr. Gaya Prasad, Assistant Director General (Animal Health), ICAR, New Delhi
- Dr. S.N.S. Randhawa, Director of Research, Guru Angad Dev Veterinary & Animal Sciences University, Ludhiana

Secretary

- Dr. P.D. Juyal, Registrar, Guru Angad Dev Veterinary & Animal Sciences University, Ludhiana

Special Invitee

- Dr. B.S. Dhillon, Vice-Chancellor, Punjab Agricultural University, Ludhiana
- Dr. N. S. Sharma, President, GADVASU Teacher's Association

ACADEMIC COUNCIL

Chairman

- Dr. V.K. Taneja, Vice-Chancellor, Guru Angad Dev Veterinary & Animal Sciences University, Ludhiana

Members

- Dr. S.N.S. Randhawa, Director of Research
- Dr. S.N.S. Randhawa, Dean, Postgraduate Studies (Additional Charge)
- Dr. H.S. Sandhu, Dean, College of Veterinary Science
- Dr. Asha Dhawan, Dean, College of Fisheries (Additional charge)
- Dr. R.S. Sahota, Director of Extension Education (Additional charge)
- Dr. S.P.S. Sangha, Dean, College of Dairy Science & Technology (Additional Charge)
- Dr. Asha Dhawan, Head, Department of Aquaculture
- Dr. Kirti Dua, Head, Dept. of Vety. Medicine
- Dr. M.P. Gupta, Incharge (Animal Disease Research Centre)
- Dr. N.K. Sood, Head, Dept. of Vety. Pathology
- Dr. N.S. Saini, Head, Dept. of Vety. Surgery & Radiology

Special Invitee

- Dr. S.P.S. Sangha, Director Students' Welfare-cum-EO
- Dr. Sushil Prabhakar, Controller of Examinations
- Dr. G.S. Brah, Director, School of Animal Biotechnology
- Dr. S.K. Jand, Principal, Khalsa College of Vety. & Animal Sciences, Amritsar
- Dr. N.S. Sharma, President, GADVASU Teacher's Association

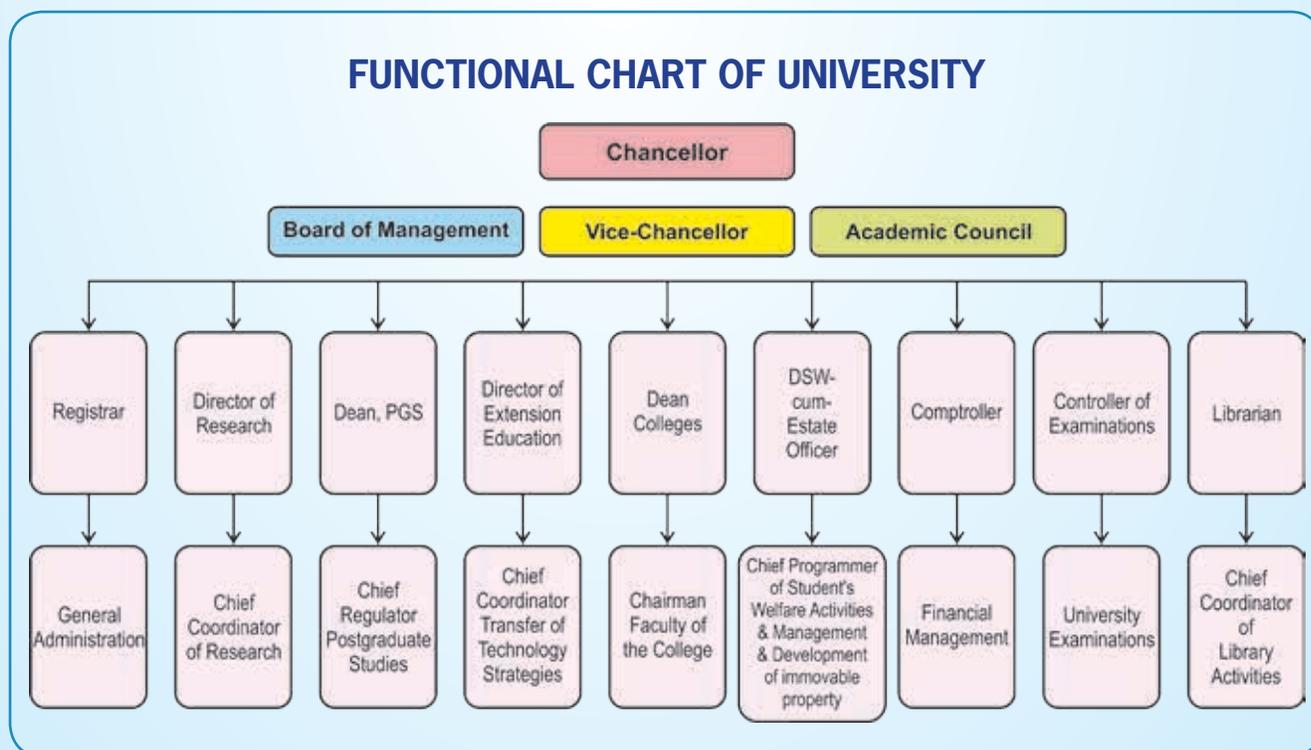
Secretary

- Dr. P.D. Juyal, Registrar, Guru Angad Dev Veterinary & Animal Sciences University, 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. R.S. Sahota
Dean, Post Graduate Studies	Dr. S.N.S. Randhawa*
Dean, College of Veterinary Science	Dr. H.S. Sandhu
Dean, College of Dairy Science and Technology	Dr. S.P.S. Sangha*
Dean, College of Fisheries	Dr. (Mrs.) Asha Dhawan
Director Students Welfare-cum-Estate Officer	Dr. S.P.S. Sangha
Librarian	Dr. R.S. Brar
Comptroller	Sh. K. R. Rohella

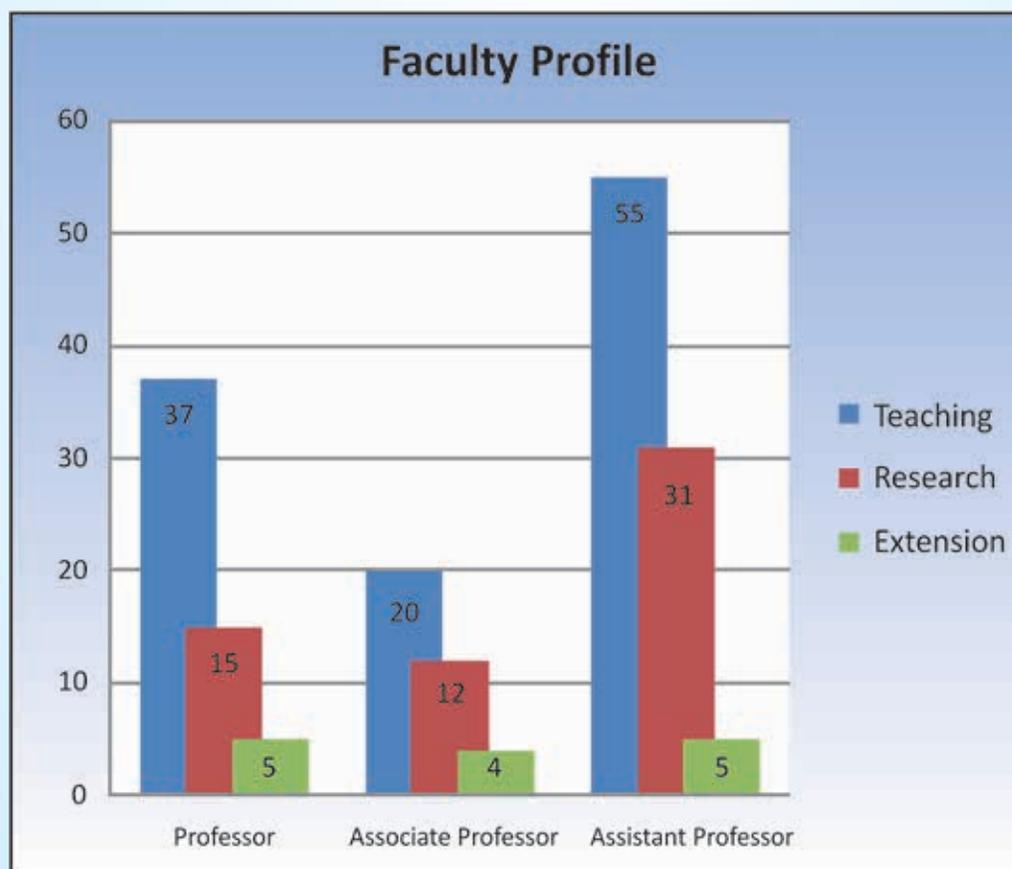
*Additional charge

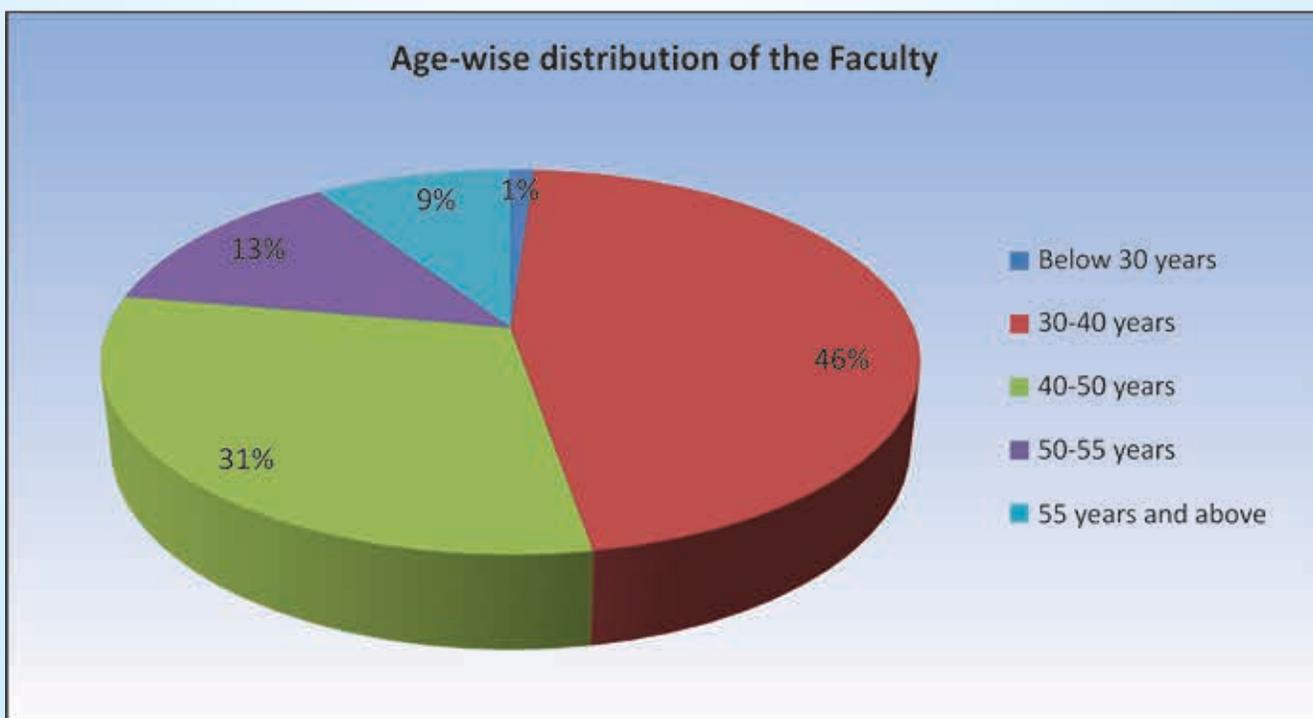
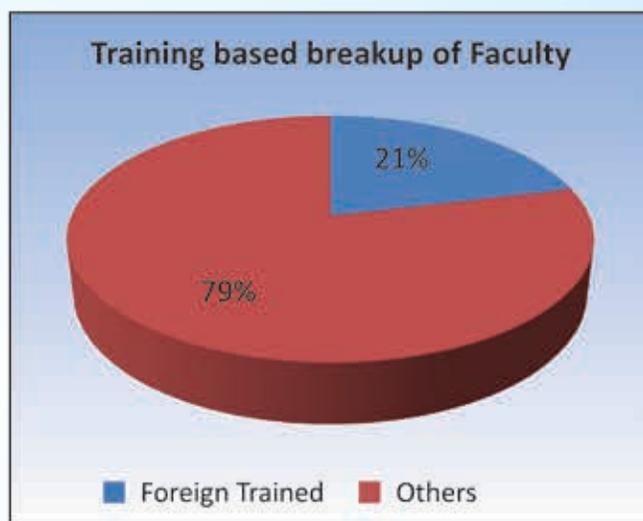
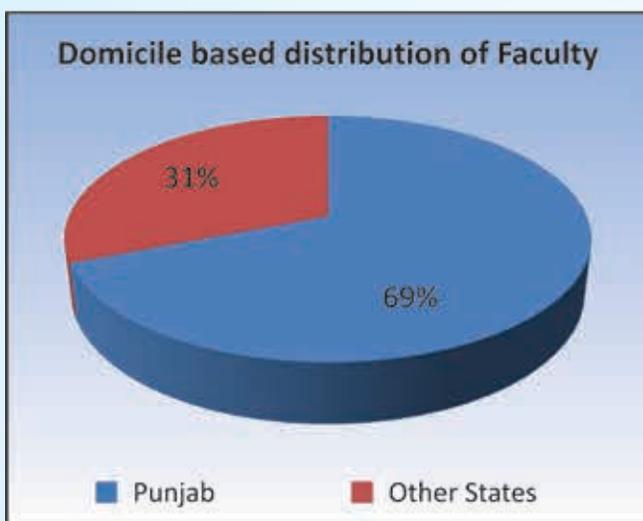
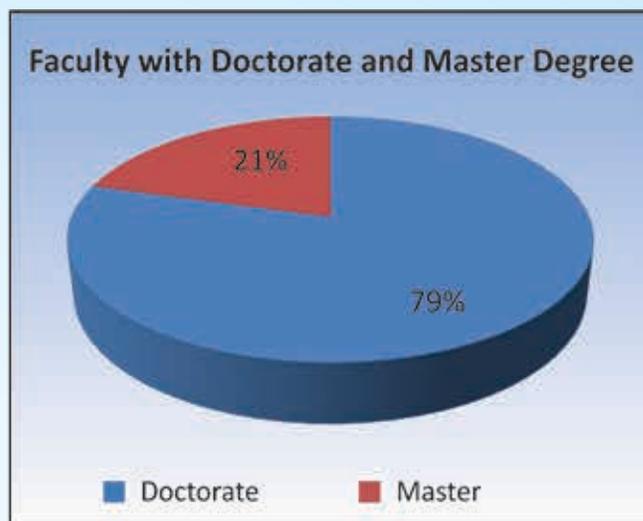
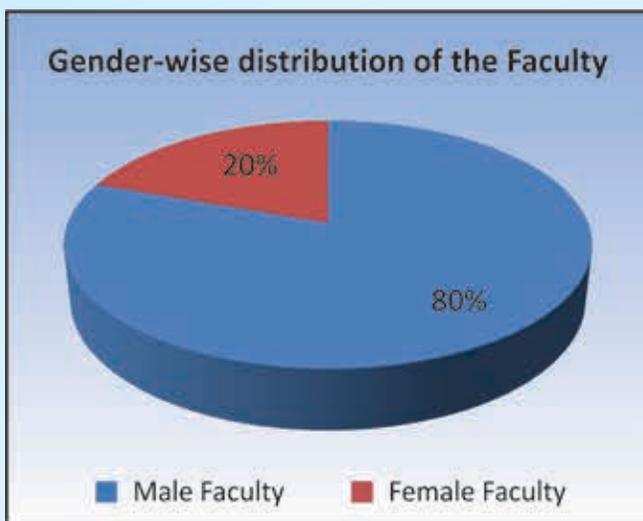


FACULTY PROFILE

S. No.	Institution	Professor	Associate Professor	Assistant Professor	Total Faculty
1	College of Veterinary Science	52	33	63	148
2	College of Dairy Science & Technology	0	0	10	10
3	College of Fisheries	2	1	7	10
4	School of Animal Biotechnology	2	1	6	9
5	Veterinary Polytechnic	1	1	1	3
6	Others	0	0	4	4
	Total Faculty	57	36	91	184*

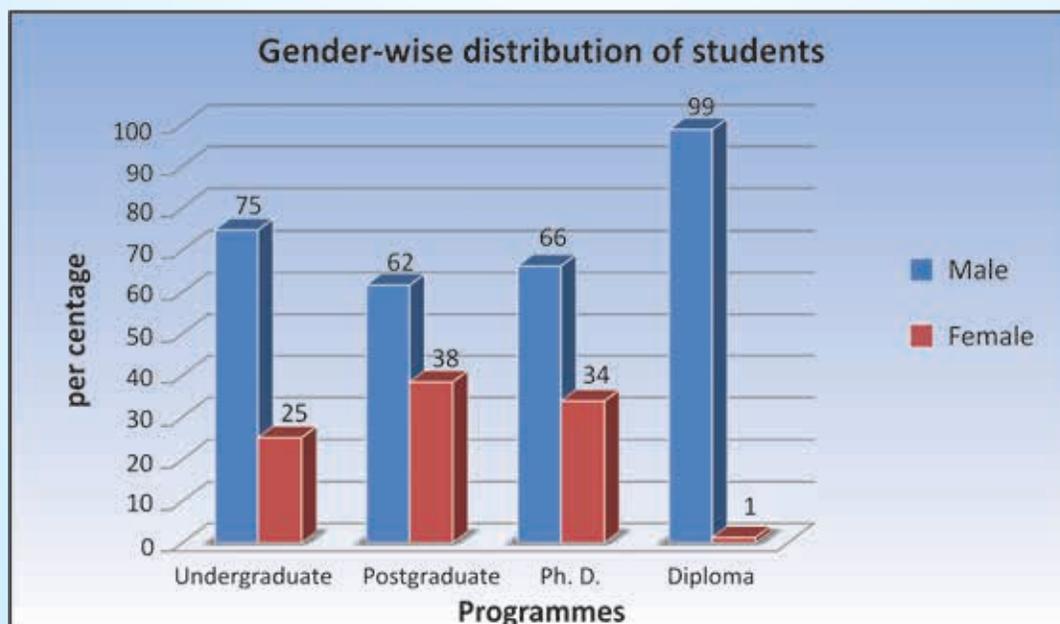
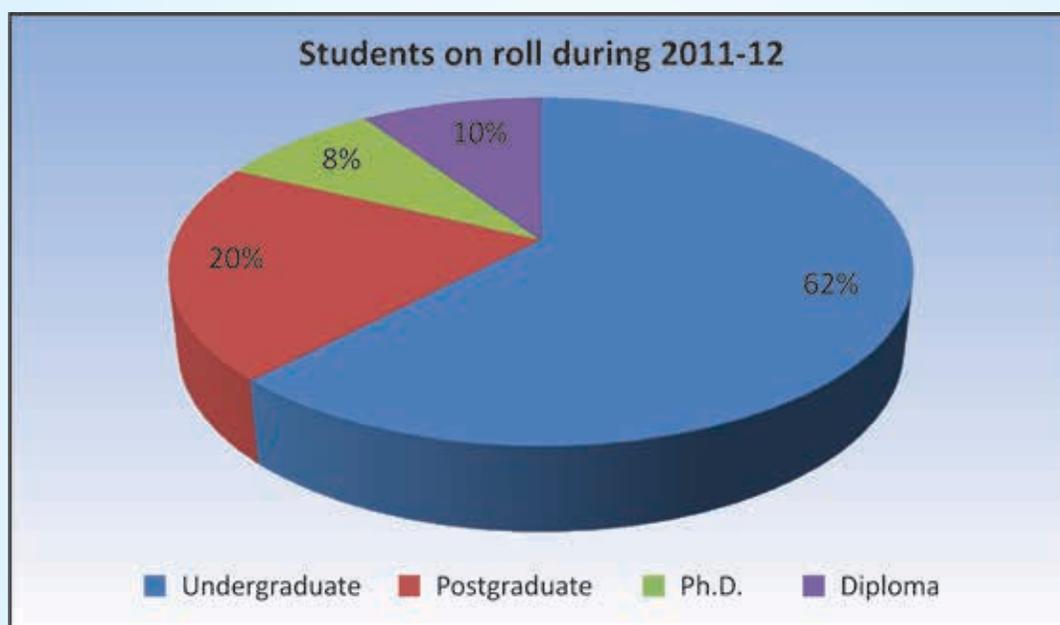
*includes 4 faculty members working on contract basis





STUDENT PROFILE

Programme	Boys	Girls	Total
B.V.Sc. & A.H.	284	90	374
B.F.Sc.	21	30	51
B. Tech. (Dairy Tech.)	91	13	104
M.V.Sc./M.F.Sc./M.Sc	106	66	172
Ph. D.	47	24	71
Diploma in Veterinary Science and Animal Health Technology	79	1	80
Total	628	224	852

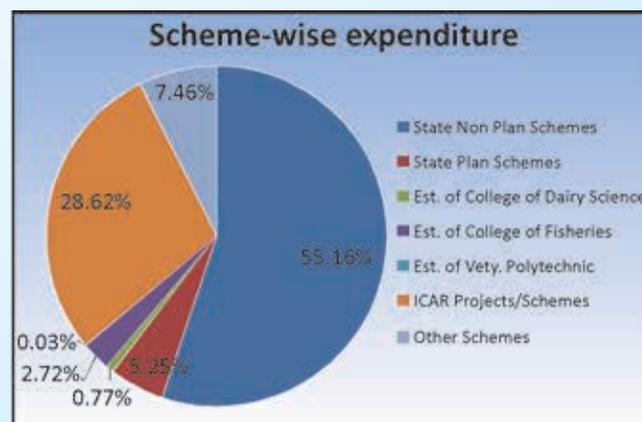
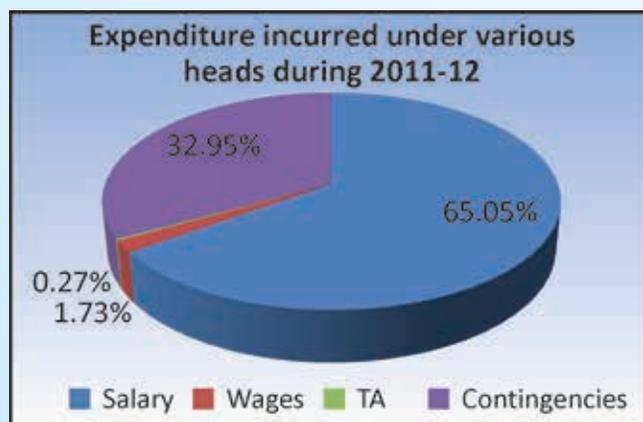
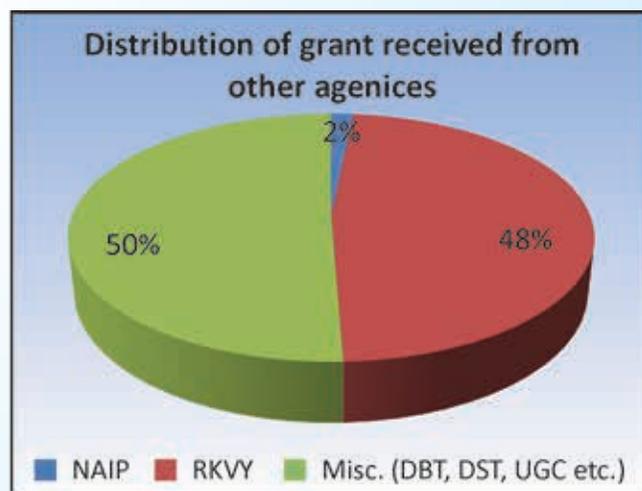
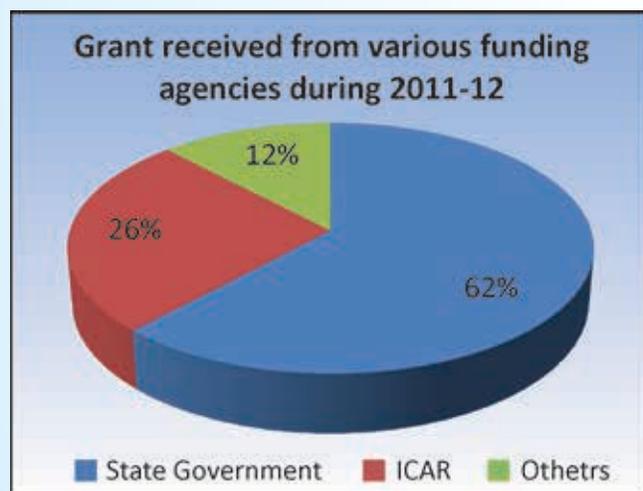


BUDGET

The university received ₹4374.12 lacs from State Government which includes ₹4050 lacs for different research projects under non-plan schemes, ₹236.42 lacs under plan schemes and ₹87.70 lacs for Est. of Veterinary Polytechnic. Grant received from ICAR was ₹1832.72 lacs which included ₹480.99 lacs for arrears, ₹423.98 lacs as development grant and ₹927.75 lacs for various research projects/schemes. Grant received from other agencies was ₹855.97 lacs which included ₹13.93 lacs under NAIP, ₹408.83 lacs under RKVY and ₹433.21 lacs under various other projects granted by DBT, DST, UGC etc. The total expenditure for the year 2011-12 was ₹7423.40 lacs which includes ₹4828.96 lacs for salary, ₹2445.98 lacs for contingencies, ₹128.40 lacs for wages and ₹20.06 lacs for T.A.

