Department of Animal Breeding

- Wet average of crossbred and Sahiwal cows was 8.65 kg/day/animal and 6.80 kg/day/animal, respectively.
- About 56% crossbred cows produced more than 3000 kg of milk during lactation and about 85% of the cows produced more than 2000 kg milk in lactation. About 21% Sahiwal cows produced more than 2500 kg of milk during lactation and about 50% of the cows produced more than 2000 kg milk in lactation.
- Beetal and Jakhrana produced 1.33 and 1.15 kids per kidding, respectively.
- Average 6 months body weights were observed as 16.00, 16.83 and 18.42 kg. in Nali, Synthetic and Munjal lambs, respectively.
- Synthetic population of sheep showed marked improvement in wool quality. The improvement in Synthetic over Nali for staple length, fibre diameter and modulation percentage was observed as 15.37, 19.09 and 51.55 per cent, respectively.
- Broiler dam line attained 2962.50 g weight at 40 weeks of age with an average egg weight of 53.70 g.

Department of Livestock Production Management

- Inclusion of mustard cake as sole source of protein in the concentrate for growing buffalo male and female calves is economical as compared to soybean meal, ground nut cake, cotton seed cake as well as combination of these protein sources.
- Supplementation of 1% Indian gooseberry and 0.05% multi-enzyme in the ration of broiler chicken is economical during hot weather condition.
- Supplementation of 1% Ashwagandha and 0.05% probiotic in the diet of broilers reared up to six weeks of age in hot weather condition is beneficial.
- Performance parameters of Buffalo Research Centre revealed that: Calving was almost uniform round the year; average age at first calving – 44 months; average milk yield of first calvers – 2571.0 kg; average lactation length of first calvers rose from 321.4 days to 353.9 days; overall average milk yield – 2600.7 kg; overall average lactation length – 325 days; overall average 305 days milk yield – 2480.2 kg; peak yield – 12.2 kg; wet average – 9.3 kg; herd average – 6.6 kg; overall percentage of animal in milk – 70.6.

Department of Livestock Products Technology

- Nutritious and acceptable chicken meat rolls containing fibre, antioxidants like polyphenols and lycopene could be prepared by using 4% dried orange pulp and 15% tomato pulp either alone or in combination. The product was microbiologically safe and organoleptically acceptable up to 12 days of storage.
at 4±1°C. The cost of the enriched chicken meat rolls was lower (Rs 227/kg) in rolls containing both 4% dried orange pulp and 15% tomato pulp than control rolls.

- Ten per cent rice bran + 4 per cent psyllium husk incorporated meat rolls and patties could meet out 1/4th recommended daily allowance for dietary fibre. The products were organoleptically acceptable and microbiologically safe up to 15 days of storage at refrigerated temperature (4±1°C).

- Rice idli mix enriched with 20% chicken meat powder and semolina idli mix enriched with 30% chicken meat powder could be stored for 60 days and 90 days, respectively, at ambient temperature without any significant deterioration in the microbiological quality. Idlies prepared from both type of mixes after reconstitution were found to have high acceptability among the taste panellists.

- On the basis of results of sensory attributes scores it was noticed that 40 % sorbitol in water or 30% sorbitol in fresh whey were suitable as cooking medium for preparation of diabetic Rasogolla. 30% Sorbitol + 0.035% Sucralose in water was found as appropriate dipping medium for preparation of diabetic rasogolla. Diabetic rasogolla packed in metalized polyester bags with heat treatment for 5 min and having nisin 10 mg was most acceptable for 10 days.

- One hundred Scheduled Cast youths from Haryana State were imparted knowledge and skill oriented training on technological aspects of processing of various meat and milk products.

- Technologies for Rogan Josh, Meat analogue and Masala Paneer are ready for commercial exploitation.

**Department of Animal Nutrition**

- Reconstituted bajra can replace 100% maize in concentrate mixture of lambs without adverse effects.

- Distillers Dried Grain Solubles (DDGS) can replace 75% Crude Protein of mustard cake in concentrate mixture without affecting nutrients intake, nutrients digestibility and nutritive value of ration in calves.

- The cost of concentrate mixture reduced by Rs.115/ quintal with 75% replacement of mustard cake protein with DDGS.

- Replacement of maize with pearl millet economizes the layers ration without affecting egg quality traits and multi enzyme supplementation increases egg production without affecting external and internal egg quality traits.

- Medium milk yielder cattle should be fed good quality roughage and concentrate mixture in the ratio of 70:30 for maximum production of human health beneficial conjugated linoleic acid.

- 30% soybean meal can be replaced with DDGS in the ration of laying hens without affecting egg production and quality.

- A total of 7396.68 quintal of compound feed was manufactured during the year (Milch animals 3201.20 quintal, Dry animals 1815.80 quintal, Poultry 755 quintal, calf 920 quintal, small animals 146.60 quintal, sheep/goat 340 quintal, Misc. 44.08 quintal and experimental ration 174.00 quintal).
A total of 387.50 quintals mineral mixture was prepared during 2011-12 (Cattle 337.75 Qtl. and poultry 49.75 Qtl.) out of which 381.29 Qtls was sold. An income of Rs. 25,69,421/- was generated through the sale of mineral mixture.

**Department of Veterinary Physiology and Biochemistry**

- Conception rate was higher in Murrah buffaloes induced to estrus with CIDR protocol as compared to Duraprogen - Progynon protocol.
- Higher progressive motility and liveability of sperm cells was observed with addition of Theophylline at a concentration of 15 mM/ml in the frozen thawed semen of Murrah buffalo bulls incubated at 37ºC for 3 hours.
- *In vitro* inorganic salt supplementation had significant effects on expression of proteins in adult *Haemonchus contortus* parasites.
- The department has established referral biochemical laboratory and work has been initiated on strengthening of existing nuclear research laboratory for diagnostic aids to the farmers.
- Isolation of different peptides from *Hyalomma* ticks’ salivary glands and evaluation of the effect of these peptides on fibrinogenolytic activity of thrombin, blood coagulation and thrombin-induced platelet aggregation.

**Department of Veterinary Anatomy**

- Histological structure of soft palate of sheep in relation to distribution of lymphoid tissue and qualitative distribution of different muco-polysaccharides in the soft palate was studied.
- Histomorphological study of the oviduct and uterus of goat during follicular and luteal phase was done.
- Histomorphology, histochemistry and micrometry of jejunum of sheep was studied.

**Department of Veterinary Surgery and Radiology**

- Ultrasonographic studies of the heart, prostate gland and testes in dogs revealed that echocardiography is safe, noninvasive and relatively inexpensive technique for diagnosis of diseases that remain undiagnosed by routine diagnostic techniques like auscultation, radiography and electrocardiography.
- The ultrasonography was very helpful to diagnose congenital conditions like cryptorchidism and differentiate between conditions of testes like hydrocele and orchitis.
- A total of 2993 animals were subjected to radiographic examination and eighty four buffaloes were operated for treatment of diaphragmatic hernia.

**Department of Veterinary Gynaecology and Obstetrics**

- A prototype of mechanical uterine detorsion device, for correcting uterine torsion in buffaloes, has been fabricated and is under modifications for final version.
- Ultrasonographically pregnancy diagnosis in mares with 100% accuracy can be done as early as day 22 of gestation, since the fetal heart beat is detectable on this day.
- Uterine culture and uterine cytology was found to be the best combination for diagnosis of uterine infections.
- Therapeutic regimens involving Cloprostenol and Oxytocin in addition to uterine lavage + intrauterine antibiotic infusion were found to be first and second preference treatment protocols in management of uterine infections in infertile mares.