(₹ in lacs)

Schemes	Grant Received	Expenditure		
		Salary	Contingency, T.A., Wages	Total
State Non Plan Schemes	4050.00	3738.00	356.56	4094.56
State Plan Schemes	236.42	206.33	183.69	390.02
Est. of College of Dairy Science	0.00	53.03	3.89	56.92
Est. of College of Fisheries	0.00	42.32	159.81	202.13
Est. of Vety. Polytechnic	87.70	0.54	1.43	1.97
ICAR Projects/Schemes	1832.72	732.83	1391.37	2124.21
Other Schemes	855.97	55.91	497.68	553.59
Total	7062.81	4828.96	2594.44	7423.40



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 were strictly on the basis of entrance examinations conducted by the Controller of Examinations.

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

Test	Date of Test	Number of Applications Received	Number of Candidates appeared in the test
Common Entrance Test (CET-2011) for admission to undergraduate programs of the university i.e B.V.Sc. & A.H./ B.F.Sc./ B. Tech (Dairy Technology)	22.06.2011	1197	1014

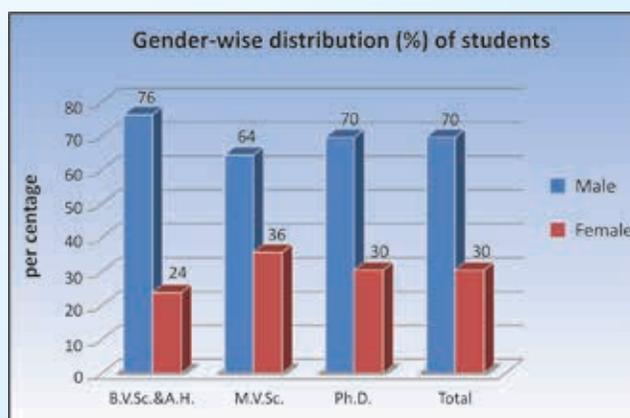
The detail of admissions made in various undergraduate and postgraduate programs for the academic session 2011-12 is as below:

Program	General/ Reserve Categories	VCI/ICAR/ State Govt. Nominations	NRI Seats/ Foreign Nationals	Total
B.V.Sc. & A.H.	62	6	12	80
B.F.Sc.	20	1	-	21
B. Tech. (Dairy Technology)	28	2	-	30
M.V.Sc.	56	44	1	101
M.V.Sc./M.Sc. (ABT)	6	6	-	12
M.F.Sc.	-	1	-	1
Ph.D.	23	-	-	23
Diploma in Veterinary Science and Health Technology	50	-	-	50
Grand Total				318

COLLEGE OF VETERINARY SCIENCE

The total number of students admitted in the College of Veterinary Science for the session 2011-12 was 204, which included 80 in B.V.Sc. and A.H., 101 in M.V.Sc. and 23 in Ph.D program. Among 204 students admitted, 142 were male and 62 were female.

During 2011-12, a total of 140 students' successfully completed their degrees, of which 100, 37 and 3 students completed B.V.Sc. & A.H., M.V.Sc. and Ph. D. programs, respectively in different disciplines.



Scholarships/Fellowships

The university awards merit scholarships to students for academic excellence. During 2011-12, university merit scholarship was given to 42 undergraduate, 21 M.V.Sc. and 11 Ph. D students. Sixteen undergraduate students admitted through an all India entrance examination were awarded National Talent Scholarship. Junior Research Fellowship of ICAR was awarded to 10 M.V.Sc students and Senior Research Fellowship to one Ph.D student. Twenty four students received fellowships/scholarships from other societies like Animal Science Scholarship (1), Government of India Fellowship to Backward Class (1), Post Matric Scholarship (5) and Means cum minority scholarship (17).

Courses Taught

The undergraduate students of the college were offered courses as per the course curriculum of Veterinary Council of India. The 1st 2nd and 3rd 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 57 courses in the Semester I and 62 courses in Semester II according to the new guidelines and 43 courses in Semester I and 21 courses in Semester II as per the old guidelines. Postgraduate students were offered courses in their respective major, minor and supporting field as approved by the Dean, Postgraduate Studies.

THESIS/DISSERTATIONS

Master of Veterinary Science

Sr. No.	Name	Month & Year of completion	Major Subject and Title of Thesis
1.	Brij Mohan Yadav	April, 2011	VETERINARY SURGERY & RADIOLOGY "Clinical studies on standardization of echocardiographic indices in dogs."
2.	Ripil Kharbanda	June, 2011	VETERINARY MICROBIOLOGY "Studies on molecular detection of <i>Mycobacterium avium subsp. paratuberculosis</i> in cattle."
3.	Deepti Bodh	August, 2011	VETERINARY SURGERY & RADIOLOGY "Evaluation of propofol and isoflurane for general anaesthesia under midazolam -butorphanol premedication in bovine".
4.	Bhavana Gupta	August, 2011	VETERINARY PUBLIC HEALTH "Prevalence and Characterization of Major Foodborne Pathogens in fish and fish products."
5.	Raghav Sharma	September, 2011	VETERINARY SURGERY & RADIOLOGY "Clinical studies on the diagnostic and therapeutic options for prostate affections in dogs"
6.	Shabir Ahmad Dar	September, 2011	VETERINARY PHARMACOLOGY & TOXICOLOGY "Toxicological and Antioxidant Profile in Cypermethrin Induced Toxicity in Buffalo Calves".
7.	Tsewang Dorjay	September, 2011	VETERINARY PHARMACOLOGY & TOXICOLOGY "Effects of cadmium and Imidacloprid on Hematology and Biochemical Parameters of Buffalo Calves".
8.	Nitin Mohan Gupta	September, 2011	ANIMAL GENETICS & BREEDING "Studies on disposal pattern and stay ability in Murrah buffaloes at an organized farm."
9.	Manisha Chauhan	September, 2011	VETERINARY & ANIMAL HUSBANDRY EXTENSION "A study on the utility pattern of Animal Husbandry related information sources by dairy farmers of Punjab".
10.	Parminder Singh	September, 2011	LIVESTOCK PRODUCTS TECHNOLOGY "Efficacy of different flours and natural preservatives on the processing and storage quality of chicken meat caruncles".

Sr. No.	Name	Month & Year of completion	Major Subject and Title of Thesis
11.	Rodge Swapnil Chhaganlalji	September, 2011	VETERINARY MICROBIOLOGY "Studies on Cytokine Profile of Bovine Peripheral Blood Mononuclear cells in response to <i>Pasteurella multocida</i> B:2".
12.	Shalini Pandey	September, 2011	VETERINARY MICROBIOLOGY "Isolation, characterization of brucellaphages and evaluation of their in vitro lytic activity".
13.	Virendra Singh	September, 2011	LIVESTOCK PRODUCTS TECHNOLOGY "Development and Quality Evaluation of Shelf-Stable Chicken Meat Biscuits using Hurdle Technology".
14.	Jasvinder Singh Sasan	September, 2011	VETERINARY ANATOMY "Quantitative and histological studies on ovarian follicles of buffaloes in different seasons".
15.	Satender Kumar	September, 2011	VETERINARY ANATOMY "Study on prenatal development of spinal cord in Indian buffalo (<i>Bubalus bubalis</i>)."
16.	Bhole Gajanan Shrinivas	September, 2011	VETERINARY MICROBIOLOGY "A Study on the Development of a DIVA Strategy for Haemorrhagic Septicaemia".
17.	Ajay Singh	September, 2011	VETERINARY SURGERY & RADIOLOGY "Studies on diagnostic approaches and involvement of vagus nerve in forestomach and abomasal disorders in bovine".
18.	Rohit Gupta	September, 2011	LIVESTOCK PRODUCTION MANAGEMENT "Effects of different cooling systems on the performance of broiler chicks".
19.	Parampal Singh	September, 2011	VETERINARY SURGERY & RADIOLOGY "Echocardiography and Doppler studies of canine heart in health and disease"
20.	Anshul Kumar Khare	September, 2011	LIVESTOCK PRODUCTS TECHNOLOGY "Development of shelf-stable chicken noodles using hurdle technology".
21.	Sayar Ahmad Mir	October, 2011	ANIMAL NUTRITION "Effect of exogenous fibrolytic enzymes on the nutrient utilization of wheat straw in buffaloes".
22.	Maqsood Ahmed Ganie	October, 2011	VETERINARY GYNAECOLOGY & OBSTETRICS "Enhancing postpartum fertility with supplementary feeding of glucogenic precursor (calcium propionate) and rumen inert fat supplement in dairy buffaloes."
23.	Aditi	October, 2011	VETERINARY PHARMACOLOGY & TOXICOLOGY "Pharmacokinetics and urinary excretion of pazufloxacin in buffalo calves".
24.	Gousia Nazir	October, 2011	VETERINARY GYNAECOLOGY & OBSTETRICS "Effect of Flaxseed supplementation of PGF 2α secretion and conception rate in buffaloes".
25.	Asif Ali Ganie	October, 2011	LIVESTOCK PRODUCTION MANAGEMENT "Effects of different cooling systems on laying performance of pullets".
26.	Daundkar Prashant Sudamrao	October, 2011	VETERINARY PHARMACOLOGY & TOXICOLOGY "Evaluation of Ameliorative effect of Selenium on Carbendazim induced endocrine disruption in male goats".

Sr. No.	Name	Month & Year of completion	Major Subject and Title of Thesis
27.	Gavhane Dnyaneshwar Shivaji	October, 2011	VETERINARY PATHOLOGY “Studies on Evaluation of Stem Cell Lineage in Canine Mammary Tumor”.
28.	Rajesh Bhardwaj	October, 2011	ANIMAL NUTRITION “Effect of compensatory feeding on the performance of feed restricted buffalo calves.”
29.	Sashitola Ozukum	October, 2011	CLINICAL VETERINARY MEDICINE, E & J “Surveillance, Clinico-Haematological and therapeutic studies on mineral imbalances in dairy animals of Bathinda district of Punjab”.
30.	Nasheema Siddique	October, 2011	CLINICAL VETERINARY MEDICINE, E & J “Surveillance, Clinico-Haematological and therapeutic studies on mineral imbalances in dairy animals of Muktsar district of Punjab”.
31.	Dilpreet Kaur	October, 2011	VETERINARY MICROBIOLOGY “Development of a multiplex latex agglutination assay with serotype specific peptides of FMD virus for differential diagnosis.”
32.	Harpeet Kaur	October, 2011	VETERINARY PUBLIC HEALTH “Studies on the pesticide residues in green fodder dry roughages and concentrate feed in Punjab.”
33.	Parul Sharma	October, 2011	VETERINARY PARASITOLOGY “Application of real time polymerase chain reaction for diagnosis of <i>Trypanosoma evansi</i> infection in Cattle and Buffaloes”.
34.	Mirza Rizwan Baig	November, 2011	VETERINARY PATHOLOGY “Studies on molecular and signaling pathways of Epithelial-Mesenchymal transition in canine mammary tumor”.
35.	Nasir Hafiz Zargar	November, 2011	VETERINARY PUBLIC HEALTH “Studies on Pesticides Residues in Fish available in Punjab”
36.	Mugale Madhav Nilakanth	November, 2011	VETERINARY PATHOLOGY “Rabies in Animals: Post vaccinal serological response; and comparison of diagnostic techniques”.
37.	Harleen Kaur	November, 2011	VETERINARY SURGERY & RADIOLOGY “Studies on locking compression T-plates and cross pinning for fixation of proximal/distal third long bone fractures in canine.”

Ph. D. Program

Sr. No.	Name	Month & Year of completion	Major Subject and Title of Thesis
1.	Kuldip Gupta	April, 2011	VETERINARY PATHOLOGY “Pathological and immuno histochemical studies on canine mammary tumours with emphasis on diagnostic and prognostic aspects”
2.	Mandeep Singh	April, 2011	VETERINARY PARASITOLOGY “Studies on molecular and parasitological diagnosis of <i>Trypanosoma evansi</i> infection”.
3.	Balvir Bagicha Singh	August, 2011	VETERINARY PUBLIC HEALTH “Molecular epidemiology of echinococcosis in northern India and its public health significance”.

Internship Program

After completion of course work in nine semesters, 92 B.V.Sc. and A.H. students of 2006 Batch were registered to the six months compulsory internship programme. The students underwent training program in 6 departments (Clinical Veterinary Medicine, Epidemiology and Preventive Medicine, Veterinary Surgery and Radiology, Veterinary Gynaecology and Obstetrics, Livestock Production Management/ Veterinary Pathology and Teaching Veterinary Clinical Complex) for a total period of 6 months.

All India Study Tour

Fifty three students of 2007 Batch participated in all India Tour in January 2012. The students visited various Veterinary Colleges, National Institutes, Laboratories and places of academic interest at Mumbai, Goa, Bangalore, Chennai and Hyderabad.



Students of B.V.Sc. and A.H. (2007 batch of College of Veterinary Science) visited Veterinary College, Bangalore during the Educational Tour

R&V Sqn NCC Unit

1st Punjab R&V Sqn NCC, 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 1 Punjab R&V Sqn NCC, GADVASU- Ludhiana during the year 2011-2012, are as under:

- 97 Cadets (SD 75 & SW 22) of this unit attended Combined Annual Training Camp from Oct. 4, 2011 to Oct. 23, 2011 at Government College for Boys Ludhiana. During the camp the cadets were imparted rigorous training in drill, physical training, weapon training and firing etc.
- On Oct. 4, 2011, 20 cadets from College of Veterinary Science, participated in a painting competition held at 1 Punjab R&V Sqn NCC, GADVASU, Ludhiana with the motto "Save Environment Save Life".

- During the NCC week cadets took part in various activities like Village visit, Run for fun, Old age home visits etc.
- 'MY EARTH MY DUTY' a tree plantation programme was organized at 1 Punjab R&V Sqn NCC, in which 40 Cadets from College of Veterinary Science participated & planted about 40 saplings of various trees.
- 116 Cadets appeared in Cert 'B' exam on Feb. 5, 2012.
- 23 Cadets appeared in Cert 'C' exam on Feb. 19, 2012.
- 05 Cadets participated in various equestrian activities during Republic Day Camp and Prime Minister Rally 2012 and won two Gold Medals and three Silver Medals.



"MY EARTH - MY DUTY" - Tree plantation drive celebration at 1 Pb. R & V Sqn NCC of GADVASU, Ludhiana



Equestrian show by NCC Cadets

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 department also provides physical facilities for training of undergraduate and postgraduate students; organize internship programme, provide regular ambulatory service to rural areas; organize 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.

Specialized services for disease diagnosis and treatment of animals

- Ultrasonography in Large and small animals
- Computerized radiography in large and small animals
- Laparoscopy in small animals
- 24 hrs emergency services to the farmers and pet owners

Clinical Cases in the hospital during 2011-12

	Medicine	Surgery	Gynae	Total
Small Animal	14757	4074	731	19562
Large animal	3331	1712	756	5799
Ambulatory	195	190	402	787
Total	18088	5786	1487	25360

Total Number of Lab Samples tested during 2011-12

Pathology	5458
Parasitology	4032
Biochemistry	1973
Microbiology	524
Total	11987



Echocardiography Unit

COLLEGE OF DAIRY SCIENCE AND TECHNOLOGY

During the session 2011-12, the total admissions made in undergraduate programme in B. Tech. (Dairy Technology) were 30. Among these 26 were male students and 4 were female students.

Scholarships/Fellowships

NTS scholarship was given to 6 students and two students received Merit-cum-Means Scholarship, one student each received Guru Harkishan Society Scholarship and PM Scholarship.

Courses Taught

The undergraduate students were offered courses as per the recommendations of 4th Dean's committee constituted by ICAR, New Delhi. The B. Tech. students were offered 22 courses in 1st Semester and 24 courses in 2nd semester.

Internship Programme:

- 20 students of 4th year B. Tech (Dairy Technology) programme underwent 1st 6 months of In-plant training from July–December, 2011 in various milk plants of MILKFED, Punjab.
- 3 students of 4th year B. Tech (Dairy Technology) programme are undergoing their 2nd semester of In-plant training NESTLE, Moga
- 2 students of 4th year B. Tech (Dairy Technology) programme are undergoing their 2nd semester of In-plant training in Schreiber Dynamix Dairy Ltd., Baramati (Pune)

All India Study Tour

Seven days-All India Study Tour was conducted from December 15-22, 2011. This was the first All India Study Tour from College of Dairy Science & Technology. 20 students of final year of B. Tech. (Dairy Technology) programme attended the study tour programme.



Faculty of College of Dairy Science & Technology with Dr. VK Taneja and Dr. SPS Sangha during launching of Yog-Ice Cream – A traditional Ice cream coupled with the taste and flavour of yoghurt

COLLEGE OF FISHERIES

Total number of students admitted during 2011-12 in various programs of College of Fisheries were 23, which included 21 in B.F.Sc., 1 in M.F.Sc. and 1 in Ph.D. Out of these, 9 were male and 14 were female students. The percentage of girl students in B.F.Sc. was 60.86 per cent.

Scholarships/Fellowships

University merit scholarship/fellowship was provided to 11 undergraduate and 3 postgraduate students. ICAR scholarship (NTS) was given to 3 undergraduate students.

Courses Taught

The undergraduate students of the college were offered courses as per recommendations of the 4th Dean's Committee of the ICAR. The students were offered 23 courses in the Semester I and 25 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

Name	Month & Year of completion	Title of Thesis
Neha Saxena	November, 2011	Effect of Different Diets on Gonadal Maturity of an Indian Major Carp, <i>Labeo rohita</i> (Ham.)

NSS Activities

- 14 B.F.Sc. students participated in 7 days NSS Summer Camp from June 8-14, 2011.
- 14 B.F.Sc. students participated in 7 days NSS Winter Camp from Dec. 7-13, 2011.
- Mr. Balwinder Singh, B.F.Sc. 2nd year student participated in "National Youth Festival and Convention" under NSS at Mangalore from January 8-19, 2012.
- Mr. Ram Rattan Singh, B.F.Sc. 3rd year student participated in Winter Adventure Camp at Bikaner (Rajasthan) as NSS Volunteer from January 19-26, 2012.



Participants and Teacher Incharge of NSS Special Winter Camp organized by NSS wing of GADVASU with the motto "Tandrust Naujawan Tandrust Punjab"



Blood donation camp organized by the NSS wing of GADVASU in association with State Blood Transfusion Council (SBTC) during the NSS Special Winter Camp



Awareness Campaign and Cleanliness Drive by NSS volunteers of GADVASU

SCHOOL OF ANIMAL BIOTECHNOLOGY

During the session 2010-11, a total of 16 students have been admitted; 12 in M.V.Sc./M.Sc. Animal Biotechnology and 4 in Ph. D. Animal Biotechnology. Out of 16 students, 62.5% (10/16 students) were female and 37.5% (6/16 students) were male.

Scholarships/Fellowships

Seven 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 1 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, 14 for Masters and 6 for Ph. D.

THESIS/DISSERTATIONS

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

Sr. No.	Name	Month & Year of completion	Title of Thesis
1	Rohini Sachdeva	October, 2011	"Isolation and Molecular Characterization of Canine Distemper Virus."
2	Mutayomba Sylvestre	August, 2011	"Eukaryotic Expression and Characterization of BHV-1 glycoprotein D (gD) as a potential diagnostic antigen".
3	Jasdeep Singh	August, 2011	"Sex Chromosome Specific Microsatellite Polymorphism in Chicken".
4	Murigo Laurent	September, 2011	"Sex Chromosome Specific Microsatellite Polymorphism in Chicken".
5	Pallvi	November, 2011	"Microsatellite based polymorphism in Japanese quails."
6	Jagdeep Singh	November, 2011	"Cloning, sequencing and expression of immunodominant outer membrane protein OMP31 from <i>Brucella SPP</i> ".

VETERINARY POLYTECHNIC & RRTC, KALJHARANI

During the session 2011-12, the total admissions made in undergraduate programme in Diploma in Veterinary Science and Animal Health Technology were 50. All the candidates admitted were male students.

Courses Taught

The diploma students were offered 11 courses in 1st Semester and 6 courses in 2nd semester.



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 2011-12, a total of 80 new project proposals were submitted to various funding agencies, viz. University Grants Commission (37), Department of Biotechnology (14), Department of Science and Technology (10), Indian Council of Medical Research (2), State Government (4), Indian Council of Agricultural Research (5), International (1), Council of Scientific and Industrial Research (2), and others (5).

During the year 2011-12, a total of 137 research schemes were operational in the university as detailed below:

Non Plan Schemes	40
Plan Schemes	9
ICAR Schemes	20
Revolving Fund Schemes	04
Miscellaneous Schemes	32
RKVY ongoing Schemes	16
RKVY new Schemes	16
Total	137

COLLEGE OF VETERINARY SCIENCE

Animal Genetics and Breeding

Cattle Breeding

The Crossbreeding Project for the genetic improvement of cattle maintained at Dairy Farm of GADVASU showed



HF Crossbred Cow

an upward trend in all the milk production traits. The average complete lactation milk yield of crossbred cattle was recorded 6604 kg. The average 305-day milk yield and peak yield were recorded as 5149 kg and 26.6 kg, respectively with the wet average of 13.96 kg. The average milk yield of the elite herd being used for the production of future crossbred bulls was 6027 kg with the peak yield of 30.8 kg. Maximum 305-day milk yield and peak yield recorded were 7496 kg and 40.3 kg, respectively in the herd. Five young crossbred bulls were selected for use under collaborative Field Progeny Testing Project of ICAR. For the genetic improvement of cattle population of the 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.



HF Crossbred Bull

Buffalo Breeding

The genetic improvement of buffaloes is being done through progeny testing of bulls. The All India Coordinated Research Project on Buffalo breeding is in operation at the Dairy Farm of department of Animal Genetics & Breeding since 1971. The best buffalo bulls are selected on the basis of performance of daughters produced at GADVASU Ludhiana, NDRI Karnal, CIRB Hisar, CCS HAU Hisar & IVRI Izzatnagar and in the villages around Hisar, Ludhiana and Karnal.

The average 305-day milk yield of general herd of buffaloes was 2466 kg with complete lactation milk yield of 2836 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



Murrah Buffalo

and 14.9 kg, respectively. A Murrah buffalo no. P 2489 has created a new record at the dairy farm since inception by producing 4636 kg milk in 305 days and 6131 kg milk in its complete lactation. 31441 doses of frozen semen and 2119 ml chilled semen were supplied to the farmers and other dairy development agencies for improvement of buffalo population in the state. 31 buffalo breeding bulls/bull calves were sold to farmers for breeding purposes.

The semen of test bulls were also supplied to 24 AI Centres adopted under the Field Progeny Testing Project and daughters were ear tagged for future recording of milk production.

Studies on age at attainment of semen freezability vis-à-vis semen characteristics and fertility in Murrah buffalo bulls suggested that the breeding bulls should be selected at an appropriate age of sexual maturity i.e. >2.75 years, for inclusion in breeding programme to meet the frozen semen production targets. Studies on effect of seasonal variations on the frequency of static ejaculate and discard rate in Murrah buffalo bulls showed that only 49.62% of static semen ejaculates and 61.50% of normal semen

ejaculates were effectively used for cryopreservation. Higher discard rate of normal ejaculates in winter showed that spermatozoa are unable to withstand the cold shock due to low temperature during this period.

Embryo transfer Technology (ETT)

With the objective of production of dairy animals of high genetic merit through multiple ovulation and embryo transfer (MOET), During last one year, a total of 25 cows were super ovulated in the field which lead to an average embryo recovery rate of 5.08 per animal with a transferable embryo recovery rate of 1.92. Of the 23 embryos transferred, 06 and 03 recipients became pregnant on rectal and non return basis, respectively. Twenty five transferable embryos were recovered frozen at field level. Also super ovulation of an elite cow at the university dairy farm resulted in a transferable embryo recovery rate of 6.0. The embryo production work was also initiated in elite buffaloes. Under this programme a total of five buffaloes were super ovulated and an average embryo recovery rate of six embryos per animal was achieved. Transferable embryo recovery rate was found to be 3.2 in buffalos. All the transferable embryos obtained were frozen.

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 percent per month. The bird is hardy and suited to small farmers with low inputs. From 2005 to 2012, the egg production has upto 40 weeks improved from 98 to 126 while egg weight improved from 55 to 58.0g.



Murrah Buffalo Bull



White Leghorn Satluj Layer

Rhode Island Red

The stock developed at GADVASU from two strains of RIR has been named as Punjab Red. Rhode Island Red (RIR) female is considered to be a hardy and dual purpose bird and thus well suited for small farmers. Therefore, to help improve the rural economy, the strains have been taken up for genetic improvement and multiplication at GADVASU, Ludhiana. The birds lay tinted (brown) eggs and are thus popular in rural areas of the state. It lays 250-260 eggs in a year with an average egg weight of 53g. GADVASU 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 110,106 & 98 eggs, respectively to the age of 40 weeks during the current year with an average egg weight ranging from 52 to 55.0g. The stock is expected to be more popular with the small/marginal farmers as brown eggs fetch higher price. 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.

Broiler Breeding

The commercial broiler (IBL-80) developed in the University has the potential to attain average 6-week body weight



IBL-80 Commercial Broiler

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 to 52 weeks of age significantly improved from 117 to 134 eggs in the dam line (PB-2) during the period from 2005 to 2012. This implied the availability of greater number of chicks per dam for hatchery operators interested to procure parent stocks from GADVASU. The performance of the cross at the Random Sample Tests was also promising and the entry of the University retained the FIRST POSITION during all these years amongst the public sector entries at Gurgaon centre.

Quail Breeding

The quail stock developed at GADVASU has been named as PUNJAB WHITE QUAIL. 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 is about 240-250g. Another strain of quails 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. Quail meat is tasty and is believed to be helpful against certain ailments. The meat contains higher proportions of carbohydrates and Vit. B-12. Quails are less susceptible to common diseases of poultry and need no vaccination against common poultry diseases as in other poultry species.



Punjab White Quail

Animal Nutrition

Tomato pomace (TP) a by-product of vegetable processing industry obtained after extracting the pulp for human consumption, was evaluated to have 20-22% crude protein (CP) and 9-11% ether extract (EE). The incorporation of TP in diets of commercial broilers at graded levels from

0-20% during starter (0-3 wks) and finisher phases (4-5 wks) revealed that it can be incorporated up to 5% of ration during starter phases and up to 10% of ration during finisher phase without affecting performance.

Amino acid chelate of zinc and copper was prepared in the laboratory using indigenous technology (fusion method) and evaluated for quality and utilization. The *in vivo* studies on comparative efficiency of rations containing indigenously prepared zinc and copper lysine chelates versus inorganic mineral mixture in beetal kids indicated that the total dry matter (DM) intake and body weight (15.0 and 15.6 kg) were comparable in the two groups. The trend in super oxide dismutase levels in the blood after 90 days indicated reduction in the stress in the kids.

The supplementation of wheat straw with different essential oils such as cinnamaldehyde, carvacrol, carvone or limonene revealed that cinnamaldehyde at 2% of substrate DM had edge over others in terms of reduced methane production, better digestibility of true organic matter (OM) and neutral detergent fibre (NDF) and increased volatile fatty acids production.

The supplementation of wheat straw with saponin of different origin such as MP biologicals, HiMedia or Qualigens showed that supplementation with saponin from MP Biologicals at the rate of 2 to 3% of substrate proved a better nutrient as indicated by PF, A:P ratio, ME availability and methane inhibition.

The supplementation of wheat straw with either catechin hydrate, gallic acid, tannic acid or ellagic acid at the rate of 1 to 5% of substrate (wheat straw) DM revealed, on the basis of improved net gas production (NGP), digestibility, volatile fatty acid production, ME availability and methane mitigation potential, catechin hydrate and ellagic acid at the rate of 3% each had an edge over others.

Methane production was estimated in 54 commercial compounded feeds and 21 complete feeds formulated keeping in view the specific feeding practices followed in this region. The methane production was lowest in napier bajra, berseem-WS or wheat straw based crude fibers (CFs) as compared to other roughage based CFs. Irrespective of the type of the roughage, the CP, EE content increased while that of NDF content and methane production per unit of DOM decreased with the increase in concentrate proportion in the CFs.

Livestock Products Technology

Development of new value added products

Intermediate moisture chicken nuggets

The intermediate moisture chicken nuggets were prepared using minced meat, seasonings and with addition of 4%, 5% and 6% glycerol levels. The physicochemical, microbiological and sensory quality was best at 4% added level of glycerol in developed intermediate chicken nuggets.

Chicken meat biscuits

Health oriented functional based chicken meat biscuits (CMB) were developed using hurdle technology. The products were optimized by Box-Behnken design of Response surface methodology (RSM) and optimized products were treated with natural antioxidants and antimicrobials, and stored at room temperature under modified atmosphere packaging (MAP) conditions. The combination of natural preservatives and MAP was found to be effective in preserving the quality of CMB for a storage period of 60 days.



Modified Atmosphere Packaged biscuits after 60 days storage

Chicken meat caruncles

Shelf stable chicken meat caruncles were developed using spent hen meat, starches, flours and natural preservatives. The optimized chicken meat caruncles subjected to treatment with 0.2% clove powder along with 50% CO₂:50% N₂ modified atmosphere packaging produced better acceptability of the product with improved sensory attributes, decreased microbial load and inhibition of lipid per oxidation.



Chicken meat caruncles after 60 days storage

Chicken meat noodles:

Shelf-stable chicken meat noodles (CMN) were developed for profitable utilization of meat and sustained consumers demand to meet the protein needs in diet. Chitosan, EDTA, eugenol and peppermint essential oil were used as antioxidants/antimicrobials. All noodles stored at ambient temperature ($35\pm 2^{\circ}\text{C}$, 70% RH) under aerobic and MAP packaging conditions were well acceptable up to 90 days.



Eugenol treated (raw/dreid) modified atmospheres packaged (MAP) chicken meat noodles

Low-fat, low salt functional chicken meat nuggets, patties and balls

Functional based chicken nuggets, patties and balls are developed with added fat at 5% level, 40% replacement of sodium chloride with potassium chloride and addition of fiber enriched non-meat ingredient (Dalia at 2% level). Carrageenan was added at 1% level as fat replacer. It was concluded that reduction of fat level, replacement of sodium chloride and addition of fiber have positive impact on product quality besides improvement of nutrition value of developed chicken meat products.

Restructured chicken meat block with the incorporation of minced meat

Restructured chicken meat blocks were developed with minced meat at three different levels (0, 25 and 50%) along with other ingredients. Minced chicken meat at 50 % level in combination with chunks meat was found to be suitable for the development of restructured chicken meat block.

Chicken meat balls, patties and nuggets with the incorporation of giblets

Chicken meat nuggets, balls and patties were developed for the effective utilization of giblets (0, 10 and 15 %). A formulation is developed with lean meat, seasoning and giblets. Products prepared with 15 % giblets (liver, gizzard and heart) exhibited higher nutritive value and overall acceptability scores but comparable textural and colour values.

Standardization for the level of acetic acid in development of gizzard pickle

Chicken gizzards pickles were developed using a formula containing spices, condiments, citric acid, mustard oil and acetic acid. The acetic acid level was recommended at 12 % for development of gizzard pickle with appropriate pH, acidity, better texture profiles and higher sensory quality.

Low-fat paneer

- It was found that both sodium alginate (SA) and carboxy methyl cellulose (CMC) at 0.3% levels in skim milk can be successfully used as fat replacer for the development of low-fat paneer. However, low fat paneer prepared using 0.3 % SA was better than 0.3% level of CMC. All low-fat paneer samples were acceptable up to 7 days of storage time at refrigeration temperature.
- Low fat paneer was prepared with different milk fat levels (1%, 1.5% and 2%) and products were evaluated for different physicochemical parameters, colour and texture profiles and sensory attributes. The 2 % milk fat level was found the best compared to other fat levels.
- The use of 0.4% CMC or 0.3% SA was found much suitable in development low-fat mozzarella cheese. Further cheese prepared from 2% milk fat than 1 or 1.5% and by using 0.3 % SA resulted in better acceptability with up to 10 days storage life at 4°C under aerobic packaging conditions.

Livestock Production Management

Effect of fenugreek and ajwain seed as herbal feed additive on performance of beetal kids

The use of fenugreek seed, @ 0.1% of BW significantly improved the milk, feed, fodder, dry matter intake, body weight, average daily weight gain (ADG) and feed conversion ratio (FCR) over control. Also, the fenugreek and ajwain, @ 0.1% BW, singly or in combination, significantly reduced the enteric problems like diarrhoea.

Effect of different probiotic cultures on kids' performance

A feeding trial was conducted on 24, five-day-old beetal kids to study the effect of probiotic cultures such as *Lactobacillus acidophilus* (P_L) and *Saccharomyces cerevisiae* (P_S) on the intestinal microflora and diarrhoea incidence. The probiotics supplementation of P_L or P_S having 1×10^8 cfu/gm @ 0.2% of BW for eight months significantly improved the dry matter intake, body weight gain, FCR and PER over the control. Pronounced effect of P_L was only up to the pre-weaning or milk feeding stage, whereas that of P_S both during the pre- and post-weaning phases. The P_S during the summer months improved animal welfare, health status and reduced the diarrhoea incidences through lesser enteric bacterial load. The probiotics feeding also improved the appearance as well as overall acceptability of cooked chevon. Supplementation of P_S during summer months helped to gain more economic returns on per unit input cost.

Effect of local anesthetics and non-steroidal analgesics during disbudding of kids

Dis-budding of the kids by pre-medication of local anesthetics (Lignocaine, 2% @ 1 ml/bud) or non-steroidal analgesics (Meloxicam @ 0.25 mg/kg BW) or their combination, reduced the pain related behaviors during and after disbudding. Effect of the local anesthetics was more pronounced during disbudding. However, non-steroidal analgesics improved the animal welfare for prolonged period after disbudding as depicted through significantly lower cortisol level ($P < 0.01$), better FCR and protein efficiency ratio (PER) over the control. Use of the local anesthetics along with non-steroidal

analgesics was most economical due to maximum return on per unit input cost.

Effect of by-pass protein feeding on growth performance of weaned kids

The feeding of rumen undegradable or by-pass protein either alone or in combination with molasses significantly improved the dry matter intake, body weight, ADG, FCR and PER as compared to control. By-pass protein feeding also mitigated the vagaries of summer stress. It helped in the production of lean red meat by reducing the body fat deposition. The use of by-pass protein alone proved most economical due to higher economic return on per unit input cost.

Effect of body coat colour on performance and meat quality of beetal kids

A study on correlation of coat colour on productive performances of beetal goats under stall-fed conditions showed that daily milk, creep feed and concentrate intake was significantly higher in black goats as compare to tan/brown or spotted goats. Also, the feed conversion ratio, average daily gain and dressing percent were better in black goats. Thus, rearing of black than tan/brown or spotted beetal goats may be preferred due to their better production ability under stall-fed conditions.

Effect of flaxseed meal on broiler performance

The feeding of broiler chicks on diets containing flaxseed meal at 0, 5, 10 and 15% did not affect the weekly body weight during the first two weeks, but at the end of 6th week, birds fed on 15% flaxseed meal showed a reduction of 8% in body weight compared to the control group. Among the treatments, birds fed on 5 and 10% flaxseed meal groups had significantly better FCR, PER and EER. The carcass characteristics indicated a significant reduction in the eviscerated weight and breast yield at 15% flaxseed. However, the alpha-linolenic acid content in both breast and thigh meat was higher with an increasing level of flaxseed meal in the diets without affecting the sensory acceptability of meat. Based on the present study up to 10% of flaxseed meal may be used in broiler diet to enhance the alpha-linolenic acid content in the broiler meat.

Veterinary Anatomy

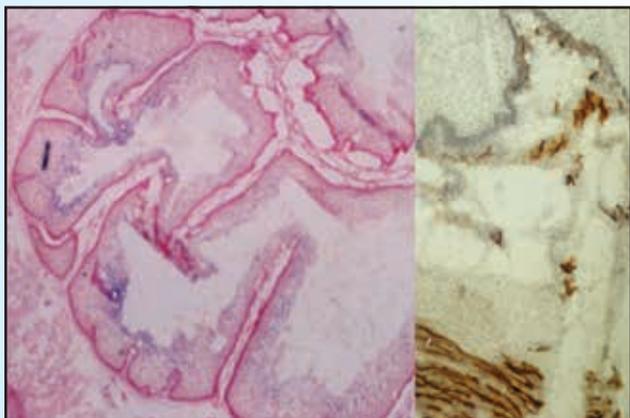
Gross Anatomical studies

The anatomical structure of normal heart of pig, sheep, goat and buffalo was studied *in vitro* by gross dissection and ultrasonography. Gross anatomical observations on thickness of left ventricular wall, right ventricular wall, interventricular septum and apex were measured and compared with that of values obtained by the ultrasonography.

Dissection and radio-opaque techniques were used to describe the liver segments and different branches of hepatic artery of pig. The study revealed that pig liver was divided into two independent segments i.e. right and left and generally the branches of hepatic artery with in different lobes of liver followed the ramification of portal vein.

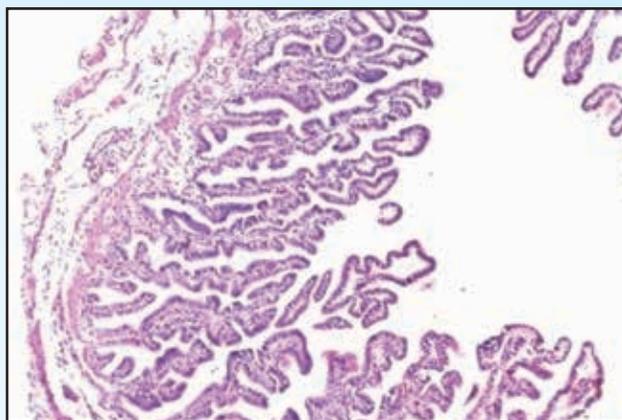
Histomorphochemical and Histoenzymic studies

The distribution of phosphatases was established in different tunics of developing fore stomach of buffalo fetuses of different age. The study concluded that the activity of phosphatases varied in different layers of developing fore stomach with advancing gestation. The acetylcholinesterase (AchE) activity observed at discrete locations in propria submucosa is suggestive of neuronal elements.

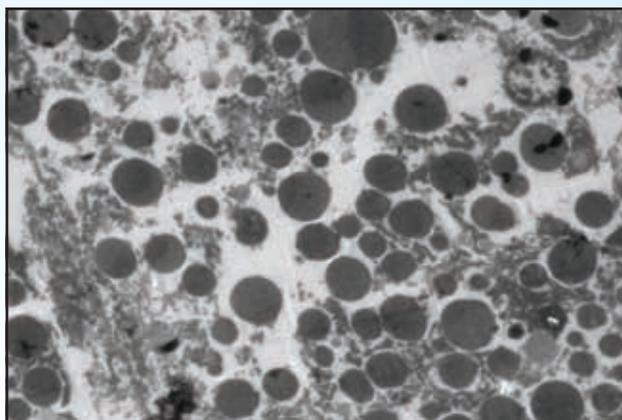


Cryostat section showing ACPase and acetylcholinesterase activity in reticulum

A histomorphochemical and electron microscopic study conducted on different parts of oviduct of Punjab White Quail revealed that the mucosal folds in magnum were thicker and filled with abundance of tubular glands. The oviduct was lined by pseudostratified columnar ciliated cells and electron dense granules were present in the proprial glands of the magnum and isthmus, whereas proprial glands of the uterus contained electron light granules. The muscle layer was thickest in the uterus and vagina.



Proximal part of Infundibulum of oviduct of quail



Transmission electron micrograph showing electron dense granules in the magnum of oviduct of quail

A histological study on serial sections of buffalo ovary during different seasons indicated significantly more number of primordial and primary follicles in autumn. The incidence of atresia of follicles ≥ 1 mm was maximum in summer (75.62 %), followed by spring (72.89 %), rainy (71.25 %), winter (69.79 %) and autumn season (68.73 %) with an overall atresia in entire year was 71.43 %.

Developmental Anatomy

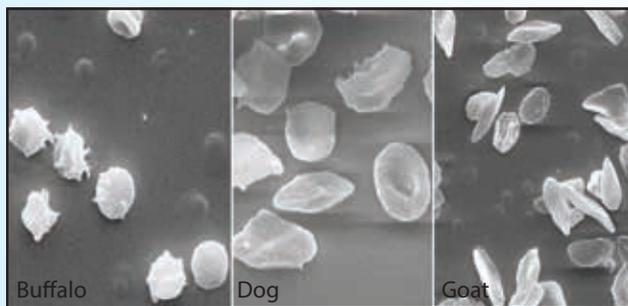
A study was conducted on histogenesis of spinal cord of 15 buffalo foeti. The neural tube along with all the six plates (roof, floor, two alar and two basal plates) of early spinal cord was present at 35 days fetus. The lumen of central canal was diamond shaped at 1.5 cm crown vertebral rump lengths (CVRL) (35 days), elongated at 6.4 cm CVRL (57 days), oval shaped at 9.1 cm CVRL (70 days), and above 15.6 cm CVRL (99 days) buffalo foeti. It attained circular shape in all the regions except caudal one. At 57 days, the mantle and marginal layers began to differentiate into gray and white matters. The differentiation of neuronal

cells in gray matter started forming different lamina and ultimately at 133 days buffalo foetus, all the lamina of gray matter appeared.

Another study was conducted on large intestine of buffalo fetuses. The mucosal projections appeared in large intestine during early stages of development whereas villi were first observed at 119 days in rectum. The degeneration of villi started at 161 days in rectum and villi disappeared at 272 days in all segments of large intestine. The epithelium was undifferentiated stratified type during early development and started transforming to simple columnar at 144 days. The goblet cells appeared in rectum at 144 days and in caecum and colon at 161 days. The intestinal glands were fully differentiated at 198 days.

Forensic Anatomy

A study was conducted to identify the species on the basis of morphological and molecular characterization of blood. The morphological features and micrometrical observations were taken on different blood cells. The differentiation of species on the basis of molecular techniques was done by PCR method. The amplification across a variable intron within the highly conserved TP53 tumor suppressor gene produced band fragments of different sizes between species like human at 460 bp, goat 405 bp, cattle 475 bp, buffalo 475 bp and dog 482 bp.



Scanning electron micrographs of Blood cells

Scanning Electron Microscopy

Electron microscopy studies on uterus of buffaloes showed that there were distinct structures on caruncular and non caruncular areas. The caruncular area was thrown into highly branched villous tree which possessed many fine microvilli. The non caruncular areas possessed many endometrial glands opening at the surface. SEM examination of the luminal surface of the inter caruncular region indicated that cells with smaller apical profiles were immediately adjacent to the gland openings.

Veterinary Gynaecology and Obstetrics

Flaxseed supplementation (300g/100Kg body wt) in buffaloes attenuated luteolytic signal and improved post insemination luteal profile. This resulted in higher conception rate 66.7% as compared to 31.3% in control group buffaloes.

Supplementation of glucogenic diet and by pass fat during pre partum period in buffaloes was beneficial to prevent post partum loss in body condition. Post partum reproduction efficiency was also improved in supplemented buffaloes.

Superovulatory response in buffaloes can be enhanced following ablation induced follicular wave emergence prior to gonadotropin treatment

Follicular wave emergence can be synchronized with transvaginal ultrasound guided follicle ablation or with administration of estradiol-17-beta in buffaloes. The new follicular wave emerged in the buffaloes within 1-2 days following follicular ablation and within 3-5 days of estradiol treatment regardless of the day of treatment.

Computer-assisted sperm analysis (CASA) based individual motility and expression for *HSP70* in buffalo bull sperm could be used for the differentiation of good fertility buffalo bulls from poor fertility. The 130 and 43 kDa proteins were not found in poor fertility buffalo bull sperm indicating a role in conception. The spot for *HSP70* could not be detected in immunoblot of frozen sperm indicating cryopreservation mediated cleavage or denaturation of *HSP70* in beef bull sperm.

Immunization of dogs with native PH-20 and LDHC sub units revealed their immune-contraceptive potential to effect reduced fertility as sperm parameters of immunized dogs remained significantly different than the recommended values for fertile dog semen. Immuno-contraceptive effect of PH-20 and LDHC sub units was also noticeable in bitches

MALDI-MS analysis of 46, 36, 32, 30, 28 kDa proteins, immunofluorescence and immunoblotting indicated that these proteins share mol. wts. and interact with each other in dog sperm or actin and tubulin mask LDHC and PH-20 in dog sperm to such an extent that sequence of PH-20 and LDHC is superimposed by actin and tubulin. Therefore, effect on sperm parameters and female fertility observed as a result of immunization with PH-20 and LDHC sub units may be a combined effect of PH-20/tubulin/actin and LDHC/tubulin/actin

Veterinary Medicine

Sub-clinical deficiencies of Ca, Cu, Zn and Pi in both cattle and buffaloes of Bathinda district exists with maximal deficiency of Cu.

Considerably high mean plasma level of Fe in both cattle and buffaloes are observed and there is no incidence of Fe deficiency in buffaloes.

Incidence of mineral deficiencies is higher in cattle as compared to buffaloes.

The mean plasma Mo level in both cattle and buffaloes is within the safe limit. There is no prevalence of molybdenosis in cattle whereas in buffaloes the prevalence is 1.19 per cent.

Reduction in milk yield, repeat breeding and anoestrus are the most common clinical manifestations in mineral deficient animals

Area specific mineral mixture is effective in improving plasma Cu concentration

Area specific mineral mixture improves milk yield ranging from over 1.5 liters to 6 liters by 60th day post treatment.

Epidemiological pattern of mastitis differed at machine milked farms that reported for hand milked farms; average prevalence of subclinical was found to be 44.72, and corynebacteria and streptococci constituted the chief isolates from machine milked dairy cows. Hyperkeratosis of teat end was found major long term effect of machine milking.

Providing regular service of culture sensitivity and mastitis diagnosis; a total number of 399 cows and 148 buffaloes milk samples comprising of 1127 and 441 quarters, respectively, were analyzed for bacteriological examination. Of which, 46.14% and 35.60% quarters for cows and buffaloes, respectively were found positive for bacterial growth. Staphylococci were found to be the main incriminate.

The mastitis diagnostic kit is being prepared in the laboratory and supplied to the dairy farmers/ technical personal for early diagnosis and management of mastitis.

Veterinary Microbiology

Hemorrhagic Septicemia

The study was carried out to understand the molecular mechanism and immune response involved in pathogenesis of disease caused by *Pasteurella multocida* B2 by

quantitation of cytokine gene response in bovine PBMCs *in vitro* using Real time PCR. The significant up-regulation of pro-inflammatory cytokine TNF- α , IFN- γ , IL-8 and IL-1 α/β were observed. The significant elevation of IL-8 transcriptional level most likely indicates the important role in development of characteristic neutrophilia in disease progression. The cytokine transcription of TNF- α was found to be maximum in PBMCs stimulated with LPS, It may be said that LPS plays major role in pathogenesis of disease.

In vitro and in vivo therapeutic potential of Bacteriophages

A total of six phages against *Salmonella* dublin were purified, enriched and subjected to various chemical conditions to evaluate their survival ability. Evaluation revealed that phages can withstand phenol and iodine preparations (commonly used disinfectants) up to 1h post exposure but are lysed beyond that time. The phages could not withstand exposure of benzalkonium and formalin even for a brief period.

Diagnosis of Brucellosis

Modified Rose Bengal Plate Test (RBPT) found to give better results than the conventional RBPT. The new method was found to minimize erroneous interpretations which may have serious consequences.

Bacteriophage therapy for controlling brucellosis in cattle and buffalo

A novel broth-based colorimetric end point assay using a redox dye was developed. In this study, *Brucella abortus* vaccine strain 19 and field isolates of *B. abortus* isolated from aborted foetal stomach contents were sensitive to the brucellaphage isolated from sewage sample as observed in the traditional agar overlay method. The brucellaphage did not lyse tested heterologous species viz. *Pasteurella multocida*, *E. coli*, *Staphylococcus spp.* and *Salmonella Dublin*.

Johne's Disease

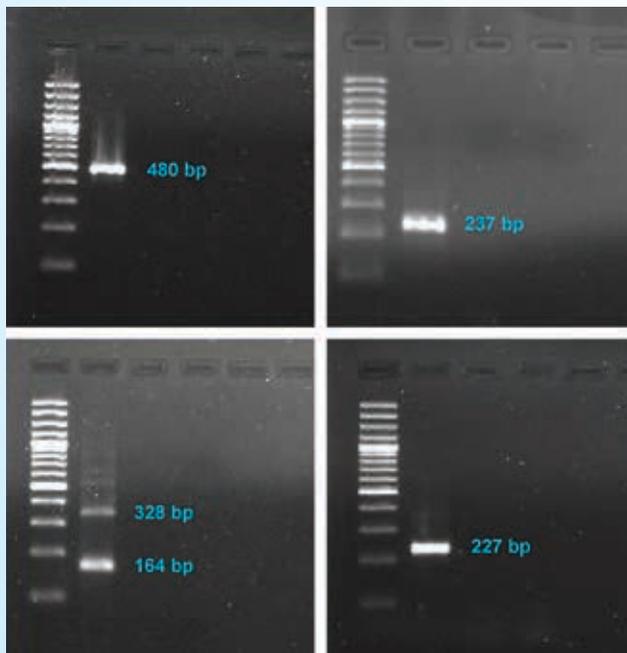
A total of 100 faecal and 25 milk samples of Cattle suffering from chronic intermittent diarrhea and emaciation were subjected to Ziehl Neelsen (ZN) Staining. The ZN Staining revealed 46 faecal samples as positive with a specificity of 56.25 per cent and 60.0 per cent as compared to faecal

culture and faecal PCR, respectively. *Mycobacterium avium* subsp. *paratuberculosis* (*MAP*) cultures were isolated from 4 faecal samples showing a prevalence of 8.7 per cent. Faecal IS900 PCR detected 10 faecal samples as positive showing a prevalence of 21.74 per cent. All the animals detected positive for *MAP* were '3+' or '4+' ZN positive animals. None of the milk samples resulted in cultural isolation of *MAP* and only 2 milk samples (8 per cent) were found positive for milk PCR. The results reflected that only high degree ZN positive animals were detected by molecular or conventional culture techniques and sensitivity of PCR was greater than conventional culture methods.

Veterinary Parasitology

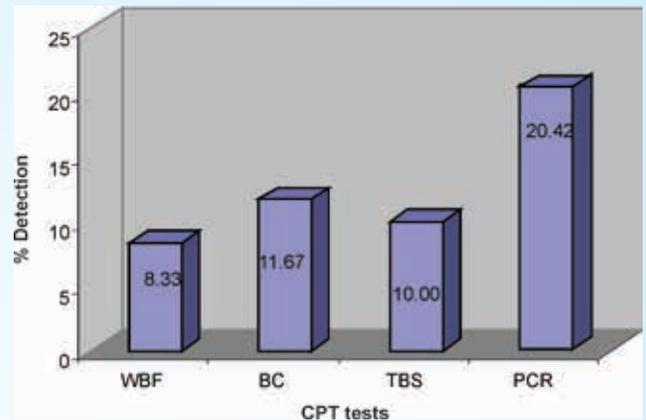
Molecular and parasitological diagnosis of Trypanosoma evansi infection

Polymerase Chain Reaction (PCR) was standardized for diagnosis of *Trypanosoma evansi* using four different sets of primers viz. ITS1/ CF/BR, ESAG 6/7, TBR1/2 and 21/22mer. PCR products obtained by using all the above primers were 480 bp, 237 bp, 164 bp multiples and 227 bp, respectively. Overall, TBR1/2 primers were found most sensitive followed by ESAG6/7 and 21/22mer, whereas ITS1 set of primers were least sensitive for detection of *T. evansi* DNA from infected mice blood and purified trypanosomes. The PCR method was found almost twice more sensitive than the conventional parasitological



PCR for diagnosis of *T. evansi* infection

diagnostic techniques viz. wet blood film (WBF), Buffy coat (BC) and thin blood smear (TBS) in terms of detection of *T. evansi* from mice blood. The analysis of blood samples from 344 cattle and 162 buffaloes for *T. evansi* revealed overall prevalence based on PCR as 4.15%. Apparently more prevalence was seen in cattle than in buffaloes.



Comparative efficacy of CPT (WBF, BC, TBS) and PCR for detection of *T. evansi*

Application of Real-time polymerase chain reaction for diagnosis of Trypanosoma evansi infection in cattle and buffaloes:

Real time PCR was applied in field cases of *T. evansi* in cattle and buffaloes. It is more sensitive assay using TaqMan primer and probe for *T. evansi* and targets the internal transcribed spacer 1 (ITS-1) region of rRNA. The sensitivity of TaqMan assay was evaluated by using purified as well as whole blood trypanosomes DNA of infected mice and found that the minimum detection limit for purified trypanosomes was 0.01 ng (0.33 genomic DNA of trypanosoma), whereas for whole blood the minimum detection limit was 0.1 ng (6.12 genomic DNA of trypanosoma). *T. evansi* infected mice blood samples were collected at different interval post infection and analyzed by CPT and real time PCR and observed that TaqMan assay is very sensitive than other CPT in case of *in vivo* infectivity in mice and gave positive signal at 36 h post infection. A total 109 (80 cattle and 29 buffaloes) blood samples of cattle and buffaloes were collected from in and around Ludhiana district and analyzed by conventional parasitological techniques and real time PCR. The results revealed that real time PCR was more sensitive than other conventional method like wet blood smear, thin blood smear, thick blood smear and haematocrit centrifugation technique. The overall prevalence of *T. evansi* in and around

Ludhiana by conventional parasitological techniques was 2.75 per cent. The prevalence of *T. evansi* in case of cattle was 2.5 per cent and in case of buffaloes 3.45 per cent by conventional methods. The overall prevalence rate by real time PCR in cattle and buffaloes was 12.84 per cent however buffaloes (13.79%) showed the higher prevalence rate than cattle (12.50%) by both conventional and TaqMan assay.

Epidemiology of Ixodid ticks in cattle and buffalo population in Punjab

In overall ixodid ticks were more prevalent in cattle and buffalo, prevalence being about 58%. Among the various agro-climatic zones highest prevalence rate of *Rhipicephalus microplus* was recorded from zones receiving highest annual rainfall submountain undulating region and lowest in driest zones of western region. However, the highest prevalence of *Hyalomma anatolicum anatolicum* was recorded from western region and lowest in undulating plain region thus indicating that *R. microplus* prefers a hot and humid environment whereas, arid and semi arid conditions are more conducive for *H. a. anatolicum*. The overall prevalence of ixodid ticks was highest in monsoon season. Among age groups maximum tick infestation was recorded in calves <6 months of age and least in >1 year age group. Also a significantly higher infestation rates of ixodid ticks was observed in males.

Veterinary Pathology

Canine mammary tumours

Diagnostic and prognostic aspects of canine mammary tumours (CMT) were studied. The study included 56 tumours (55 malignant + 1 benign) affecting 50 females and 1 male dog. The CMT was seen in 46.79 % cases with median age of affection 9 years. A good correlation (95.74%) of cytology with histopathology, with a sensitivity of 97.22% in diagnosing CMT, was recorded. The follow up studies revealed the mean survival of dogs with CMT as 3.73 and 13.40 months, without and with censoring, respectively. Further, immunohistochemical studies showed that cells expressing BRCA1, Rb and BCL2 markers represent the early cancer stem cells population whereas, cells expressing ALDH1, c-Myc and S100A7 markers represent both the early as well as late cancer stem cells. Among the various epithelial-mesenchymal transition (EMT)

studied immunohistochemically, the immunoreactivity of Snail (93.54%) was found to be greater than Twist (64.51%) and Slug (61.29%). The immunoreactivity of other EMT markers i.e. N-cadherin, fibronectin, TIMP-2 and MMP-3 was observed in 61.29%, 70.96%, 74.19% and 77.41% cases, respectively. Chromogenic *in situ* hybridization (CISH) studies of HER-2 in selected cases of CMT unveiled HER-2 gene amplification in 3/15 (20%) cases. HER-2 mRNA expression by quantitative real time PCR (qPCR) showed weak expression in 14 cases, moderate in 2 and over expression in 6 cases.

Chlorpyrifos toxicity

Acute and chronic toxico-pathological effects of chlorpyrifos, an organophosphate insecticide were studied in *Gallus domesticus*. Acute toxicity produced cholinergic signs of toxicity commencing two hours after administration. Chickens died shortly after the exhibition of clinical signs. Electron microscopy study revealed ultra morphological alteration and presence of microholes in erythrocytes. Chronic toxicity of chlorpyrifos @ 0.8 mg/kg bw to broiler chickens produced diarrhoea and significant reduction in body weight. The main gross lesion was paleness and flaccid consistency of slightly enlarged liver. Histopathologically, chlorpyrifos produced degenerative changes in various organs. Supplementation with vitamin C partially ameliorated the degenerative changes in kidney, heart, bursa of Fabricius and spleen.

Rabies

The study was conducted to elucidate the serological response to vaccination in 180 dogs (163 immunized with different makes of rabies vaccine and 17 unvaccinated). In vaccinated dogs, rabies virus specific antibodies (above 0.5 IU/ μ l) were detected in 71.16% cases. The antibody level was directly proportional to the number of vaccine shots. Vaccination in dewormed animals revealed better protection through higher antibody titre (8.878 IU/ μ l) than non dewormed ones (4.01 IU/ μ l). The diagnosis of rabies in natural cases was found to be 100% by immunohistochemistry and 83.33% by histopathology. Thus, immunohistochemistry was more sensitive and a valid test and it can replace fluorescent antibody test in screening impression smears, where fluorescent microscope and fresh samples are not available.

Pharmacology and Toxicology

Pharmacokinetics and urinary excretion of pazufloxacin

The pharmacokinetic properties and urinary excretion of pazufloxacin, a third generation fluoroquinolone were investigated in six buffalo calves after single intravenous, intramuscular and subcutaneous administration (5 mg/kg body weight). After IV administration, distribution was rapid with an area under the pazufloxacin serum concentration: time curve of $7.67 \pm 0.21 \mu\text{g}\cdot\text{ml}^{-1}\cdot\text{h}$. Furthermore, elimination was rapid with a body clearance of $0.66 \pm 0.03 \text{ L}\cdot\text{kg}^{-1}\cdot\text{h}^{-1}$ and a $t_{1/2\beta}$ of $2.00 \pm 0.07 \text{ h}$. Peak serum concentration C_{max} , t_{max} , AUC and bioavailability for the IM administration were $1.53 \pm 0.01 \mu\text{g}\cdot\text{ml}^{-1}$, 0.75 h, $8.60 \pm 0.46 \mu\text{g}\cdot\text{ml}^{-1}\cdot\text{h}$ and $112.84 \pm 7.80 \%$, respectively. Urinary excretion of pazufloxacin was less than 31% after 24 h of administration of drug. *In vitro* activity (MIC) of pazufloxacin against *Staphylococcus aureus* was $0.0625 \mu\text{g}/\text{ml}$. It can be concluded that dose of 5mg/kg can be repeated at 24 hours interval against the microorganisms having MIC of up to $0.07 \mu\text{g}/\text{ml}$ without any adverse effects.

Pesticide-mineral interaction study

Toxicological effects of cadmium, imidacloprid and their interaction were investigated in buffalo calves. Repeated oral administration of cadmium at 0.1 mg/kg/day and imidacloprid at 0.5 mg/kg/day alone or in combination for 90 consecutive days produced varying degree of toxic signs and significant haemato-biochemical changes.

Toxicological studies of Cypermethrin

Cypermethrin, a type II synthetic pyrethroid insecticide, at dose rate of 0.5 mg/kg/day for 14 consecutive weeks produced mild signs of toxicity in buffalo calves. There was a significant increase in the extent of lipid peroxidation and enzymic activity such as glutathione peroxidase, superoxide dismutase, catalase and glutathione-S-transferase. A significant decrease in blood glutathione, total antioxidant activity and vitamin E was observed and no significant effect was found on blood selenium levels.

Veterinary Physiology

Effect of herbal formulation AV/DAC-16 supplementation on rumen profiles in buffalo calves (Bubalus bubalis)

Experimental study on buffalo calves showed that oral administration of AV/DAC-16 did not have any prominent

effect on the protozoal count in the rumen, however, the bacterial count increased significantly in comparison to control group. Total nitrogen concentrations fell significantly while a significant increase was observed in the ammonia nitrogen content in the supplemented group at 6 hours after feeding. The animals of supplemented group showed a significant increase in body weights.

Effect of Flunixin meglumine and Ketorolac tromethamine (Ketanov) a combination of NSAIDs on endotoxemic buffalo calves

The infusion of NSAIDs in endotoxaemic buffalo calves resulted in increase in systolic, diastolic, pulse, central venous pressure close to pre-infusion normal level while mean arterial pressure (MAP) was higher than normal pre-infusion values at 300 and 420 minute. The respiratory rate was elevated throughout the observation period even consequent to flunixin meglumine and Ketorolac tromethamine administration. All the animals opened their eyes and were alert. This drug combination successfully restored the various hemodynamic parameters to normal pre-infusion values and can be used to provide immediate relief to the endotoxemic buffalo calves thus allowing clinician valuable time to plan further long term treatment.

Veterinary Surgery and Radiology

Abdominal disorders in large animals

GIT disorders were reported in 96 dairy animals during the last one year. These animals were reported with the history of anorexia (n=87), scanty or no defecation (n=72), reduced water intake (n=52) and decreased milk yield (n=91). Diaphragmatic hernia (n=26), foreign body syndrome (n=25), rumen impaction (n=13), omasal impaction (n=15), abomasal impaction (n=5), reticular abscess (n=6), liver abscess (n=4), reticular adhesions (n=16), intestinal obstruction due to faecolith (n=4), due to mesenteric torsion (n=1) and peritonitis (n=4) were the common findings. Caecal distension and impaction was found in 3 animals for which right flank caecotomy was performed.

Surgical interventions:

- For diaphragmatic hernia midline approach away from routine post-xiphoid approach was performed.
- Perineal hernia was operated in 2 buffaloes.
- Correction of atresia-ani was performed in 7 calves
- Hernioplasty using indigenous nylon mesh and

polypropylene mesh was used.

- Thoracic trauma was treated in one buffalo and two cows
- Urinary tract affections viz. obstructive urolithiasis was recorded in 12 bullocks and 13 buffalo calves and 4 buffalo bulls. In 6 animals rupture of urinary bladder was recorded which was repaired by surgical means. In 6 animals urethra was ruptured. Urethrotomy followed by catheterization was performed in these animals. In 3 cow and 9 buffalo calves, tube cystotomy was performed.
- Studies in buffaloes on use of butorphanol and ketamine for inducing general anaesthesia is standardized showed that this combination was having advantage over traditional combination as fast recovery is achieved. For equine use of new anaesthetic combinations namely acepromazine was undertaken.
- For hind leg diseases spinal anaesthesia was performed in 14 buffaloes and 6 cattle.
- Fracture of long bone was recorded in 65 large animals. These animals were having 20 metatarsal, 12 metacarpal, 8 tibial and 5 radiu-ulna fractures. The animals affected were 8 cow calves, 8 buffalo calves, 9 cows, 5 bullocks, 11 buffaloes and 4 horses.
- Transfixation was performed in 3 cases, cross pinning and hanging pin cast was performed in two cases each. POP with aluminium splint was performed in 32 cases and in 4 cases amputation was done. Out of these 45 cases, 8 cases recovered completely with complete fracture union and normal limb usage and 12 cases were showing partial weight bearing.
- Intermedullary interlocking nailing was performed in 12 cases. Bone plating was performed in 8 animals. Different animals affected were 4 bullocks, 8 buffalo calves, 2 cow calves, 2 buffaloes, 2 cows and 2 foals.
- Radiography in combination with ultrasonography proved useful tools for diagnosis of abdominal disorders. Blood biochemistry and haematology indicate the severity of the disease.
- Nine Equine patients, presented with signs of colic, were handled with surgery. Animals operated for colic due to uterine torsion responded uneventfully to surgery and all survived without any postoperative complications. Animals with gastrointestinal colic showed 66.6% survivability; 2/6 cases died.

Postoperative intravenous lignocaine helped in achieving gastrointestinal motility. Placement of Foley's catheter as a drain tube in the abdomen helped in managing postoperative peritonitis which was assessed eriodically using ultrasonography.



Pre and Immediate post operative radiographs of a humerus fracture repaired by intramedullary interlocking nailing in a foal



Surgery for gastrointestinal obstruction in an equine patient



Fixation of Foley's catheter in abscess cavity for drainage and lavage

SCHOOL OF PUBLIC HEALTH AND ZOOSES

Pesticide residues in green fodder, dry roughages and concentrate feed in Punjab

Contaminated feed and fodder being the established source of entry of pesticide residues into animal body can lead to contamination of animal products intended for human consumption. Pesticide residues were detected in 93% of green fodder, 100% of concentrate feed and 83% of wheat straw. Results revealed that residues of β HCH exceeded minimum risk levels (MRLs) in 5% fodder samples, 8% feed samples and 5% wheat straw samples while residues of total DDT and HCH exceeded the MRLs in 8% of concentrate feed samples and 29% of the wheat straw samples, respectively.

Pesticides residues in fish available in Punjab

A study was undertaken to ascertain the levels of pesticide residues in 17 market fish species (107) and in 5 farm fish species (57), fish feed (20) and pond water (20) collected from twenty different organized fish farms in various districts of Punjab. Among various pesticides, HCH was found to be the most predominant pesticide detected in farm and market fish samples comprising on an average 35 and 33 per cent of total pesticide residues, respectively. Residue levels of endosulphan sulphate, DDT, aldrin and cypermethrin in farm fish comprised 34, 21, 7 and 3 per cent respectively while in market fish samples endosulphan sulphate, DDT, chlorpyrifos, aldrin, cyhalothrin and ethion comprised of 31, 21, 5, 4, 3, and 3 per cent of total pesticides, respectively. The pattern of contamination in fish, fish feed and pond water was almost similar.

Food borne Pathogens in Fish and Fish Products

A total of 184 samples comprising 96 raw fish and 88 ready-to-eat (RTE) fish products were collected from Ludhiana and other parts of Punjab and were put to test for *Aeromonas* spp, *E. coli*, and *S. aureus*. From raw fish samples, 38 (39.58%) *Aeromonas* spp; 47 (48.95%) *E. coli*, and 19 (19.79%) *S. aureus* were isolated. Overall prevalence was 21.73% *Aeromonas* spp; 47.82% for *E. coli* and 29.89% for *S. aureus*.

Molecular epidemiology of echinococcosis in northern India and its public health significance

Out of a total of 4130 animals examined, 66 were positive for hydatid cysts with overall prevalence rate of 1.59 per

cent. The prevalence of hydatid cysts was highest in cattle (5.39%) followed by buffaloes (4.36%), pigs (3.09%), sheep (2.23%) and goat (0.41%). Among different occupational risk groups, comparatively higher prevalence was recorded in dog handlers (30%), followed by dairy farmers/farm labor (26.66%), HIV positive subjects (25%), persons with liver disorders (14.81%), veterinary doctors (6.25%) and control group (6.25%).

ANIMAL DISEASE RESEARCH CENTRE

Disease Outbreaks Investigation

Animal Disease Research Centre (ADRC) provides outbreak investigation services at field level on emergency basis. Department attended 27 outbreaks (BQ-1, H.S-4, PPR-1, Classical swine fever-1, Listeriosis-2 Sheep Pox-1, Theilariosis-2, Babesiosis-2, Trypanosomiasis-4, Mixed Hemoprotozoan diseases – 6, Nitrate toxicity-3) during 2011-12.

Haemorrhagic septicemia (HS)

HS outbreaks caused by *Pasteurella multocida* type B are encountered sporadically in Punjab. There has been gradual decline in HS outbreak in the state from 2010 to 2012 where only two outbreaks (each) were encountered. There has been regular and complete vaccination being carried out in the state of Punjab as a result of farmer awareness programmes carried out by the ADRC and department of Vety Extension Education, GADVASU in the form of Animal Welfare Camps, Lectures and Veterinary Officers training programme.

Black Quarter (BQ)

Department encountered a suspected outbreak of BQ at a farm in village Kangthal (Patiala) in the month of April 2011. There were total of 30 cows at the farm, out of which two were affected with the disease.

Swine Fever

Pig farming is on the rise in the state. A large number of farmers consulted the department for disease control measures. Department attended one outbreak of swine fever in pig farm. There were 60 animals in this farm, 12 were affected and 4 succumbed to disease.

Peste des petits ruminants (PPR)

One outbreak suspected of PPR was recorded at village

Maulvi wala, Patiala in the month of December 2011. A total of 70 goats were there in the farm and 30 were affected with PPR. 12 goats died of the disease. Suspected tissue samples & blood in EDTA were submitted to Regional Disease Diagnostic Laboratory (RDDL), Jalandhar for further confirmation of the virus.

Brucellosis

Brucellosis is an important disease responsible for huge economic losses to our country as well as state. It is also an important zoonotic disease which causes debilitating disease in humans (undulant fever). It is becoming a matter of concern for farmer and the veterinarians. The trends in the prevalence of Brucellosis in the state of Punjab since 2006 shows rise of disease during the years of 2008-09 (28%) and 2009-10 (32.5%), however it has become possible to significantly reduce the prevalence of Brucellosis to 17.8% during the year 2012 due to farmer awareness programmes (Extension programmes, welfare camps) regarding economic effects and prevention of Brucellosis by mass vaccination. On the recommendations of the department, Punjab Animal Husbandry department has purchased the vaccine in bulk amount and started calf hood brucellosis vaccination in the field.

Tuberculosis and Johne's disease testing

A total of 427 cattle and buffaloes were tested for Bovine Tuberculosis and Johne's disease by SID (Single intradermal testing) on the request of the farmers and 26 animals (approx. 6%) were found positive for Bovine tuberculosis while 28 animals were found to be positive (6.5%) for Johne's disease.

Hemoprotozoan diseases

Department encountered two outbreaks of Theilariosis at Jalandhar and Ludhiana. There was also one outbreak of mixed Theilaria + Anaplasmosis (Fateh garh Sahib) and two outbreaks of Theilaria + Trypanosomiasis (Jalandhar). Department investigated four outbreaks of Anaplasmosis at Patiala (Patran), Jalandhar, Nawanshehar & Tarantarn. There were three outbreaks of mixed haemoprotozoan infections (Theilaria + Anaplasma + Trypanosomiasis) during the period of report. There have been sporadic cases of Hemoprotozoan diseases in Punjab in 2011-12 as compared to the years 2009-10 & 2010-11.

Nitrate poisoning outbreaks

Constant efforts of the department, through testing of fodder samples of farmers at their door steps, has generated awareness regarding use of lesser urea for fodder crops. Earlier farmers were using excess urea for fodder crops and this was causing heavy mortality due to nitrate poisoning in Punjab. This awareness was also extended to the veterinary and agriculture officers. As compared to previous years (18 outbreaks/2009-10, 24 outbreaks/2010-11), only three outbreaks were observed during 2011-12.

COLLEGE OF FISHERIES

Fish Nutrition

Azolla culture trials in silpaulin lined pits (16m²) were carried out at different harvesting frequencies to assess monthly productivity trends under local climatic conditions of the State. Pits were fertilized with organic manure (cow dung) and inorganic fertilizer (DAP) at weekly intervals. Once *Azolla* covered the water surface completely, it was harvested @ 3kg (Treatment-A1) and 2 kg (Treatment-A2) daily. Harvesting was however suspended for one or two days in case the *Azolla* mat failed to cover the whole water surface, any time during the culture period.



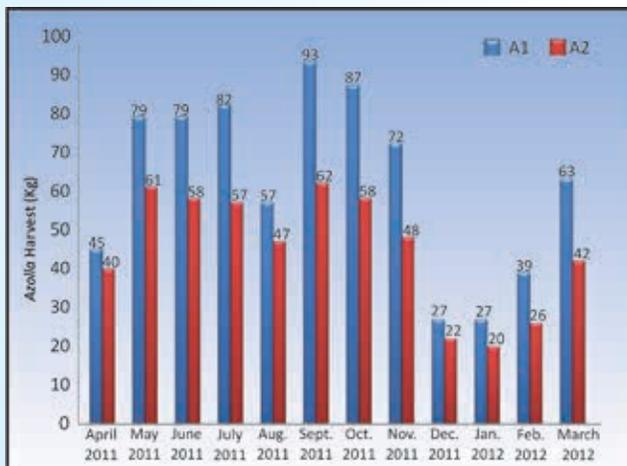
Azolla culture unit



Azolla Harvest

It was observed that monthly productivity of *Azolla* increased gradually from April to July in both A1 & A2 treatments registering 82.2 & 42.5% increase, respectively. However, it recorded a significant decline during August (30.5% A1 & 17.5% in A2) due to heavy rains followed by another peak in September (63 & 31.9% increase, respectively) which was found to be the maximum. Little decline was recorded during October and while up to 22% decline was registered November, in both the treatments. However, sudden decline in productivity was recorded during December, January and February due to severe cold conditions. Again the *Azolla* productivity registered growth of 61.5 % in both the treatments (A1 and A2) in the month of March 2012. Unlike *Azolla* growing in open waters, the stock reared in the culture pits not only retained its colour but was also able to survive during winters due to the protection provided by the net cover over the pits.

The result revealed higher productivity of *Azolla* during May to July & September to November as compared to other months and recorded 38.63 % higher annual *Azolla* biomass production with harvesting frequency of 3kg/day as compared to 2 kg/day at the same manuring rate.



Azolla Production

Inland Saline water aquaculture

Preliminary freshwater prawn culture trials in inland saline water at Fazilka conducted successfully. 0.5 to 1.5 g Juveniles were stocked in the pond. Male prawns recorded higher final body weight (23-67 g) as compared to female prawns (3-16 g) in 80 days. However, freshwater carp (mono- & poly-culture) and murrel culture trials under different stocking densities are under progress.

Fish breeding and seed production

Carp brood stock management

Comparative efficacy of fish meal based diets in comparison to plant based diets was evaluated with respect to water quality, productivity, survival, growth, gonadal maturity and flesh quality of Indian major carp, *Labeo rohita*. The fish were fed with experimental diets for 270 days @ 3% of body weight (BW) in outdoor cemented tanks. Fish meal based diets were found to induce higher growth, improved gonadal development, egg size and fecundity as compared to plant based diets. Among the fish meal based diets, the diet containing Rice Bran 30%+ Mustard Meal 50% + Fish Meal 20% recorded maximum growth, gonadal maturity and fecundity. However, none of the diets had any significant affect on the water quality, productivity and survival of fish.

Catfish breeding & culture

Fingerlings of catfish, singhi (*H. fossilis*) were reared in the cemented ponds on slaughter house waste for 3 months for production of brood stock for breeding purpose. In the month of June – July 2011, thirteen breeding trials were carried out (without scarifying the male) in flow through FRP troughs by using a synthetic inducing agent 'ovaprim'. Out of 13 breeding trials, 11 were successful with an average fecundity/g body weight and hatching percentage of 278 (185 – 448) and 75 % (40-100 %), respectively. Egg diameter of the fertilized eggs varied from 0.65 – 0.95 mm. Singhi reared successfully under indoor condition for about two months (from hatchling to fry stage) with an average survival of 40-50%, and shifted to poly-house for overwintering.

Catfish (*Heteropneustes fossilis*) Brooders

Complete breeding setup for breeding of catfish

Singhi hatchlings were reared on different diets (live food, egg diets, liver diets, dry powdered diets) under indoor conditions to work out comparative efficacy of different diets in terms of survival and growth. Maximum survival was found when fed on diet containing mixture of zooplankton and egg yolk (80 %) followed by diets having egg custard (60 %), liver diet (50 %), egg yolk (1) : rice bran(1) & formulated dry diets having fish meal (25 %), liver (1) : rice bran (1) & egg encapsulated diet (20 %), egg albumin (10 %) and formulated dry diets having soybean meal (5%), respectively.

Effects of Stocking Size and Stocking Density on Growth Performance of Giant Freshwater Prawn, *Macrobrachium rosenbergii*

A 78 day experimental trial was conducted in experimental pools to study the effect of stocking size and stocking density on growth performance and survival of giant freshwater prawn, *M. rosenbergii*. For stocking size experiment, different sizes of prawn were graded on the basis of BW as lower grade (LG), control ungraded (CUG), upper grade 1 (UG1) and upper grade 2 (UG2) with stocking size of 1.5 g, 2.1 g, 3.0 g and 5.1 g, respectively and were stocked @ 5 prawns per pool (50,000/ha) for each treatment. The average final BW for LG, CUG, UG1 and UG2 were 10.86 g, 9.24 g, 12.85 g and 14.14 g, respectively. For stocking density experiment, four treatments with stocking density of 40,000/ha (T1), 50,000/ha (T2), 60,000/ha (T3) and 70,000/ha (T4) were maintained. The average stocking BW was 1.41 g for each treatment. The average final BW was 16.2 g, 16.7 g, 16.1 g and 11.6 g for treatment T1, T2, T3 and T4, respectively with survival of 100%, 80%, 75% and 71.4%, respectively. The present investigation shows that higher stocking size (>5.0 g) and stocking density of 50,000 to 60,000/ha results in better growth performance and survival of giant freshwater prawn.

Effects of Eye Stalk Ablation of *Macrobrachium rosenbergii* on Growth and Survival

Differential growth rate, which is also known as heterogeneous individual growth rate, is one of the most important problems faced during grow-out culture of fresh water prawn. Eye stalk of crustaceans secrete molt inhibiting hormone (MIH), which has direct affect on their

growth performance. Keeping in view the above problem, a 90 day experimental trial was conducted in outdoor FRP pools to study the effect of unilateral and bilateral eye stalk ablation in giant freshwater prawn, *M. rosenbergii*. Eye stalk ablation was done by using surgical blade and suture thread followed by antibiotic bath treatment. Five prawns (@ 50,000/ha) of 9.3 g average BW were stocked in each pool and triplicate were maintained for each treatment. The final average final BW for control (T1, normal prawn without ablation) and unilateral ablated group (T2) was found to be 19.82 g and 25.37 g, respectively. Significant survivals was obtained in treatment T2 (93.3%) in comparison to control T1 treatment (73.3%), whereas in treatment T3 (bilateral ablated group), mortality of all prawns occurred within 22 days. The results of present study suggest that unilateral eye stalk ablation might be helpful for obtaining better growth performance and survival of giant freshwater prawn.



Eye Stalk Ablation of Giant Freshwater Prawn, *M. rosenbergii*

Integrated fish farming

On-campus fish-cum duck farming

Layer variety of ducks, Khaki Campbell reared successfully in an integrated fish cum duck farming unit for the first time in GADVASU. Fingerlings of Indian Major Carps (catla, rohu and mrigal) with an average size 2-3 inch were stocked in the pond (0.4 acre) @ 4000/acre in the ratio of 3:4:3 in June, 2011 and 48 ducks including 40 females and 8 males, were released in the pond. No supplementary feed is being provided to stocked fish. Water quality was analyzed on fortnight basis and all the parameters remained within optimum levels for carp culture throughout the culture period. The ducks attained an average body weight of 1.28kg and produced 1800 eggs in 8 months; whereas the fish attained an average weight of 350gm in 8 months of rearing period.



Fish cum duck farming unit at GADVASU

Proximate analysis of duck eggs including fat, protein, moisture, ash, albumin and yolk content was carried out to evaluate its nutritive value. It constituted 12.35% shell, 52.10% albumin, 32.59% yolk, 1.25% ash, 72.06% moisture, 11.74% fat, 14.18% protein. Sensory evaluation was also carried out to assess its relative acceptability in comparison to poultry eggs.

Successful preliminary hatching trials for production of ducklings of Khaki Campbell at GADVASU were also carried out at the poultry farm hatchery of COVSc. A set of 50 ducklings was also provided to one of the progressive farmers of Punjab for establishing fish cum duck farming unit for demonstration and off campus testing.



Ducklings Produced at University

Off-Campus fish cum duck farming

An off-campus fish cum duck farming unit has also been established in inland saline water aquaculture trial ponds in village Shajran, district Fazilka in the month of May, 2011. A total of 6 ducks (1 male and 5 females) has been kept in a duck house erected on the dyke of a 2 kanal (1000m²) pond. They not only survived the saline conditions but also produced eggs at an expected rate of 200-250 eggs/bird/

yr. It has provided an additional option of enterprise for livelihood for salt affected waterlogged zero earning waste lands in south west districts of Punjab.



Off-Campus Fish Cum Duck Farming trial unit in inland saline water pond at Village Shajrana, Fazilka

Fresh water pearl culture

Stock of fresh water pearl mussel, *Lamillidens marginalis* was collected from Una district, Himachal Pradesh and preliminary trials for rearing it under local climatic conditions have been initiated.



Freshwater pearl Mussel, *L. marginalis* reared at university fish farm

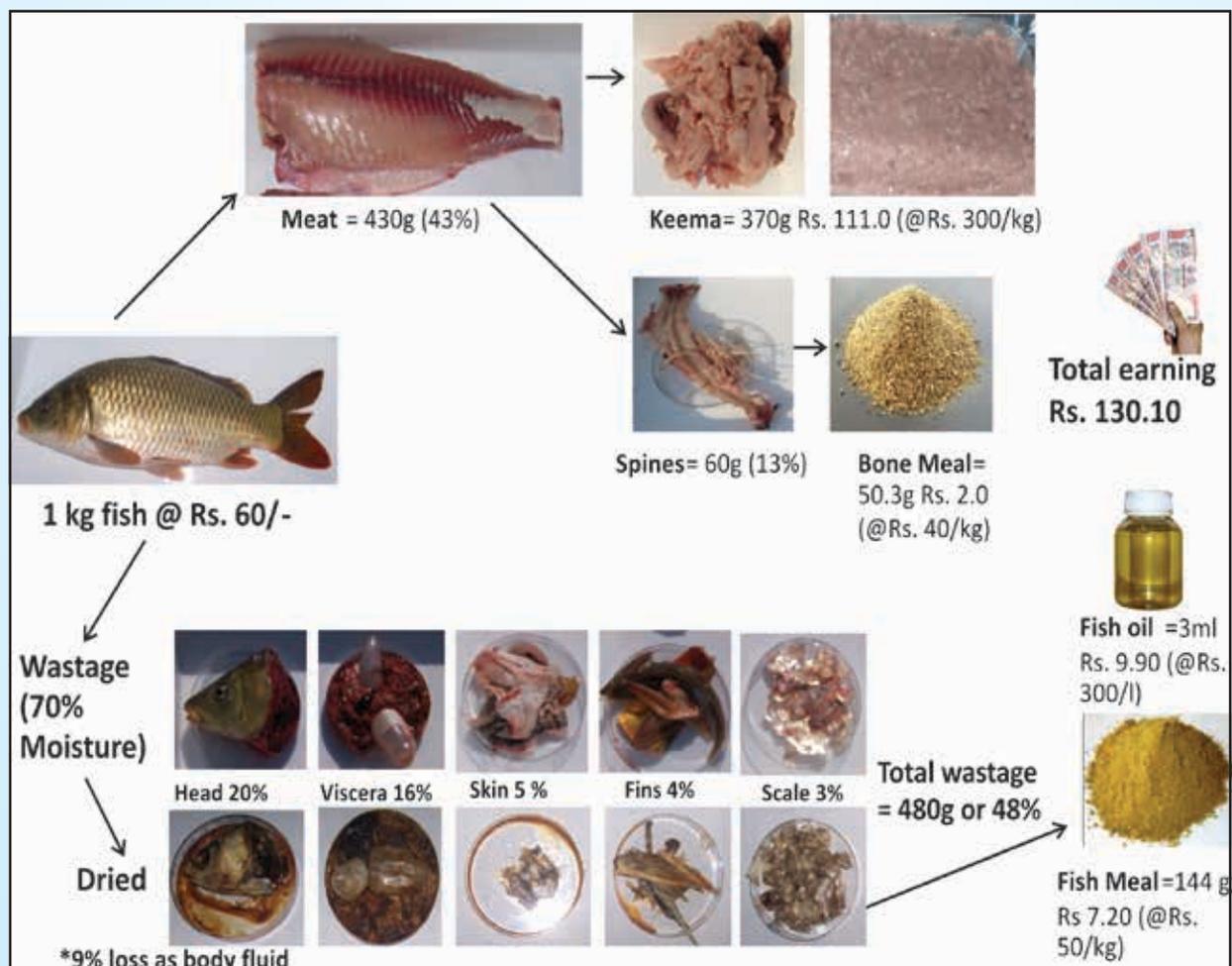
Cage aquaculture

A cage aquaculture unit, consisting of 2 cages, established in 1 acre production pond for demonstration and experimental rearing of high value species like catfishes and murrels for higher economic returns. Rearing of high value candidate species (*Channa spp*) in cage is in progress.

Post harvest processing & Value addition

Zero wastage processing of carp fish for preparation of value added products

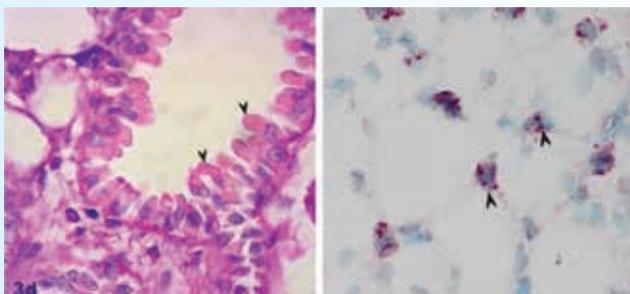
College is working on zero wastage processing of carp fish for development of value added products not only from the deboned carp meat but also from all type of waste produced during the processing of fish. It has been found that about 43% meat (including 37% muscles + 6% intramuscular spines & vertebral column) is recovered from 1 kg whole fish. Minced meat obtained from deboned muscle was used for preparation of value added edible products and intramuscular spine and vertebrae were dried and grinded to make bone meal. 48% of fish waste obtained in the form of head, viscera, scale, skin and fins was further processed for production of fish meal and fish oil which accounted for 14.4 & 0.3% of the 1 kg processed fish on fresh weight basis. About 9% weight losses occurred during processing due to loss of body fluids including blood, lymphatic fluid and moisture. The preliminary studies revealed 116% higher economic returns from processed fish as compared un- processed fish.



SCHOOL OF ANIMAL BIOTECHNOLOGY

Exposure of mice to chicken barn air: Role of TLR 9

Exposure to chicken barn air causes lung injury resulting in lower and upper respiratory symptoms in the poultry workers. The lung injury can initiate modifications such as proliferation of the airway epithelial cells such as Clara cells, type II alveolar (T2) cells and mucus producing goblet cells as part of the innate immune response. Toll-like receptors (TLR) have been suggested to play a role in cell division and proliferation. To understand the effect of TLR9 on Clara cells, T2 and mucus producing goblet cells, the numbers of these cells were quantified in the lungs of wild-type (WT) and TLR9^{-/-} mice exposed to chicken barn air. The mice were exposed for either one day or five or 20 days for 8 hours/day. Clara cells and T2 cells were labelled with antibodies, and the mucus cells were identified with Periodic-acid Schiff stain, and quantified in per unit tissue section area. The data show decrease in the number of Clara cells and increase in mucus producing goblet cells after exposure to chicken barn air in both WT and TLR9^{-/-} mice. Numbers of T2 cells increased and decreased in WT and TLR9^{-/-} mice, respectively, after exposure to poultry barn air. These data show that exposure to chicken barn air can affect major lung epithelial cells, and alludes to the role of TLR9 in regulation of some of these responses.



PAS staining of mucus producing cells in the airways. Immunohistochemistry of alveolar cells in the airways: The exposed type 2 (T2) cells in the alveolar septa. lung sections of TLR9^{-/-} mice T2 cells (double arrow heads) were showed large number of pink stained by using antibody which stained mucus producing cells reacts with alveolar cells in the (double arrow heads). normal lungs of wild-type mice.

Sex chromosome specific microsatellite polymorphism in chicken

Sex chromosome specific microsatellite loci (Ase50, HUR0404, HUR0411, HUR0412 and MCW154) were used in the present study to investigate the genetic polymorphism in 96 unrelated birds belonging to three breeds (PL2, PB2 and PR) of chicken and to associate

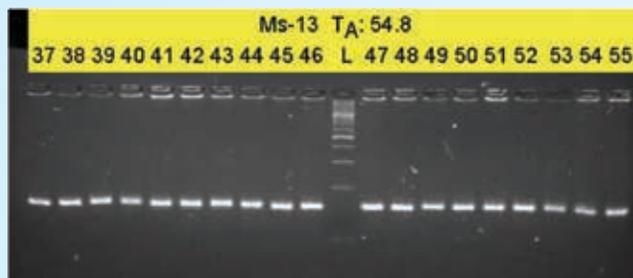
the polymorphism with growth and egg production traits. The PCR products for different microsatellite loci were resolved on 3.5% Metaphor agarose against 100 bp plus DNA ladder and manually scored for band patterns. The Chi-square test indicated that the loci might be under the influence of forces like selection, mutation etc. The number of alleles in the different microsatellite loci studied varied from 8 to 10 (HUR0412) among the different germplasms, indicating high degree of polymorphism. The 'D' allele of Ase50 locus was found to be highest in PL2 population (both female & male). For rest of the loci, no specific trend or prevalence of the various alleles could be assessed, indicating the loci are not appropriate to characterize the 3 breeds. The PIC value of MCW154 locus in PR was the highest (0.739). The dendrogram depicted that the PB2 and PR are closer to each other than PL2, which corresponds to the breed history. Some of the traits were significantly ($P < 0.05$) different among the different genotypes identified for the specific microsatellite loci, like, body weight at 5 weeks (HUR0404 and HUR0412) and 40 weeks of age (HUR0412 and HUR0412), egg number at 40 weeks, egg mass, age at sexual maturity and egg production rate (all for HUR0412 locus).

Microsatellite marker based genetic diversity in divergent germplasm of chicken

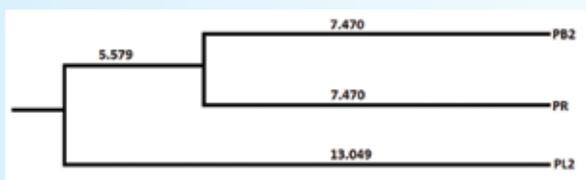
Microsatellites have a high degree of polymorphism and therefore great potential for characterizing divergent populations. The genetic variability in 75 unrelated birds belonging to three breeds (PB2, PL2 and PR) of chicken and association of the genetic polymorphism with growth and egg production traits using five microsatellite markers (Ms-13, -14, -18, -19 and -20) was carried out. PCR products were resolved on 3.5% Metaphore agarose against 100 bp plus DNA ladder and manually scored for band patterns. The Chi-square test indicated that the loci might be under the influence of forces like selection mutation etc and was not in Hardy-Weinberg equilibrium.

Genotypic and allelic frequencies for each locus vis-à-vis heterozygosity and polymorphic information content (PIC) for each breed were estimated. The observed number of alleles in different microsatellite loci studied varied from 5 (in Ms-14) to 8 (in Ms-13) among different germplasms, indicating high degree of polymorphism. The PIC values was the highest (0.75) for Ms-18 in PB2 and Ms-13 in

PR. Genetic distance was least (0.1494) between PB2 and PR breeds and highest between PB2 and PL2 (0.2684), which corresponds to the breed history. Some of the traits were differing significantly ($P < 0.01$) among the genotypes identified for the specific microsatellite loci, like egg weight at 40 weeks of age (Ms-14) and egg mass (Ms-18).



Band-patterns of the microsatellite locus MS13 resolved in 3.5% metaphore agarose

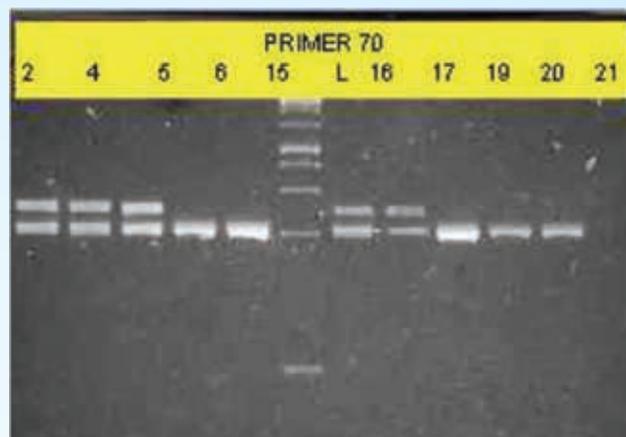


Dendrogram showing the evolutionary relatedness based on Nei's (1978) genetic distance using the UPGMA method

Microsatellite based Polymorphism in Japanese Quails

The genetic polymorphism in 40 unrelated birds belonging to two strains (Black and White) of Japanese quails was investigated using Microsatellite loci (GUJ0008, GUJ0034, GUJ0041, GUJ0056 and GUJ0070) and the polymorphism was associated with body-weight at 5 weeks of age trait. The genomic DNA was isolated from the peripheral blood samples collected from 20 unrelated birds, belonging to each of the strains. The PCR products for different microsatellite loci were resolved on 3.5% metaphor agarose against 100 bp plus DNA ladder and manuallu scored for band patterns. The Chi-square test indicated that the loci might be under the influence of forces like selection, migration, mutation etc as all locus-strain combination deviated from Hardy-Weinberg equilibrium. The number of alleles in the different microsatellite loci varied from 6 to 10, indicating high degree of polymorphism. The PIC value was the highest for locus GUJ0070 for white plumage (0.698) and locus GUJ0034 for black plumage (0.768). Specific alleles were found to be private to either of the strain for the loci studied except for GUJ0070 locus. The GUJ0034 locus had significant effect on the Body weight

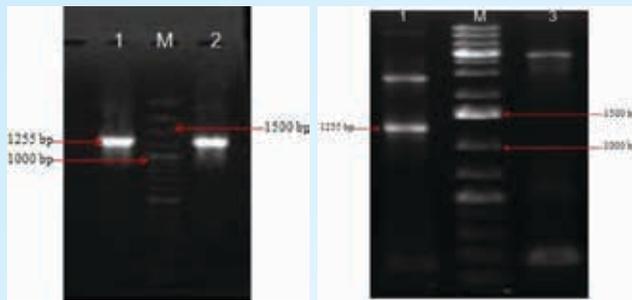
at 5 weeks of age. The genotypic value was found to be the highest in genotype "FD" and the lowest in genotype "BA".



Band patterns of microsatellite locus GUJ0070 (size 196 to 206), resolved in 3.5% metaphore agarose

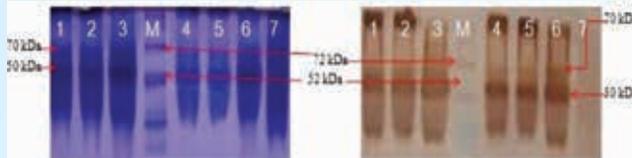
Eukaryotic expression and characterization of BHV-1 glycoprotein D (gD) as a potential diagnostic antigen

BHV-1 causes Infectious bovine rhinotracheitis/Pustular vuvlvovaginitis in cattle. Glycoprotein D of BHV-1 represents a major component of the viral envelope and is a dominant immunogen. gD encoding gene was expressed in a baculovirus-insect cell system. Viral genomic DNA extracted from BHV-1 grown on MDBK cell monolayer was used as a template for PCR amplification of gD gene (1255bp) using a self designed set of primers. Gel purified gD gene was used for directional cloning into pENTR/SD/D Directional TOPO vector to produce entry clone. Recombinant plasmids were screened by PCR and RE digestion for gD gene insert. The endotoxin free purified plasmids were then subjected to LR recombination reaction with Baculovirus linear DNA. LR recombination mix was transfected into Sf-9 cells and observed for appearance of cytopathic effects (CPE). The recombinant virus was serially passaged for 3 more generations and the 4th passage viral stock was used to infect fresh Sf-9 cells for gene expression study. The recombinant gD protein was immunoprecipitated and when subjected to SDS-PAGE and western blot analysis protein band of ~70kDa was detected consistently. The recombinant gD protein was further confirmed by dot-ELISA indicating its potential as a coating antigen in gD-based diagnostic ELISA.

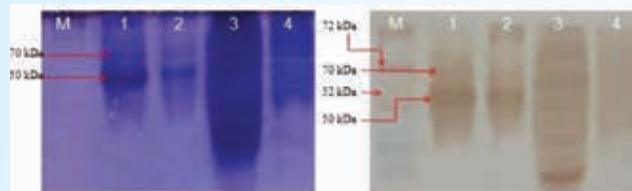


PCR amplification of complete gD gene from BHV-1 genomic DNA

PCR amplification of gD gene (1255 bp) with M13 Forward and Reverse primers from pENTR-TOPO gD clones



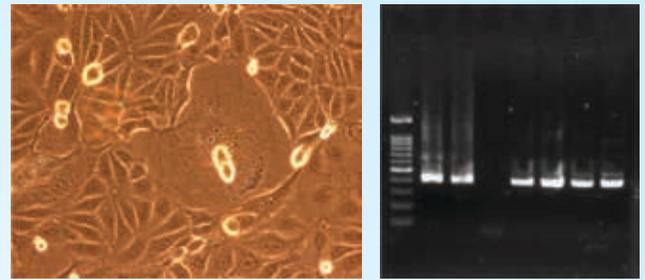
SDS-PAGE (left) and Western blot with polyclonal antibody (right) analysis of immunoprecipitated recombinant gD at different intervals of time after infection



SDS-PAGE (right) and Western blot (left) analysis of the recombinant gD with monoclonal

Isolation and Molecular characterization of Canine Distemper Virus

Canine distemper is one of the most severe infectious disease affecting wild and domestic *Canidae* as well as many other species of carnivores. A total of 75 samples (25 each of serum, nasal and conjunctival swabs) from 25 dogs suspected for CD were processed for virus isolation in MDCK cells. CPE were not consistent and characteristic CPE (syncytia and giant cell formation) were observed only in few cases. RT PCR and nested RT PCR was used for the detection of virus in the cell culture harvest. By nested PCR desired amplicon of 419 bp was detected from 76%, 72% and 64% of cell culture harvests from serum, nasal and conjunctival swabs respectively. Subsequently attempts were made to amplify H gene, however this could be amplified from only one isolate with amplicon of 1782 bp. This PCR product was cloned and got sequenced. The nucleotide sequence revealed a coding region of 1782 bp coding to a 594 aa long polypeptide. Pairwise nucleotide divergence revealed 99%, 97.5% and 97% homology with Onderstepoort, Indian isolate and Lederle strain respectively.

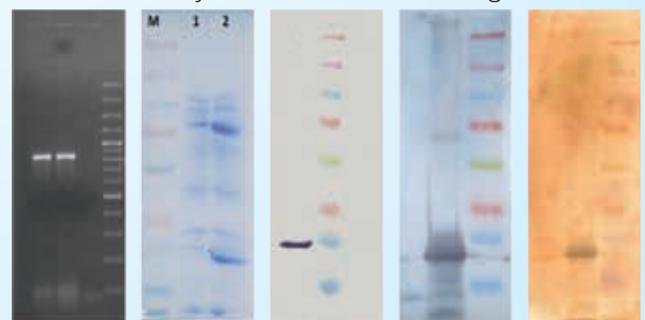


CPE of Canine distemper virus in MDCK

PCR confirmation of CDV isolates

Cloning Sequencing and Expression of Immunodominant Outer Membrane Protein OMP31 from *Brucella* Spp.

Brucellosis is a re-emerging zoonosis with serious implications for both humans and animals. It is caused by members of genus *Brucella*. For rapid detection of *Brucella* from clinical samples, PCR was carried out by using published primers based on immune-dominant outer membrane protein gene *omp31*. A new set of primers based on *omp31* gene were designed and by using this primer set, it was possible to differentiate *Brucella abortus* and *Brucella melitensis*. The amplicons of 513bp and 477bp were amplified by PCR in case of *B. abortus* and *B. melitensis* respectively. Subsequently *omp31* gene was amplified from a clinical isolate of *Brucella abortus* and cloned in to TA cloning vector. The cloned product was sequenced and the sequence data obtained (Accession No. JF734338) was analysed. For expression of *omp31* gene, pPROExHT b prokaryotic expression vector (Invitrogen, USA) was used. His-tagged recombinant Omp31 protein was successfully expressed which showed a specific band of 34kDa in SDS-PAGE analysis. Expressed recombinant Omp31 protein was successfully purified to homogeneity by Ni-NTA affinity chromatography under denaturing conditions and the purified recombinant protein was confirmed by DOT and Western blotting.



PCR for detection of *Brucella* spp.

SDS-Page analysis of OMP 31 protein

Western blot of OMP 31 protein

Ni-NTA purified OMP-31

Western blot of recombinant OMP31

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	114
Specialized pig farming training course	1 week	1	29
Specialized poultry farming training course	2 week	1	42
Specialized goat farming training course	1 week	1	22
Training on balanced and quality feed manufacturing	3 days	5	197
Knowledge up gradation programmes for farmers	5 days	4	145
Ecofriendly & Model Dairy Farming System for field personnel from GOI	8 days	1	22
Training course of Field Veterinarians	3 days	12	145
Training course of Field Veterinarians	5 days	4	83
Awareness on production of safe meat and value added meat products	2 days	1	07
Value added milk products with special emphasis on mozzarella cheese	2 days	1	22
Culture and seed production of ornamental fishes	2 days	1	16
Skill Development in Freshwater Prawn Farming	2 days	1	22
Value Added Products From Freshwater Fish	2 days	1	60



Knowledge Upgradation Programme for Dairy Farmers



Training on culture and seed production of ornamental fishes



Model Training Course on Eco-Friendly and Modern Farming System



Dr. G.S. Kalkat, Chairman, Punjab State Farmer's Commission and Dr. V.K. Taneja interacting with farmer participants of training on Value Added Products from Freshwater Fish.

PASHU PALAN MELAS

Guru Angad Dev Veterinary and Animal Sciences University organized Pashu Palan Mela at Ludhiana on March 21-22, 2012 & September 22-23, 2011. 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.



ANIMAL WELFARE CAMPS

The University organized 15 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.



Animal welfare camp at Booh-Harike (Tarn Taran)

DAIRY SHOW

The faculty of university actively participated in different events of 6th PDFA International Dairy & Agri Expo organized jointly by the GADVASU and PDFA in the month of December, 2011. The faculty provided technical support for holding and judging of various events in the dairy show.



Judging by faculty of GADVASU during dairy show

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 providing on the spot diagnosis and treatment.



A Dairy farm at village Gureh (Distt. Ludhiana)

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.

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 attends to 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, Government of Punjab at Fatehgarh Sahib, Moga, Tarn Taran, Bathinda and Mukatsar.

CHIEF MINISTER AWARDS CONFERRED TO PROGRESSIVE FARMERS

To give a push to the livestock farming, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana has conferred Chief Minister Award to progressive farmers of the state. Many livestock farmers applied for the CM award in different categories and the University team visited the Livestock farms of the farmers.



Chief Minister Award winning progressive dairy farmers

WORLD VETERINARY DAY

The University organized World Veterinary Day on April 30, 2011 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.

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

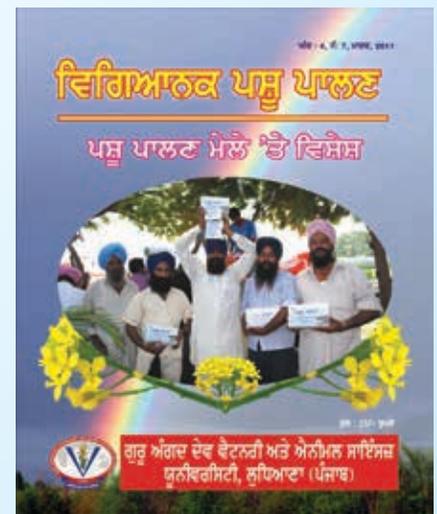
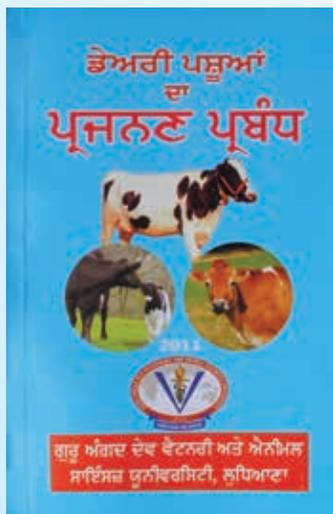
- Semen : Cattle bull semen: Frozen semen doses- 40601, Liquid semen- 4422; Buffalo bull semen: Frozen semen doses- 31441, Liquid semen- 2119
- Breeding bulls/calves: Cattle- 6, Buffalo- 31
- Mastitis Kit
- Disease outbreaks
- Sale of carp seed, ornamental fish seed and table size fish
- Maintenance of Aquaria
- Supply of duck eggs and chicks
- Free of cost *Azolla* and Duckweed inoculums for livestock and fish farmers

Chartered services

- Animal Welfare Camps
- 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 of goat products, 25 kg of turkey products, 12 kg of pork products and 16.25 kg of quail egg pickle under Revolving Fund Scheme
- Free facility for checking of adulteration in milk and milk products



Information services through University Publications

REGIONAL RESEARCH AND TRAINING CENTRE KALJHARANI, BATINDA

Animal Welfare Camps

Animal Welfare Camps were organized 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 in the month of March and September at Regional Research Station Bathinda and provided the technical information to the farmers.

REGIONAL RESEARCH AND TRAINING CENTRE, BOOH (TARN TARAN)

During the current financial year, four Animal Welfare Camps were organized in the operational area of the Centre. Five villages with 25 families from each village (5 x 25 = 125 families) have been adopted and their survey has been conducted with regards to number of animals, their health and upkeep etc. Daily treatment of animals is also being done at the centre and during visit to the operational area of the centre.

REGIONAL LIVESTOCK AND POULTRY RESEARCH AND TRAINING CENTRE, BHATOLI, TALWARA

Animal Welfare/Awareness Camps

Animal Welfare and 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.

NATIONAL AGRICULTURAL INNOVATION PROJECT

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

Under the National Agricultural Innovation Project (NAIP) 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.

Achievements:

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.

S. No.	Innovations/achievements
1.	Mineral mixture (940 kg), uromin licks (590 No) and fodder blocks were distributed to beneficiary farmers of the operational area of the project. A total of 220 large ruminants were dewormed and 150 animals were vaccinated against FMD, HS and BQ.
2	Regular feeding of mineral mixture, uromin licks and deworming to pregnant buffaloes reduced the incidence of post partum anoestrus (up to 60 days) from 82 per cent to 64 per cent. Average daily milk yield in cross-bred cows also got improved by 25-30% from the base value in Bhunga Block.
3	Agroforestry with Bamboo, <i>Tun</i> , <i>Simbal</i> , <i>Kachnar</i> , <i>Dek</i> , <i>Mehandi</i> , <i>Sagwan</i> ; Medicinal plant cultivation with <i>Bhel</i> , <i>Reetha</i> , <i>Karonda</i> , <i>Jamun</i> , <i>Harrar</i> , <i>Neem</i> , <i>Amla</i> , <i>Fig</i> , <i>Bahera</i> and Orchard plant cultivation with <i>Kinnow</i> , <i>Baramasi Lemon</i> , <i>Mango</i> , <i>Galgal</i> , Litchi has been strengthened by supplying a total of 1255 plant saplings.
4	A total of 53 women farmers were trained for bee-keeping, knitting and stitching & embroidery. Three women SHGs were linked with Banks for financial management. One women-SHG got FIRST PRIZE for best stall at Regional Kisan Mela organized at Kandi Regional Research Station, Ballawal Saunkhri (District SBS Nagar), Punjab.

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.

Dr Bangali Baboo, National Director (NAIP), and Dr A P Srivastava, National Coordinator (Component-III, NAIP) visited the operational area of the project on 07.04.2011 and had first hand experience from the beneficiary farmers. The team also reviewed the project on 09.04.2011 at the University Campus.

A World Bank mission carried out the Tenth Implementation Support Mission (ISM) of NAIP from December 7-14, 2011. The mission held extensive discussions with senior officials of the Indian Council of Agricultural Research (ICAR), Project Implementation Unit (PIU), and the consultants working on internal audit and procurement. The mission also made field visit to the operational area of NAIP Sub-Project project in Hoshiarpur district on December 9, 2011.

The Mission wrote comments about this NAIP Sub-Project in their Aide Memoire as:

“Interventions are being made for increasing crop, livestock, horticulture and fish productivity - and several of them have yielded good results. Many of the interventions have addressed the issues of ‘value addition’ and ‘gender’ admirably well. Notable results relate to: (v) women development through a variety of processing including Amla in Punjab.”

“The mission is pleased to record good work being done in remote isolated parts of Hoshiarpur district of Punjab. While on one hand, efforts are underway to introduce new rainfed wheat varieties, on the other hand, women are being empowered through formation of self help groups and promotion of household level processing, packaging and value addition. These groups proudly present a variety of products, including bamboo pickles (presumably known to have medicinal value in addressing arthritis). Small kiosks have also been opened for marketing. Similarly farmer groups have been mobilized and linked with a large rural industrial unit (Unati Co-operative Processing and Marketing Society) which has added a new dimension to agricultural diversification in the region. This sub-project has also popularized an innovative foot-operated rope making machine which uses local raw materials like Munj, Bhabbar and Lemon grass.”



National Director and National Coordinator (Component-III), NAIP interacting with Leader of the Consortia and Principal Investigator of the Project



ND and NC, NAIP interacting with Officers of GADVASU



Dignitaries on a field visit



A beneficiary farmer demonstrating rope making

LIBRARY AND NETWORKING



The University Library is hub of the academic, research and extension activities of GADVASU. Having state-of-the-art infrastructure and ultra-modern facilities, it supports the goals of the University through collection, organization and dissemination of information and knowledge. The Library is fully automated of its operation using LSEase (Libsys) Library Management Software. The Library is fully air-conditioned and equipped with standardized furniture to make users feel at home. It provides peaceful and encouraging environment for concentration of the users. Library has a Campus wide Network connecting all buildings and offices of the University with more than 400 access nodes.

The University Library successfully organized two-day book exhibition on 17-18th January, 2012 for on the spot selection of books on different subjects of Veterinary and Animal Sciences, Fisheries, Dairy Science and Technology, Animal Biotechnology and related fields. Exhibition was inaugurated by the worthy Vice-Chancellor of the University. Twenty two book publishers and distributors of repute from various parts of North India participated in book exhibition. The exhibition succeeded to fetch the interest of a large number of students and faculty members of GADVASU. The University Library purchased 2042 books during book exhibition.

The library subscribed to 19 foreign Journals, 12 Indian Journals and two databases i. e. Veterinary Science Database and Indiatat.com. at a subscription cost

of about Rs. 12 lacs during 2011. Library also subscribed to 13 newspapers and 9 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 provides access to about 2900 journals in the broad spectrum of Agricultural Sciences including nearly 300 Journals in the disciplines of Veterinary Sciences, Animal Husbandry, Livestock Management & Poultry Sciences, Fisheries and Aquaculture, Dairy Technology, Biotechnology, Animal Nutrition and allied subjects through the Consortium for electronic Resources in Agriculture (CeRA). A manual has been prepared by the Library to promote the utilization of CeRA by students, researchers and faculty of GADVASU.

The University Website has been totally restructured keeping in view the addition of new colleges/ institute and School of Animal Biotechnology. It has several new features. The new website was released on March 04, 2011 by the worthy Vice-Chancellor of the University. Licenses of the latest version of MS Office 2010 for 65 computers of the University Library has been purchased and installed for users. Its features will help the students and faculty to capture their ideas more creatively. Fourteen Licenses of the latest version of windows operating system i. e. Window 7 were purchased and installed. University Library has a video conferencing system and two Asus monitors have been introduced to facilitate video conferencing. An apple ipad with 3G connectivity has been purchased to

read e-resources. The University Library is introducing 5 apple computers for students to do the graphical work and for other advanced programmes. Keeping pace with the technological advancements, the RAM of 15 computers of Digital Resources Centre is being upgraded.

The National Informatics Centre (NIC), Govt. of India has provided the connectivity of 100 Mbps and equipment and 15 IP addresses for connectivity under the National Knowledge Network (NKN) project.

The data inputs of GADVASU in National Information System on Agricultural Education Network (NISAGENET) have been initiated. NISAGENET is an activity of the Education Division of ICAR being maintained at Indian Agricultural Statistics Research Institute, (IASRI), New Delhi.

The NISAGENET provides a unified information system for collection, compilation and analysis of data about the activities of the agricultural education system in India. Under NISAGENET, all SAUs are required to provide data inputs on various aspects online. A Case has been initiated for setting up the Book Bank for Schedule Caste Students under Centrally sponsored Post-Matric Scholarship to SC students. Keeping in view the safety measures to prevent any mishappening due to fire breakage, existing fire system in the University Library has been expanded as per needs.

The library is in the process of establishment of Integrated University Management System (IUMS) for instant single point access to information and data retrieval through a secure medium.

Two day book exhibition organized by the Guru Angad Dev Veterinary and Animal Sciences University



SPORTS AND CO-CURRICULAR ACTIVITIES

SPORTS WING

During the period under report, GADVASU has created enough facilities to promote the sports activities among the students. Large number of students (both boys and girls) from various constituent colleges have shown keen interest in sports activities. The participation and achievements of students in various inter-varsity competitions are listed hereunder:

1. 13th All India Inter Agricultural Universities Sports and Games Meet held at Akola (Maharashtra) from Feb. 16-19, 2012. About 1200 players from 35 different Universities from all over India participated in this meet and GADVASU contingent won 1 gold, 1 silver and 2 bronze medals. Table Tennis (M) team won Gold Medal. Basketball (M) team won Silver Medal. In athletics, Ishab Poudel won Bronze Medal in Discus



Gold Medal winning Table Tennis (M) Team of GADVASU

Throw, and Rajan deep, Diljit Pal Singh, Sonikbir Singh, Ravinder Singh and Gurjot Singh won Bronze Medal 4X100 mt Relay (M).

2. 6th Annual Athletic Meet of GADVASU was successfully conducted on March 14, 2012. In this meet, Ms Ramneet Kaur and Ms. Rubal were declared Best Athlete and 2nd Best Athlete, respectively in women section. Mr. Rajandeep and Mr. Ravinder Singh Chahal were declared Best Athlete and 2nd Best Athlete, respectively in men section.
3. North Zone Inter-Varsity Participation in the session 2011-12
 - GADVASU Football (M) team participated in North Zone Inter-Varsity Football (M) Tournament held at PTU Jalandhar from Sept.30 to Oct. 6, 2011.
 - GADVASU Badminton (M&W) team participated in North Zone Inter- Varsity Badminton (M&W) Tournament held at PTU Jalandhar from Nov. 2-6, 2011.
 - Basketball (W) team of GADVASU participated in North Zone Inter-Varsity Basketball (W) Tournament at held Kurukshetra University, Kurukshetra from Nov. 9-14, 2011.
 - GADVASU Cricket (M) team participated in the North Zone Inter- Varsity tournament held at

6th Annual Athletic Meet



Uttarakhand Technical University Dehradun from Nov. 10-24, 2011.

- GADVASU Basketball (M) team participated in North Zone Inter-Varsity Basketball (M) Tournament held at MPJ Rohilkhand University, Bareilly from Jan. 3-7, 2012.
- GADVASU Handball (M) team participated in North Zone Inter-Varsity Handball (M) Tournament held at Panjab University, Chandigarh from Jan. 26-30, 2012.

CULTURAL ACTIVITIES WING

The Cultural Activities Wing of the Directorate has been entrusted the responsibility of promoting the cultural and co-curricular activities among the students, sharpening of their skills and to provide them a platform to articulate their creativity. To achieve this objective, the Wing organizes regular camps, seminars, meetings and interaction with eminent artists/personalities from the field of art and culture and facilitates the participation of the students in cultural programmes in and out of the University. During the

period under report, the 2nd GADVASU Youth Festival was successfully conducted from Oct. 7-14, 2011. The Cultural Activities Wing of the University also organized functions to celebrate Independence Day (15 Aug., 2011), Republic Day (26 Jan., 2012) and Birth Day Anniversary of Shri Guru Angad Dev Ji (on 18th April, 2011). A 29 member cultural Contingent of GADVASU participated in 27th North Zone Inter University Youth Festival held from Nov. 22-26, 2011 at Lovely Professional University, Jalandhar and won prizes in various events. The Wing also celebrated ‘Van Maha Utsav’ and planted trees of various varieties in the GADVASU Campus. A new association of budding writers Navian Kalma GADVASU was formed with the help of Dr. Surjit Patar on the pattern of PAU Young Writers Association. The inaugural function of this association was held in Oct., 2011 in which a book in Punjabi entitled Aamad written by student writer ‘Gulbash’ was released.



Youth Festival



Independence Day Celebration



Teej Festival Celebration



Republic Day Celebration

ESTATE ORGANIZATION

During the period under report, the Estate Unit continued to look after its lands, buildings and maintenance services. Efforts were made to consolidate the GADVASU land and marked its boundaries. The Unit has also managed to acquire land from the Punjab Govt. for the establishment of three new KVKs at newly created districts of Punjab namely, Mohali, Tarn Taran and Barnala.

The Construction Wing continued its efforts for the construction of new buildings and renovation of existing ones. The construction work of various buildings of the University i.e. Farmers' Hostel, Scientists' Hostel and V.C.' residence etc. are underway. The following construction/renovation works were completed during the period under report:

1. Renovation of Postgraduate Lab in Deptt. of Vety. Pharmacology & Toxicology
2. Repair and renovation of Small Animal Clinics at Silver Jubilee Block
3. Construction of field store, feed mill store, extension of cat fish hatchery and field toilet at College of Fisheries.
4. Installation of two submersible tube wells at Kaljharani (Bathinda)
5. Installation of submersible pump and sanitary fittings at Poultry Farm
6. Providing and fixing water supply in Bull Shed at Dairy Farm.
7. Electrical wiring in Calf shed at Dairy Farm, GADVASU.
8. Electrical repair/renovation in laboratories of Deptt. of Animal Biotechnology
9. Construction of feeding and watering trough in Deptt. of LPM
10. Construction of Chowkidar Cabin alongwith M.S. gate at Hostel No. 5

On the front of Students' Welfare activities, efforts have been made to provide maximum facilities and amenities in the hostels so that the students could feel at home. Hostels have been provided generator facility, solar lights and solar geysers. Efforts have also been made to provide security, good landscaping, proper cleanliness and good atmosphere in the campus.

Landscape Section

During the period under report, the Landscape Section continued its efforts to aesthetically beautify the campus by plantation of seasonal flowers and ornamental plants of various varieties. The lawns of various buildings of GADVASU are regularly maintained. Plantation and maintenance of evergreen trees were also undertaken with a view that the Campus remains evergreen throughout the year.



Infrastructure developed/renovated and strengthening of Labs

<p>College of Veterinary Science</p> <p>Livestock Production Technology</p> <ul style="list-style-type: none"> • Renovation of Instructional Poultry Processing Unit is under progress • Chemker Vacuum Pump Model 300, Vacuum Pump & System (Remao KNF), Poultry Processing Equipments, Gel Unit, Betyro Refractometer MSW-501, Abbe Refractometer MSW-502, On line UPS with 120 minutes, Electrical water Heater Model 2.5 ltr, P.H. Meter, Infra Red Thermometer, Weighting Balance, Electronic Weighting Balance (Animal Balance), Laser Printer Canon 5050, Numeric UPS, Applied Biosystem Vert 96 Thermal cycler, Meat Mincer Mado Germany, Brine Injector, Deep Freezer
<p>Teaching Veterinary Clinical Complex</p> <ul style="list-style-type: none"> • Renovation of Small Animal Hospital (Surgery Wing)
<p>Veterinary Anatomy</p> <ul style="list-style-type: none"> • Renovation of dissection hall was undertaken • New instruments like - Cryostat microtome, Microscope with digital camera
<p>Veterinary and Animal Husbandry Extension Education</p> <ul style="list-style-type: none"> • Renovation of Audiovisual Lab & Information Centre
<p>Veterinary Gynaecology and Obstetrics</p> <ul style="list-style-type: none"> • Renovation of Radioimmunoassay (RIA) Lab and Committee-cum-Seminar Room
<p>Veterinary Medicine</p> <ul style="list-style-type: none"> • Designed a lameness chute for hoof examination and trimming in dairy animals • Established Endoscopy unit • New instrument like - Laminar Air Flow, UV Spectrophotometer
<p>Veterinary Microbiology</p> <ul style="list-style-type: none"> • New instruments like - Fluorescent Microscope, Polarization and Luminescence Meter, Real Time PCR
<p>Veterinary Pharmacology and Toxicology</p> <ul style="list-style-type: none"> • Renovated in-vitro Toxicology Laboratory • New instruments like - Fluorescent and Inverted Microscope, CO2 incubator, Biosafety Cabinet
<p>Veterinary Surgery & Radiology</p> <ul style="list-style-type: none"> • Renovation of small animal operation theatre • New instruments like- C-Arm Image Intensifier
<p>School of Animal Biotechnology</p> <ul style="list-style-type: none"> • Established Bioinformatics Lab.
<p>College of Fisheries</p> <ul style="list-style-type: none"> • Establishment of FRP Carp hatchery, Water Testing Lab • Renovation of Nutrition lab • New instruments like- Semi motorized microscope with CCD camera, automatic titration system, multiple vortexer, automatic protein digestion & distillation system, bomb calorimeter, fully automatic autoclave, band saw, Wheel and splash aerators, engine driven water pump, microplate spectrophotometer (ELISA reader), Gradient Thermal cycler, multi parameter water analysis kit, vertical electrophoresis unit, Horizontal electrophoresis unit, digital balances, Deep freezer (-20°C), Refrigerator
<p>Veterinary Polytechnic, Kaljharani</p> <ul style="list-style-type: none"> • Hostel for the students of the Veterinary Polytechnic

Conferences and Trainings Organized

1	<p>Training course on “Microbiological and Molecular Biology techniques” held at Deptt. of Vety. Microbiology, GADVASU (for Biotechnology students of other Universities) organized by Department of Veterinary Microbiology from June 1-30, 2011.</p>
2	<p>Udder Health Management in Dairy Animals organized by Department of Veterinary Medicine in collaboration with Indian Immunologicals from Aug 2-4, 2011.</p>
3	<p>Prevention and therapeutic management of peri -parturient complications in domestic animals” organized by Department of Veterinary Gynaecology and Obstetrics from Aug 23-Sep 12, 2011</p>
4	<p>Twenty fourth Advanced Training Course on “Computerized Radiography and Interventional Surgical Procedures for Veterinary Patients” organized by Department of Veterinary Surgery and Radiology from Sept 30-Oct 20, 2011.</p> <div data-bbox="820 499 1404 882" data-label="Image"> </div> <p data-bbox="381 829 803 892" style="text-align: center;">Practical Demonstration of Surgery during 24th Advanced Training Course</p>
5	<p>Winter School entitled “Advanced Molecular Biology Tools used in Animal Disease Diagnosis and Development of New Generation Vaccines” sponsored by ICAR organized by School of Animal Biotech., GADVASU, Ludhiana from Oct 3-23, 2011</p> <div data-bbox="820 934 1404 1270" data-label="Image"> </div> <p data-bbox="284 1207 803 1270" style="text-align: center;">Participants of Winter School organized by School of Biotechnology, GADVASU, Ludhiana</p>
6	<p>Dog Show organized by Department of Veterinary Medicine in collaboration with Ek Tek Pharma from Oct 30, 2011.</p> <div data-bbox="203 1386 787 1774" data-label="Image"> </div> <p data-bbox="203 1785 787 1879" style="text-align: center;">Dr. VK Taneja, Vice Chancellor GADVASU inaugurating the Dog Show on the special occasion of World Veterinary year – 2011</p> <div data-bbox="820 1386 1404 1900" data-label="Image"> </div> <p data-bbox="998 1900 1226 1942" style="text-align: center;">Dog Show in progress</p>

CONFERENCES AND TRAININGS ORGANIZED

7	<p>National Symposium on “Emerging Management Concepts for Sustainable Livestock and Poultry Production” and XIX Annual Convention of Indian Society of Animal Production and Management (ISAPM) from 2nd to 4th November, 2011 organized by Department of Livestock Production Management, GADVASU, Ludhiana from Nov 2-4, 2011.</p> <div style="display: flex; justify-content: space-around;">   </div> <p style="text-align: center;"> Presidential address by Dr. VK Taneja, Vice-Chancellor GADVASU during inauguration of the Symposium Poster session during the symposium </p>
8	<p>Training on “Reproductive Ultrasound Procedures for field Veterinarians” organized by Department of Veterinary Gynaecology and Obstetrics from Dec 5-7, 2011.</p>
9	<p>Workshop on “Basic Experimental Design: Planning for Good Results and Working with Mice-Basic Considerations and Sample Taking” organized by Department of Veterinary Public Health & Epidemiology in collaboration with University of Saskatchewan, Canada from Dec 13, 2011</p>
10	<p>Seminar on Nanotechnology “Its Scope and Perspective in Veterinary Sciences with emphasis on Public Health Issues” organized by Department of Veterinary Public Health & Epidemiology in collaboration with University of Saskatchewan, Canada from Dec 21, 2011</p> <div style="text-align: center;">  <p>Presidential address by Vice-Chancellor, Dr. VK Taneja during the seminar on Nanotechnology</p> </div>
11	<p>Refresher Course on “Ultrasound Procedures” organized by Department of Veterinary Surgery and Radiology from Jan 16-18, 2012</p>
12	<p>Food Festival organized by University on Feb 10, 2012</p> <div style="display: flex; justify-content: space-around;">   </div> <p>‘Food Festival’ was organized by GADVASU to popularise various value added meat (chicken, duck, goat & fish) and milk products. Products developed by the university were presented for sensory evaluation and sale during the ‘Food Festival’</p>

Awards and Honours

Name of the Faculty/ Student	Award/Honour
COLLEGE OF VETERINARY SCIENCE	
Animal Genetics and Breeding	
Samita Saini	Dr. N.S.R. Sastry Young Scientist Award for best oral presentation at National Symposium on “Emerging Management Concepts for Sustainable Livestock and Poultry Production” and XIX Annual Convention of Indian Society of Animal Production and Management (ISAPM) from November 2-4, 2011 at GADVASU, Ludhiana.
Balwinder Singh	Dr. J S Pruthi Award for best paper published in the Journal Spices and Aromatic Crops (JOSAC) 2010.
Simarjeet Kaur	Executive Member of the Society of Conservation and Livestock Biodiversity.
Veterinary Medicine	
Dr. S.N.S. Randhawa, Director of Research and Dean PGS	Nominated by ICAR as member of Quinquennial Review Team (QRT) to review the research work of ICAR Research Complex for Eastern Region, Patna, Bihar for a period of 5 years.
Kirti Dua	Fellowship of Indian Society of Veterinary Medicine
B.K. Bansal	Poster Presentation Award by Indian Society for Veterinary Medicine
Naimi Chand	Best Oral Presentation Awards Indian Society for Veterinary Medicine
Livestock Production Management	
Chandahas	Best Paper Presentation Award for research paper entitled “Effect of probiotic cultures on faecal microflora and diarrhoea incidences in beetal kids under stall-fed conditions” at National Symposium on “Emerging Management Concepts for Sustainable Livestock and Poultry Production” and XIX Annual Convention of Indian Society of Animal Production and Management (ISAPM) from November 2-4, 2011 at GADVASU, Ludhiana.
Daljeet Kaur	Best Poster Award for research paper entitled “Performance and welfare of laying pullets under different cooling systems during summer” at National Symposium on “Emerging Management Concepts for Sustainable Livestock and Poultry Production” and XIX Annual Convention of Indian Society of Animal Production and Management (ISAPM) from November 2-4, 2011 at GADVASU, Ludhiana.
Rohit Gupta, P.G. Student	Dr. N. S. R. Sastry Young Scientist Award for research paper entitled “Efficacy of cooling systems on broiler performance during hot-humid season” at National Symposium on “Emerging Management Concepts for Sustainable Livestock and Poultry Production” and XIX Annual Convention of Indian Society of Animal Production and Management (ISAPM) from November 2-4, 2011 at GADVASU, Ludhiana.
Teaching Veterinary Clinical Complex	
Vandana Sangwan	Consolation Award for Second Best paper in Dr. Rishendra Verma Young Scientist Award Session (2011) by Indian Association for the Advancement of Veterinary Research at Jaipur, Rajasthan from Feb. 11-12, 2011. (Kumar A, Saini NS, Sangwan V and Mohindroo J. “Ultrasonographic evaluation of traumatic reticulo-peritonitis in bovine”) Best Oral Presentation Award in Animal Reproduction and Health Management Session (2011) by Indian Society for Animal Production and Management at GADVASU, Ludhiana from Nov. 2-4, 2011 (“Unilateral Mastectomy for the management of chronic suppurative mastitis in a goat” by Kumar A, Mahajan SK, Singh K, Sangwan V, Chandra M, Saini NS and Anand A)

Name of the Faculty/ Student	Award/Honour
	<p>Gold Medal for Best Paper in Ruminant Surgery Session (2011) by Indian Society for Veterinary Surgery at Kolkata from Nov. 11-13, 2011 (“Ultrasound Guided percutaneous Drainage of massive perireticular abscesses in bovine” by Kumar A, Saini NS, Sangwan V and Mohindroo J)</p> <p>Appreciation Award for Second Best Paper in Equine Surgery Session (2011) by Indian Society for Veterinary Surgery at Kolkata from Nov. 11-13, 2011 (“A long term study on the management of endemic outbreak of Rhodococcus equi pneumonia at a Horse Breeding Farm” by Sangwan V, Saini NS, Kumar A, Chandra M, Randhawa CS and Singh SS).</p>
Rakesh Ranjan	Best Oral Presentation Award, Best Poster Presentation Award and ISVM Appreciation Award 2011 during 30th Annual Convention of Indian Society for Veterinary Medicine, held at Central Agricultural University, Aizawl from Feb. 1-3, 2012.
Veterinary Anatomy	
Neelam Bansal	Fellow of Indian Association of Veterinary Anatomists.
Opinder Singh	Fellow of Indian Association of Veterinary Anatomists.
Varinder Uppal, Neelam Bansal, Devendra Pathak, Gurpreet Kaur and Anuradha Gupta	Late Shri L O Dhande memorial silver jubilee award and medal in forensic anatomy including archaeological study.
Anuradha, Neelam Bansal, J Mohindroo and Varinder Uppal	Dr Md. Hafeezuddin silver jubilee award and medal in gross anatomy.
Neelam Bansal, Varinder Uppal, Devendra Pathak, Anuradha, G S Brah	Best poster presentation award
Veterinary and Animal Husbandry Extension Education	
Jaswinder Singh	Best poster award at XIX Annual Convention of Indian Society of Animal Production and Management (ISAPM) held from November 2-4, 2011 at GADVASU, Ludhiana.
Parminder Singh	Best paper award at XIX Annual Convention of Indian Society of Animal Production and Management (ISAPM) held from November 2-4, 2011 at GADVASU, Ludhiana.
Veterinary Gynaecology & Obstetrics	
S P S Ghuman	Best Presentation for clinical cases” during the XXVII annual convention of Indian Society for the Study of Animal Reproduction (ISSAR), Aizwal.
SPS Ghuman, Jagir Singh, M. Honparkhe & Dinesh Dadarwal	<p>‘Nils Lagerloff Award” in XXVII annual convention of Indian Society for the Study of Animal Reproduction (ISSAR), Aizwal.</p> <p>‘NC Sharma Award” in XXVII annual convention of Indian Society for the Study of Animal Reproduction (ISSAR), Aizwal.</p>
M Honparkhe, VK Gandotra, PS Brar & SPS Ghuman	Best Poster Presentation Award” in XXVII annual convention of Indian Society for the Study of Animal Reproduction (ISSAR).
Emy. E. Varughese	Best student Clinical cases presentation Award, 1st –position during TANUVAS – MSU, International symposium and 3rd National clinical case conference in farm and companion animal practice held at Chennai July 14-15 2011.
Veterinary Microbiology	
H. M. Saxena	Fellowship of Society for Applied Biotechnology

Name of the Faculty/ Student	Award/Honour
Veterinary Pathology	
Amarjit Singh	Diplomate ICVP by Indian College of Veterinary Pathologists Fellowship Award by Indian Association of Veterinary Pathologists (Fellow IAVP) Web Manager, Indian Association of Veterinary Pathologists and Indian College of Veterinary Pathologists for a period of three years from 2012-2014
NK Sood	Vice-President (Elect) of Indian College of Veterinary Pathologists
Kuldip Gupta	Editor, Indian Journal of Veterinary Pathology for a period of three years from 2012-2014
CK Singh	Zonal Secretary (North Zone) of Indian Association of Veterinary Pathologists for a period of three years from 2012-2014
BS Sandhu	Executive Member of Indian Association of Veterinary Pathologists and Indian College of Veterinary Pathologists for a period of three years from 2012-2014
Amarjit Singh, Dnyaneshwar Shivaji Gavhane, Kuldip Gupta, Deepti Narang, Mirza Rizwan Baig, Ramneek Verma, Naresh Kumar Sood	Savithree Jibachch Sinha best poster presentation award for the best poster: Expression and significance of cancer stem cells in canine mammary tumour during XXVIII Annual Conference of IAVP held at Chennai from Dec. 29-30, 2011.
Kuldip Gupta, Naresh Kumar Sood and Amarjit Singh	Prof. (Dr.) S. Ramachandran Memorial “Molecular Oncology” Award for the paper ‘Molecular subtyping of canine mammary tumours and its prognostic significance’ during XXVIII Annual Conference of IAVP held at Chennai from Dec. 29-30, 2011.
NK Sood, APS Brar, AK Arora, MR Baig, D Narang, DS Gavahne, K Gupta	Best Poster presentation Award in National Symposium and XIX Annual Convention of Indian Society of Animal Production and Management held at, COVS, GADVASU, Ludhiana from November 2-4, 2011.
Veterinary Surgery & Radiology	
Ashwani Kumar	Consolation award for second best research paper in “Dr. R. Verma Young Scientist Award” by IAAVR Congress held at Apollo Veterinary College, Jaipur
K Raje, J Mohindroo, T Singh	Best paper in the Companion Animal Surgery Section, for paper entitled “Successful management of generalized peritonitis in a dog” at the International Symposium on “Clinical Skill Development for the next generation Veterinary Practice” and 3rd National Clinical Case Conference in Farm and Companion Animal Practice jointly organized by TANUVAS and Michigan State University, USA, held at Madras Veterinary College, Chennai.
Varun Prabhakar, A.K. Bishnoi, M. Raghunath	“Successful management of Bilateral tibia fracture in a dog using interlocking nailing and POP cast” at the International Symposium on “Clinical Skill Development for the next generation Veterinary Practice” and 3rd National Clinical Case Conference in Farm and Companion Animal Practice jointly organized by TANUVAS and Michigan State University, USA, held at Madras Veterinary College, Chennai.
A Kumar, SK Mahajan, K Singh, V Sangwan, M Chandra, NS Saini, ,A Anand	Best Oral Presentation Award (2011) in Animal Reproduction and Health Management Session during XIX Annual convention of Indian Society of Animal Production and Management and National Symposium on “Emerging Management Concepts for Sustainable Livestock and Poultry Production” held at Department of Livestock Production and Management from for the paper entitled “Unilateral Mastectomy for the management of chronic suppurative mastitis in a goat”
J Mohindroo	Hafizuddin silver jubilee medal and Gold medal for the best paper in Gross Anatomy session entitled ‘Gross anatomical and ultrasonographic studies on the heart of sheep, goat , pig and buffalo’ presented at XXVI convention and National Symposium of Indian Association of Veterinary Anatomists held at Mathura, U.P.

Name of the Faculty/ Student	Award/Honour
A Singh, J Mohindroo	Gold medal for the paper entitled “Comparison of two methods for diagnosis of omasal impaction in bovines” in the Imaging Technique session of the XXXV Annual Congress of ISVS held at WBUAFS, Kolkata, WB, India
A Kumar, NS Saini, V Sangwan, J Mohindroo	Gold Medal for Research article entitled “Ultrasound guided Percutaneous drainage of massive peri-reticular abscesses in bovine” in the ruminant surgery session of the XXXV Annual Congress of ISVS held at WBUAFS, Kolkata, WB, India
T Singh, SS Singh, Mohindroo J, M.Raghunath, P Verma, N Singh, NS Saini	Appreciation award for research article entitled “Treatment of Degenerated Nasal Turbinates in a Cow” authored in the Large animal surgery poster session of the XXXV Annual Congress of ISVS held at WBUAFS, Kolkata, WB, India
V Sangwan, NS Saini, A Kumar, M Chandra, CS Randhawa, SS Singh	Appreciation Award (2011) in Equine Surgery Session during XXXV Annual conference of Indian Society for Veterinary Surgery and International Symposium held at Kolkata for the paper entitled “A long term study on the management of endemic outbreak of Rhodococcus equi pneumonia at a Horse Breeding Farm”
D Bodh, K Singh, J Mohindroo, SK Mahajan, A Anand	Appreciation award for research article entitled “Evaluation of propofol and isoflurane for general anaesthesia under midazolam butorphanol premedication in bovine in the Anesthesiology session of the XXXV Annual Congress of ISVS held at WBUAFS, Kolkata, WB, India.
Veterinary Parasitology	
Dr. P.D. Juyal, Registrar	Nominated as member of Quinquennial Review Team (QRT) to review the work done by Project Directorate on Animal Disease Monitoring and Surveillance (PDADMAS) Bengaluru. Nominated to the Academic Council of Chaudhary Sarwan Kumar Krishi Viswavidyala Palampur (H.P.) for a period of two years.
LD Singla	Selected Editorial Board member for Journal of Research in biology and Journal of Veterinary Advances
School of Animal Biotechnology	
R S Sethi	Fellow of Indian Association of Veterinary Anatomists. K L Suri Award and medal for Best Poster Presentation in Immunology and Immunohistochemistry at XXVI Congress on Veterinary Anatomy at Mathura (India) November 2-4, 2011.
Rohini Sachdeva	“ISVIB Young Scientist Award” for research presentation entitled “Expression of Bovine Herpesvirus 1 (BHV-1) glycoprotein C (gC) by recombinant baculovirus in insect cells” at XVIII Annual Convention of Indian Society of Veterinary Immunology & Biotechnology and National Symposium on “Effective utilization of translational Research platforms for Animal Biotechnology” held from December 12-14, 2011 at Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat.
Hitesh N Pawar, Ravikant Agrawal, Ramneek and G S Brah	ISVIB Best Poster Award for the research work “Cloning, Sequencing and Phylogenetic analysis of Heat Shock Protein (HSP 70) gene from ruminant species” at XVIII Annual Convention of Indian Society of Veterinary Immunology & Biotechnology and National Symposium on “Effective utilization of translational Research platforms for Animal Biotechnology” held from December 12-14, 2011 at Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat.
Niraj K Singh	1. Best poster award, XVIII Annual Conference of IAAVR, 2011, Jaipur 2. PGIMR-Young Scientist award for poster presentation at 20th National Conference on “Managing Emerging and Re-emerging Plant, Animal, Human and Aquatic Viral Diseases: One Health Perspective” organised by Indian Virological Society ‘VIROCON-2011’ at National Research Centre on Equines, Hisar, Dec. 29-31, 2011

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	16 th Symposium and 8 th Conference on Lameness in Ruminants	Rotorua, New Zealand	Feb. 28 to March 3, 2011
2	World Congress on Biotechnology	OMICS group held at Hyderabad	March 21-23, 2011
3	Pathogenesis of laminitis in horses	Western College of Veterinary Medicine, University of Saskatchewan, Canada	May-June, 2011
4	Global Outsourcing Summit	Asia-Pacific CEO, China	May, 30 2011
5	31st Annual Conference of Society for Teaching and Learning in Higher Education	University of Saskatchewan, Canada	June 15-18, 2011
6	3rd International Conference on Sustainable Animal Agriculture for Developing Countries (SAADC 2011)	Suranaree University of Technology (SUT), Nakhon Ratchasima, Thailand	July 26-29, 2011
7	First Global Forum on bacterial infections: Balancing treatment Access antibiotic resistance	Indian Habitat Centre, Delhi	October 3-5, 2011
8	IAVP/ICVP Workshop on Toxicologic Pathology -2011	Indian College of Veterinary Pathologists, Indian Association of Veterinary Pathologists and TANUVAS, Chennai	October 4-9, 2011
9	International Conference on Functional Dairy Foods (ICFDF)	NDRI, Karnal	Nov. 16-19, 2011
10	Indo-Global Education Summit 2011	The Indus Foundation Inc. New Delhi, Bangalore, Mumbai	Nov. 4-12, 2011
11	"Swine genetics & livestock"	Polar genetics group & Govt of Canada & Deptt of Vety & Animal Husbandry Extension, GADVASU, Ldh	Dec. 5, 2011
12	Basic Experimental design: Planning for good results and working with mice- Basic considerations and sample taking	Held at The Department of Vety. Public health and Epidemiology GADVASU in collaboration with University of Saskatchewan, Saskatoon, Canada	13th Dec., 2011
13	International conference on frontiers in reproductive and XXI annual meeting of the Indian society of reproduction and fertility	NDRI Karnal and ISSRF.	Jan. 30-31 2012

NATIONAL

S. No.	Name of the Conference/ Symposia/ Workshop/ Training	Name of the organizing agency	Dates during which held
1	Advances in Processing and Quality Assurance of Dairy Foods	NDRI, Karnal	March 22- April 11, 2011
2	National Training Program on "Nanotechnology: Concepts and Applications in Basic and Strategic Research for Livestock Improvement"	Animal Biochemistry Division, NDRI, Karnal	March 22- April 6, 2011

PARTICIPATION OF FACULTY IN CONFERENCES

S. No.	Name of the Conference/ Symposia/ Workshop/ Training	Name of the organizing agency	Dates during which held
3	Summer School on "Advances in Bio processing/ Bio engineering and Quality Assessment Techniques	CIPHET, Ludhiana	June 1-21, 2011
4	Training on Real time PCR	AB Applied Systems, Gurgoan	June 4-6, 2011
5	Orientation course in "Science communication through media-Recent trends "	PAU, Ludhiana	June 7-27, 2011
6	Advances in Educational Methodology and Instructional Technology	NAARM, Hyderabad	July 3-23, 2011
7	National workshop on 'Portable FRP Carp Hatchery Technology'	CIFA (ICAR), Bhubaneshwar, Odisha	July 11-13, 2011
8	Basic and Applied Approaches in Designing of Dairy Based Nutraceuticals and Functional Foods	NDRI, Karnal	July 18-27, 2011
9	Fisheries colleges Dean's meeting regarding Experiential Learning Program for B.F.Sc.	Tuticorin, Tamil Nadu	July 20-23, 2011
10	Workshop on 'Strengthening of Fisheries in Haryana'	Haryana Farmers Commission	July 30, 2011
11	Recent advances in methane estimation and mitigation strategies in ruminants	NIAP, Bengaluru	Aug. 5-18, 2011
12	Training Programme on "Partnering of KVKs/ SAUs/ICAR/Institute with NABARD's Initiative for Rural Prosperity	Bankers Institute of Rural Development, Lucknow	Sept. 5-8, 2011
13	Workshop on "Better Management Practices for Enhancing Productivity"	Director, Animal Husbandry, Punjab Govt. Livestock Farm (Buffalo) Mattewara, Distt. Ludhiana, Punjab, India	Sept. 14, 2011
14	'Ideation workshop on various aspects of dairy industry'	Pfizer, India, Ludhiana	Sept. 21, 2011
15	27th Annual Convention of ISSAR and National Symposium on 'Reproductive Biotechnologies for Augmenting Fertility and Conservation of Animal Species with Special Reference to North Eastern Hill Region' held at Central Agricultural University, Aizawl, Mizoram	Indian Society for the Study of Animal Reproduction, Mizoram Chapter, Central Agricultural University, Aizawl	Sept. 27-29, 2011
16	19th Annual Convention of Indian Society of Animal Production and Management on 'Emerging Management Concepts for Sustainable Livestock and Poultry Production at Department of Livestock Production Management, GADVASU, Ludhiana.	Indian Society of Animal Production and Management, Punjab Chapter, GADVASU, Ludhiana	Sept. 27-29, 2011
17	The National Symposium and First Indian Academy of Veterinary Nutrition and Animal Welfare Conference 2011	College of Veterinary Science and Animal Husbandry, Durg (Chhattisgarh)	Sept. 2011
18	Advanced training in 'Advances in Aquaculture Nutrition and Feed Processing Technology'	CIBA (ICAR), Chennai (T.N.)	Sept. 15- Oct. 5, 2011
19	Twenty fourth Advanced Training Course on "Computerized Radiography and Interventional Surgical Procedures for Veterinary Patients"	Department of Surgery and Radiology	Sept. 30- Oct. 20, 2011

S. No.	Name of the Conference/ Symposia/ Workshop/ Training	Name of the organizing agency	Dates during which held
20	21 day ICAR sponsored Winter School on "Advanced Molecular Biology Tools used in Animal Disease Diagnosis and Development of New Generation Vaccines"	School of Animal Biotechnology, GADVASU, Ludhiana	Oct. 3-23, 2011
21	Annual review meeting of the AICRP/Methane projects by the ICAR at Animal and Fishery Sciences, University.	Nagpur , Maharashtra	Oct. 22-23, 2011
22	Data Analysis in Dairy Science using SAS	NDRI, Karnal	Oct. 31-Nov. 5, 2011
23	Advances in Reproductive Technology to augment fertility in farm animals	IVRI, Izatnagar UP	Nov. 1-21, 2011
24	XX Annual conference of Society of Animal Physiologists of India (SAPI)	Department of Veterinary Physiology, West Bengal University of Animal and Fishery Sciences, Kolkata	Nov. 2-4, 2011
25	XXVI annual convention of IAVA and National Symposium on "Application of structural dynamics of animals and birds in relation to health and production with special reference to Biotechnology and Immunology"	Department of Anatomy, College of Veterinary Science, Mathura (UP)	Nov. 2-4, 2011
26	National Symposia on 'Emerging management concepts for sustainable livestock and poultry production'	Department of LPM, COVSc, GADVASU	Nov. 2-4, 2011
27	14 th Biennial Conference of Animal Nutrition Society of India	Department of Animal Nutrition College of Veterinary & Animal Sciences, G.B.Pant University of Agriculture and Technology Pantnagar, Uttarakhand	Nov. 3-5, 2011
28	35 th Annual Congress of Indian Society of Veterinary Surgery and International Symposium	College of Veterinary Science, West Bengal University of Animal and Fishery Sciences, Kolkata	Nov. 8-10, 2011
29	Xlth Conference of Indian Society of Pharmacology & Toxicology	Division of Pharmacology & Toxicology at IVRI, Izatnagar	Nov. 17-19, 2011
30	National Seminar on " Vet. for Health, Vet. for Food, Vet. for the Planet"	Delhi Veterinary Association and Indian Veterinary Association	Nov. 19-21, 2011
31	19 th Annual meeting of Project Directorate on Animal disease Monitoring & Surveillance (PDADMAS)	PDADMAS, Bengaluru (ICAR)	Dec. 8, 2011
32	SYMSAC VI: Symposium on Spices and Aromatic Crops: Exploiting Spices Production Potential of the Deccan Region	University of Agricultural Sciences, Dharwad, Karnataka, India	Dec. 8-10, 2011
33	XVIII Annual Convention of Indian Society of Veterinary Immunology & Biotechnology and National Symposium on "Effective utilization of translational Research platforms for Animal Biotechnology"	Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat.	Dec. 12-14, 2011

PARTICIPATION OF FACULTY IN CONFERENCES

S. No.	Name of the Conference/ Symposia/ Workshop/ Training	Name of the organizing agency	Dates during which held
34	Workshop on “Basic experimental design: Planning for good results and working with mice- Basic considerations and sample taking”	Department of Veterinary Public Health and Epidemiology, GADVASU, Ludhiana,	Dec. 13, 2011
35	Food and Agri Processors Conclave: Linking Clusters to Markets	The Associated Chambers of Commerce and Industry of India, Punjab Agricultural University, Ludhiana	Dec. 16, 2011
36	Meeting of Deans of the College of Fisheries	Central Institute of Brackishwater Aquaculture (CIBA), Chennai	Dec. 18, 2011
37	9 th Indian Fisheries Forum	Central Marine Fisheries Research Institute (CMFRI)- Kochi, Chennai	Dec. 18-23, 2011
38	Seminar on Nano Technology: Its scope and perspective in veterinary science with emphasis on public health issues	Department of Veterinary Public Health & Epidemiology in collaboration with University of Saskatchewan, Canada	Dec. 21, 2011
39	31 th Annual Conference of STOX	IIS University, Jaipur	Dec. 22-24, 2011
40	XXVIII Annual Conference of Indian Poultry Science Association and International Symposium on “Rural Employment Generation and Nutritional Security through Poultry Production”	Dept. of Livestock Production & Management, Bihar Vety. College, Patna	Dec. 22-24, 2011
41	III Annual Meeting of the Indian College of Veterinary Pathologists	Department of Veterinary Pathology, Madras Veterinary College, TANUVAS, Chennai	Dec. 28, 2011
42	XXVIII Annual Conference of Indian Association of Veterinary Pathologists & National Symposium on Innovative Research Approaches for Diagnostic Pathology	Department of Veterinary Pathology, Madras Veterinary College, TANUVAS, Chennai	Dec. 29-30, 2011
43	XX National Conference on managing emerging reemerging plant animal human and aquatic viral diseases: one health perspective Virocon 2011	National research centre on Equines, Hisar,	Dec. 29-31, 2011
44	20 th National Conference on “Managing Emerging and Re-emerging Plant, Animal, Human and Aquatic Viral Diseases: One Health Perspective” organised by Indian Virological Society ‘VIROCON-2011’	National Research Centre on Equines, Hisar.	Dec. 29-31, 2011
45	National symposium on recent advances in reproductive biotechnology: Retrospective and prospective vision	NDRI, Karnal	Jan. 30-31, 2012
46	30 th Annual Convention and National Symposium of Indian Society of Veterinary Medicine	Central Agricultural University, Aizawl, Mizoram	Feb. 1-3, 2012
47	XL Dairy Industry Conference	Indian Dairy Association, New Delhi	Feb. 2-5, 2012
48	An Expert consultation and farmers meet on ‘Sustainable Development and Perspectives in Inland Saline Aquaculture’	Central Institute of Fisheries Education (CIFE) Centre (ICAR), Lahli, Rohtak	Feb. 11, 2012
49	X th Annual Conference of Indian Association of Veterinary Public Health Specialists (IAVPHS)	Department of Veterinary Public Health, College of Veterinary Science, Mannuthy, Thrissur	Feb. 16-17, 2012

Visitors to the University



S. Parkash Singh Badal, Hon'ble Chief Minister of Punjab for inauguration of Veterinary Polytechnic building at Veterinary Polytechnic & RRTC, Kaljharani. (December 2, 2011)



Dr. G.S. Kalkat, Chairman, Punjab State Farmer's Commission (January 25, 2012)



Mr. S.C. Agarwal, IAS, Chief Secretary, Govt. of Punjab (April 29, 2011)



Mr. G.S. Sandhu, IAS, Financial Commissioner (Animal Husbandry, Dairy and Fisheries), Govt. of Punjab (April 21, 2011)



Dr. S. Ayyappan, Director General, ICAR, New Delhi visited GADVASU as Chief Guest of 1st Convocation (December 9, 2011)



Dr. Deva Kumar, ADG (EDP) ICAR (April 18, 2011)



Dr. KML Pathak, DDG (ICAR) and Dr. M.C. Sharma, Director, IVRI, Izzatnagar (May 9, 2011)



Dr. Kusumakar Sharma, ADG (HRD), ICAR (March 3, 2011)



Dr. A.K. Srivastava, Director NDRI, Karnal (November 3, 2011)



Dr. B.S. Dhillon, Vice Chancellor, PAU, Ludhiana (July 11, 2011)



High powered team of scientists from Project Implementation Unit (PIU), New Delhi comprising Dr Bangali Babu, National Director, National Agricultural Innovation Project (NAIP) and Dr A P Srivastava, National Coordinator, NAIP Component III, visited Guru Angad Dev Veterinary & Animal Sciences University, Ludhiana to review the progress of NAIP Sub-Projects (April 7, 2011)



World Bank Mission Team (10th Implementation Support Mission of NAIP) (December 9, 2011)



Peer Review Team, ICAR (Feb. 8-10, 2012)



Team from NABARD (November 17, 2011)



Delegation from Nuffield Global Farming Scholars (September 16, 2011)



Pennsylvania delegates (Feb 29, 2012)

LIST OF RESEARCH SCHEMES OPERATIONAL DURING 2011-12

S.No.	Name of the Scheme
Non Plan Schemes	
1.	Director of Research
2.	Research Facilities for Dairy Cattle and Buffalo Breeding
3.	Genetic Improvement of Egg-Type Stock
4.	Recovery, Cryopreservation and embryo transfer in buffaloes and crossbred cattle
5.	Germplasm Multiplication of Egg-type Poultry Stocks
6.	Physical Facilities of Breed quails for Meat and Egg
7.	Additional facilities for modernization of diary operations
8.	Advanced Research Centre for Buffalo Reproduction
9.	Rearing of Buffalo Male Calves for Meat
10.	Introduction and Breeding and Naked Neck/Rhode island Red and other Miscellaneous Stocks of Poultry
11.	Molecular and Cytogenetic Studies on Animals for faster genetical gains
12.	Intensification of Research in Animal Nutrition
13.	Improvement of Buffalo and crossbred cattle through nutrition effect of plans of nutrition on their growth rate age at puberty, pregnancy and lactation
14.	Seed Production in Forage crops
15.	Establishment of Research Laboratory for feed evaluation and processing
16.	Improvement of forages and establishment of forage unit
17.	Establishment of Research-cum-quality Control Laboratories for Feed for livestock/poultry farmer and feed manufacturers
18.	Establishment of Small Animal Colony
19.	Creation of facilities for rearing of meat animals i.e. goat,pig and rabbit
20.	Studies on Utilization and Popularization of Processed Meat products prepared from buffaloes and other species
21.	Anatomical, Histological, Histo-chemical, electron-microscopic studies as related to hormonal and biochemical profile in female reproductive organs in buffalo
22.	Internal diseases of dairy animal their clinico pathological diagnostic and therapeutic aspect
23.	Nutritional deficiency diseases of dairy animal and their clinico pathological diagnostic and therapeutic aspect
24.	Animal Disease Research Centre and Strengthening of diagnostic facilities & Experimentation
25.	Reproductive Biology, Ecology, and Management of Birds and Mammals
26.	Reproductive disorders in dairy animals
27.	Studies on viral bacterial and mycotic infection of cattle and buffaloes with a view to develop diagnostic test and suitable vaccines
28.	Research on poultry diseases
29.	Establishment of research-cum-diagnostic laboratory for rabies
30.	Immunological Studies on the Helminthic diseases of livestock
31.	Immunological control of cattle tick (Boophilus Microplus)
32.	Toxicity studies on insecticide in livestock
33.	Research on diagnostic aids & surgical treatment of musculer skeletal and abdominal disorders in large animals
34.	Strengthening of Fisheries Research in GADVASU
35.	Fisheries Research Scheme
36.	Establishment of Fisheries Unit
37.	Sustainable aquaculture technology for salt-affected/water-logged areas of Punjab
38.	Regional Livestock Research Centre at Bathinda

LIST OF RESEARCH SCHEMES

S.No.	Name of the Scheme
39.	Regional Livestock Research Centre at Kapurthala
40.	I. State share in AICRP & other schemes on sharing basis II. State share on account of personal promotion in ICAR & other agency schemes III. State share for works/ROC financed by ICAR & other agencies IV. Areas of employees and provision for vacant posts
Plan Schemes	
1.	Strengthening of Directorate of Research, GADVASU
2.	Establishment of Regional Research Centre for Nili Ravi Buffalo
3.	Regional Livestock Research Centre for Sahiwal Cattle
4.	Studies on Goats for meat and milk production under stall-fed conditions in Punjab
5.	Pesticide-induced adverse effects Implication on Livestock Production.
6.	Development of strategies for production of safe and residue free animal origin 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.	Strengthening of teaching Semen Laboratory
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 (FPT)
4.	AICRP on Poultry Improvement
5.	AICRP on Improvement of feed resources and Nutrient utilization in raising animal production
6.	Project Directorate on Animal disease monitoring & surveillance (PD_ADMAS)
7.	Sustainable Livestock Farming System for Livelihood Security in Hoshiarpur District of Punjab
8.	Rumen Microbial diversity in domesticated and wild ruminants and impact of additives on methanogenesis and utilization poor quality fibrous feed
9.	All India Network Programme on HS
10.	Antiluterolytic strategies - a novel approach to enhance fertility in buffalo
11.	Otreach/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.	Inland Aquaculture in Punjab (Niche Area of Excellence)
15.	Experiential Learning Unit setting up of facilities for Entrepreneurship Training - Critical Care Unit.
16.	Estimation Of Methane Emission under Different Feeding Systems and Development of Mitigation Strategies
17.	Centre of Advanced Studies in Veterinary Gynaecology and Reproduction
18.	Centre of Advanced Studies in Veterinary Surgery and Radiology
19.	Niche Area of Excellence – Animal Disease Registry and Tissue bank
20.	Novel Bioactive Edible Films for Extended Self Life Meat Based Products
Miscellaneous Schemes	
CSS	
1.	Open Nucleus Breeding System to improve Sahiwal Cattle and Nili Ravi Buffalo in the state of Punjab (AH, Pb.)

S.No.	Name of the Scheme
DBT	
1.	Characterization of antimicrobial peptide genes in buffaloes in health and disease
2.	Identification of target molecule on B cells which binds Infectious Bursal Disease (IBD) virus and its regulation for immunoprophylaxis of IBD in chicken
3.	Isolation and Characterization of sperm specific antigenic protein(s) with Immunocontraceptive potential in Dog
4.	Development of a novel marker vaccine for bovine Herpes Virus-I (BHV-I) and a companion Diagnostic test
5.	Molecular characterization of Toll Like Receptors (TLRs- 2,3,4,9) in Indian carp <i>Catla catla</i>
6.	Isolation and Characterization of Animal Adenoviruses for Development of a Novel Viral Vector for Vaccine delivery
7.	MVSc/MSc in Animal Biotechnology
8.	To evaluate the in-vitro and in-vivo therapeutic potential of bacteriophages
9.	Differential Response to Heat stress and production of monoclonal antibodies against Hsp70 in Buffalo
10.	Molecular characterization of cytolethal distending toxin (CDT) of genus Salmonella and exploring its applicability as novel delivery vehicle and potential anti tumor agent
11.	A Study on Sero-prevalence of Viruses Associated with Porcine Reproductive Problems.
12.	Melatonin – A potential candidate for alleviating seasonal suppression of fertility in buffaloes.
13.	Diagnosis and control of brucellosis a dreadful zoonotic disease in domestic livestock for enhancing productivity in Punjab State.
14.	Network project on brucellosis for molecular epidemiology and characterization of species of biotypes for sustainable management of brucellosis
UGC	
1.	Studies on the evaluation of outer membrane protein (OMP) genes of <i>Leptospira interrogans</i> for development of PCR based diagnostics as well as production of recombinant OMPs and their immunological characterization
2.	Influence of Exposure to new Generation on the Dis-position of Anti-Microbial Agents.
3.	Evaluation of Retino-pathic potential of Fluoroquinolones
4.	Studies on the Development and Standardization of molecular diagnostic assays for infectious causes of abortions.
5.	Development of Bacteriophage Therapy as an alternate strategy for treatment of multiple drug resistant bacteria causing pyogenic / suppurative infections.
6.	Characterization and ultra-structural details of Endotoxin induced Laminitis in Buffalo Calf Model
Other	
1.	Pharmacokinetics-Pharmacodynamics Integration and Toxicological Studies of Fluoro-Quinolones and Cephalosporins in Buffalo Species (CSIR)
2.	Improvement of dairy animals through embryo transfer technology at the institutional farm and field conditions (PDDDB)
3.	Confirmation of lactation performance and animal safety of dairy animals of the <i>Bos.sp.</i> and <i>Bubalus sp.</i> Treated with recombinant bovine somatotrophin (AHC/ELANCO)
4.	Improvement of udder health and milk quality through application of mastitis control program under field conditions (PSFC)
5.	Production and evaluation of hyper immune sera and monoclonal antibodies (mAbs) against immuno-dominant antigens of opportunistic Gram –ve pathogen <i>Pseudomonas aeruginosa</i> (ICMR)
6.	Evaluation of herbal medicine in the treatment and prevention of Mastitis in dairy cows (Ayurved Co.)
7.	Antibiotic use and residues in chicken meat and milk samples from Karnataka and Punjab, India (PHFI)
8.	Experiential Learning Unit – setting up of facilities for entrepreneurship processing of milk and milk products (Ministry of Food Processing)
Department of Science & Technology (FIST)	
1.	Department of Veterinary Gynaecology

LIST OF RESEARCH SCHEMES

S.No.	Name of the Scheme
2.	Department of Veterinary Microbiology
3.	School of Animal Biotechnology
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 scheme funded by the ICAR and other agencies
RKVY Research Schemes	
1.	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 therapeutics of animals
2.	Enhancing production, reproduction, health of livestock in Punjab through research activity
(A)	Animal Production, Fisheries and Food Safety
1.	DNA bar-coding of livestock & poultry germplasm of the state for registration
2.	Energy requirement during transition period in crossbred cows
3.	Exiting status of food safety measures at dairy farms of Punjab
4.	Culture & breeding technology for ornamental fishes in Punjab

S.No.	Name of the Scheme	
(B)	DISEASE DIAGNOSIS	
1.	Studies on intra-vitam diagnosis of Rabies in Animals	
2.	Diagnosis of Emerging/Re-emerging diseases/conditions of Avian species using Bio-molecular, Immuno-pathological approaches	
3.	Development & Standardization of molecular and sero-diagnostic tests against economically important bacterial & viral diseases of farm animals prevalent in Punjab	
4.	Detection of mycotoxins in animal & poultry feed and their implication in poultry diseases	
5.	Studies on bacterial and Cystic pathogens associated with reproductive disorders in bovines	
(C)	HEALTH & VETERINARY CARE	
1.	Development & evaluation of potent new vaccines against economically important bacterial & viral diseases of farm animals prevalent in Punjab	
2.	Development of an economical & efficient fixed-time AI protocol for buffalo reared in tropical areas	
3.	Studies on epidemiology, diagnosis & management of production diseases in dairy animals	
4.	Diagnosis & therapeutic management of important diseases of equines	
5.	Clinical studies on diagnosis & surgical management of colic in equines	
6.	Nitrite toxicity an emerging problem in Punjab: Impact on animal health & production	
7.	Nitrite toxicity an emerging problem in Punjab; Impct on animal healand production	

Visits Abroad

S.No.	Name of the Faculty	Place	Date(s)	Purpose
1.	MK Chatli	Meat Proteomics Lab, Department of Animal and Food Science, University of Kentucky, Lexington, USA	March 22- Sept. 21, 2011	Training for Scientists Abroad
2	Dipak Deka	Vaccine and Infectious Disease Organization-International Vaccine Centre (VIDO-InterVac.), University of Saskatchewan, SK, CANADA,	March 29- Sept. 27, 2011	Six months foreign training on "Non human adenovirus based vaccines
3	HM Saxena	China	May 30, 2011	To attend two global summits
4	Swaran singh	University of Saskatchewan, Canada	May-June, 2011	Visiting Scientist in the Project "Pathogenesis of laminitis in horses"
5	Mudit Chandra	San Diego, US	May 23 - Nov. 16, 2011	Six months Advanced training on Molecular Diagnosis
6	JPS Gill	University of Saskatchewan, Canada	July 29 - August 16, 2011	To strengthen the already ongoing collaboration with the University
7	CS Mukhopadhyay	Department of Animal Science of Iowa State University, Ames	July 20, 2011- Jan. 19, 2012	6 months Advanced Training on "Marker Assisted Selection and Functional Genomics"
8	M Raghunath	Cape Town, South Africa	Oct. 10-14, 2011	To present paper at 30th World Veterinary Congress, Cape Town, South Africa

PUBLICATIONS

RESEARCH PUBLICATIONS

1. Alam HM, Kaur A, Jyoti, Singh NK, Haque M and Rath SS. 2011. Molluscicidal effects of ether extract of *Azadirachta indica* (neem) on experimentally reared snails *Lymnaea auricularia* and *Indoplanorbis exustus*. *Indian Journal of Veterinary Research*. 20: 50-55.
2. Anuradha and Bansal N. 2011. Histoenzymic alterations in buffalo lung due to lead toxicosis: an experimental study. *Indian Journal Veterinary Research*. 20 (1): 34-37.
3. Anuradha and Bansal N. 2011. Histomorphochemical studies on cardiac skeleton in buffalo foetus. *Indian Veterinary Journal*. 88 : 65-66
4. Anuradha, Bansal N and Uppal V 2012. Alteration in intestinal phosphatases due to lead toxicosis in buffaloes. *Indian Veterinary Journal*. 89 (1) : 20-21
5. Anuradha, Bansal N and Uppal V. 2011. Anatomy of Mandible in Relation to Dental Surgery in Dog. . *Indian Veterinary Journal*. 88 : 88
6. Athar H, Mohindroo J, Randhawa CS, Singh K and Saini NS. 2011. Clinical, hematobiochemical, radiographic and ultrasonographic findings in bovines suffering from pericardial and pleural effusions. *Indian Journal of Animal Science*. 81(8): 827-830.
7. 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.
8. Awahan S, Sandhu BS, Singh CK, Kaw A and Sood NK. 2011. Histopathological alterations in rabid animals. *Indian Journal of Veterinary Pathology*. 35: 4-7.
9. Bakshi MPS and Wadhwa M. 2011. Nutritional status of dairy animals in different regions of Punjab State in India. *Indian Journal of Animal Sciences*. 81: 52-58.
10. Bakshi MPS, Singh MP, Wadhwa, M and Singh B. 2011. Nutritional value of forest tree leaves as livestock feed in sub mountainous region of India. *Indian Journal of Animal Sciences*. 81: 276-281.
11. Banga HS, Deshmukh S, Singh N, Singh D, Mahajan V, Brar RS and Gandotra VK. 2012. Intestinal Phycomycosis in a pig dog. *Indian Veterinary Journal*. 89(1):77-78.
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BOOKS, CHAPTER IN BOOKS COMPENDIUM, BULLETINS, ETC.

S. No.	Name of Authors	Title	Other details
Books			
1	Dua K	Infectious diseases of farm animals	Narosa Publisher
2	Kumar B, Malik DS, Saini AL	A manual of Practical's on "Fodder Production and Grassland Management- 2011	-
3	Bansal BK, Gupta DK	Udder Health Management in Dairy Animals	-
4	Sahota RS, Bhatti JS, Hundal JS, Singh J	Extension Delivery System	Veterinary officers
5	Verma HK, Kansal SK, Sharma R	Eco-friendly and model dairy farming system	Field officers
6	Singh NK, Gupta PK	Advances in vaccine biotechnology: Designing strategies for developing safe vaccine. Applied Aspect of Biotechnology (2010) IVRI Publication.	-
Chapters in books			
1	Bakshi MPS, Wadhwa M	Phytogenics: Role in enteric methane mitigation and In "Nutritional interventions for clean and green livestock production" Edts. Chaturvedi, V. B., Dutta, N., Verma, A. K., Singh, P. and Kamra, D. N. CAFTAN, IVRI, Izatnagar. performance of animals 2011, pp 180-184.	-
2	Wadhwa M, Bakshi MPS	Urea-molasses-multinutrient blocks/licks: A blend of nutrients for ruminants In 'Successes and Failures with Animal Nutrition Practices and Technologies in Developing Countries. FAO, Rome, Italy. Ed. Makkar, H. P. S. 2011. pp. 35-39.	-
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4	Sikka SS	Applications abuses and alternatives to antibiotics. Veterinary Nutrition & Health at S.P Tiwari & P.K Sanyal Pb. 65-106	-
5	Phogat JB, Ghuman SS	Understanding stress pathways involved in modulation of GnRH/LH release in the ewe In: Trends in Small Ruminant Production: Perspectives and Prospects (Eds: Sahoo A, Sankhyan SK, Swarnkar CP, Shinde AK and Karim SA). Publishers: Satish Serial Publishing House, Delhi,	-
6	Juyal PD, Bal MS, Singla LD	Economic impact, diagnostic investigations and management of protozoal abortions in farm animals.	All India SMVS' Dairy Business Directory 11: 39-46. (Chapter)
7	Saini NS, Mohindroo J	Application of veterinary surgical procedures in rural settings in veterinary and livestock sector- a blue print for capacity building ed. SR Garg	Book chapter

S. No.	Name of Authors	Title	Other details
Compendium/Bulletin/ Proceedings			
1	Saijpaul S, Singh J, Saini AL	Silage and Hay making	Bulletin prepared under NAIP project
2	Ramneek, Agrawal RK, Deka D	Proceedings of the Winter School on Advanced Molecular Biology Tools used in Animal Disease Diagnosis and Development of New Generation Vaccines	ICAR sponsored from 3rd-23rd Oct, 2011
3	Saijpaul S, Singh J, Saini AL	Importance of mineral mixture in dairy animal ration	Bulletin prepared under NAIP project
4	Singh J, Saijpaul S, Saini AL	Feeding of urea to dairy animals	Bulletin prepared under NAIP project
5	Chhabra S, Ranjan R	Souvenir Dog Show	-
6	Chandrabhas, Saini AL, Kaur D, Singla M, Malik DS	Emerging Management Concepts for Sustainable Livestock and Poultry Production.	Compendium (National Conference, ISAPM-2011)
7	Saini AL, Chandrabhas, Kaur D, Singla M, Malik DS	Emerging Management Concepts for Sustainable Livestock and Poultry Production.	Souvenir (National Conference, ISAPM-2011)
8	Verma HK, Singh N	Workshop Compendium	Animal Husbandry, Dairy and fisheries Officers
9	Ghuman SPS, Singh J, Gandotra VK	Advances in applications of diagnostic techniques in veterinary theriogenology	Compendium of lectures delivered during training held under CAFT
10	Brar PS, Singh AK, Gandotra VK	Prevention and therapeutic management of peri-parturient complications in domestic animals”	-Do-
11	Honparkhe M, Gandotra VK	Reproductive Ultrasound Procedure for field Veterinarians	Compendium of lectures delivered during training for field veterinarians
12	Mahajan SK, Kumar A, Singh K, Anand A, Sangwan V, Saini NS	Twenty third Advanced Training Course on “Diagnostic and Surgical Procedures for Thoracic and Abdominal Disorders in Veterinary Patients”	Compendium
13	Mohindroo J, Raghunath M, Singh T, Verma P, Singh N	Twenty fourth Advanced Training Course on “Computerized Radiography and Interventional Surgical Procedures for Veterinary Patients”	Compendium
14	Singh K, Verma P	Refresher Course on “Ultrasound and small animal Surgery” from Aug 2 to 4th, 2011 at department of Surgery and Radiology, COVS, GADVASU, Ludhiana	Compendium
15	Kumar A, Saini NS, Sangwan V	Refresher Course on “Large Animal Surgery” from July 11 to 13th, 2011 at department of Surgery and Radiology, COVS, GADVASU, Ludhiana	Compendium
16	Kumar A, Saini NS, Sangwan V	Refresher Course on “Ultrasound Procedures From Jan 16 to Jan 18, 2012 at department of Surgery and Radiology, COVS, GADVASU, Ludhiana	Compendium

S. No.	Name of Authors	Title	Other details
Manuals			
1	Afsha N	Practical Manual on Introduction to Dairy Microbiology	-
2	Afsha N	Practical Manual on Fundamentals of Microbiology	-
3	Malik DS, Chandrahas, Saini AL	A Practical Manual on LPM-III (Regional Interest; Cattle Production Management; LPM-222)	UG Manual
4	Chandrahas, Malik DS, Saini AL	A Practical Manual on Livestock Farm Practices (LFP-221)	UG Manual
5	Kaur D, Nagra SS	A Practical Manual on Avian Production Management (LPM-211)	UG Manual
6	Kaur D, Nagra SS	A Practical Manual on Commercial Poultry Production & Hatchery Management (LPM-221)	UG Manual
7	Kumar B, Malik DS, Saini AL	A Practical Manual on Fodder Production & Grassland Management (LPM-121)	UG Manual
8	Chatli MK, Sahoo J, Biswas AK	Milk and Milk Products Technology	Manual for LPT-311 course for B. V. Sc & A. H. 3rd Professional (New VCI Syllabus Revised)
9	Sahoo J, Chatli MK, Biswas AK	Abattoir Practices and Animal By Products Technology	Manual for LPT-312 course for B. V. Sc & A. H. 26 3rd Professional (New 28 VCI Syllabus Revised)
10	Sahoo J, Chatli MK, Biswas AK	Abattoir Practices and Animal By Products Technology	Manual for LPT-312 course for B. V. Sc & A. H. 3rd Professional (Old VCI Syllabus Revised)
11	Sahoo J, Chatli MK, Biswas AK	Meat and Meat Products Technology (including Poultry Products Technology)	Manual for LPT-411 course for B. V. Sc & A. H. 4th Professional (VCI Syllabus Revised)
12	Bansal N, Sethi RS	Laboratory Manual of Veterinary Splanchnology and Applied Anatomy	As per new VCI curriculum
13	Anuradha, Pathak D, Bansal N, Uppal V	Comparative Osteology and Arthrology	As per newly introduced course of VAN 601
14	Uppal V, Bansal N, Anuradha	General Histology and Ultrastructure	Revised as per newly introduced course of VAN 603.
15	Singh O, Sethi RS	Systemic Histology and Ultrastructure	Revised as per newly introduced course of VAN 607.
16	Verma HK, Kansal SK, Singh J	Practical manual for AHE-311	UG Manual

S. No.	Name of Authors	Title	Other details
17	Ghuman SPS, Honparkhe M, Dadarwal D, Dhaliwal GS, Gandotra VK	Practical Manual on Animal Reproduction and Gynaecology	UG practical manual
18	Brar PS, Prabhakar S, Sharma RD	Practical Manual on Veterinary Obstetrics	-do-
19	Kumar A, Singh J, Dhaliwal GS	Practical Manual on Andrology and Artificial Insemination	-do-
20	Saxena HM, Narang D, Kaur G, Kaur P	Veterinary Immunology and Serology-VMC221	-
21	Kaur R, Saini SPS, Sandhu HS	Lab Manual for General & Systemic Veterinary Pharmacology	-
22	Singh DV, Jindal R	A Practical Manual of Endocrinology/ Reproduction, Growth and environment	For the course VPB-221
23	Sethi RS	Revised manual of Systemic Histology as per newly introduced course of 'Systemic Histology and Ultrastructure' (VAN 607)	-
24	Sharma R, Kaur S, Gill JPS, Singh BB, Aulakh RS	Milk & Meat Hygiene, Food Safety & Public Health VPE-311	UG manual
25	Sethi RS	Manual of VAN221 as per new syllabus	UG manual
26	Gupta A	Taxonomy of Shellfish	B.F.Sc. Practical Manual Course - FRM 113

NATIONAL AND INTERNATIONAL LINKAGES

- Research links with University Saskatchewan, Canada on health effects of environmental pollutants.
- Central Institute of Post-Harvest Engineering and Technology (CIPHET) for "Refinement and evaluation of fish de-scaling machine and entrepreneurship development".
- Centre of Advanced Faculty Training for imparting trainings to faculty from SAUs/ICAR institutes in the field of Veterinary Gynaecology and Obstetrics and Veterinary Surgery.
- Collaborative centre of All India Network Programme on Haemorrhagic Septicaemia
- Project Directorate on Cattle, Meerut

FIRST CONVOCATION OF THE UNIVERSITY



First Convocation of the University was held on Dec 9, 2011. A total of 237 students were conferred degrees for Ph.D. (17), M.V.Sc. (39), M.V.Sc./M.Sc. in Animal Biotechnology (4), M.F.Sc. (3) and B.V.Sc. & A.H. programs (174). Four gold medals for Masters' and two gold medals for B.V.Sc. & A.H were awarded to the meritorious students.



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