**Department of Animal Biotechnology**

- Developed ns1 gene based Real-time -Taqman probe assay for detection of bluetongue virus infection irrespective of serotype specificity.
- India's first Inactivated Pentavalent Vaccine for control of Bluetongue Disease under AINP-BT project (funded by ICAR, New Delhi) was jointly developed by Hisar, TANUVAS, Hyderabad, Bangalore, and IVRI centers.
- The VP2 gene based PCR assay for genotyping of canine parvovirus (CPV) has been successfully applied for typing of field samples. The clear cut difference was seen in vaccine and field strains of CPV by PCR-RFLP analysis.
- Out of 200 (100 bovine+100 human kids) faecal samples, 38 samples were found positive for group A human rotavirus and 9 samples of group A bovine rotavirus by RNA-PAGE. Bovine rotavirus might be reassortant, resulted from interspecies transmission.
- The expression by RT-PCR of leptin receptor gene and CYP19 gene in in vitro capacitated spermatozoa was found higher than the spermatozoa present in fresh semen. So these genes may play an important role in capacitation.
- A significant (P<0.05) difference was observed in the genotypic frequencies of the two genotypes in healthy and mastitic animals. The genotype aa was found more frequent (0.70) in healthy than mastitic animals (0.43). It may be associated with resistance to mastitis.

**Department of Veterinary Microbiology**

- Studies on monitoring of Haemorrhagic Septicaemia (HS) immunity levels in Haryana: Out of a total of 3802 serum samples of cattle (1845) and buffaloes (1957) tested for HS serum antibody levels, 1920(50.50%) samples were recorded as "Protected", 1492(39.4%) as "Partial protected" and 384 (10.10%) as "Not protected".
- Anti –*Pasteurella multocida* monoclonal antibody secreting hybridomas were developed.
- The use of oil as an adjuvant has been found to be the most effective in preventing mortality in the challenge studies vis-à-vis alum or aluminium hydroxide gel in mouse model. Further, IgG antibodies played a predominant role in preventing the deaths in mice due to HS, whereas the role played by IgA antibodies was only marginal. These studies may have a significant bearing in designing the improved vaccines against HS.
Only four FMD outbreaks were recorded from Jhajjar (Feb. and March 2012), Bhiwani (March 2012) and Rohtak (March 2012) in cattle, buffaloes and pigs. A total of 15 FMD specimens were collected and FMD virus serotype ‘O’ was identified in all the four outbreaks using sandwich ELISA.

A total of 11772 (5784, pre- and 5988, post-vaccination) serum samples from Haryana and Delhi were processed for sero-monitoring of FMD-CP (Phase XI and XII) and Extended FMD-CP/ ASCAD (Phase VIII) against three FMDV serotypes and in four serial dilutions by LPB-ELISA.

The HN gene of La Sota strain of NCDV cloned, sequenced and bioinformatics done. GenBank accession no. JN669424 was assigned (http://www.ncbi.nlm.nih.gov/).

Beta-hemolysin (Hlb) gene of Staphylococcus aureus isolated from clinical mastitis cases was cloned, sequenced, bioinformatics done, expressed, purified and characterized. GenBank accession no. JN580071 was assigned (http://www.ncbi.nlm.nih.gov/).

Pasteurella multocida B:2 transferrin-binding protein gene of vaccine strain P52 and two field strains were cloned, sequenced and compared for determination of genetic variations with an aim to understand molecular epidemiology.

Department of Veterinary Public Health and Epidemiology

A total of 86 outbreaks were investigated in different species of livestock (cattle, buffaloes, sheep, goats, pigs) besides 20 in rabbits and 11 in emu farms.

Three hundred and thirty seven animals were tested for TB and JD and none was found positive.

A total of 5439 flocks of poultry birds with a population of 3.8 crore birds were investigated. Respiratory disease complex remained the major cause of mortality in these flocks. The involvement of viral infections (Newcastle disease, infectious bronchitis and other respiratory disease) and Mycoplasma in this complex cannot be ruled out.

Mortality in peacocks in southern Haryana was found to be due to Newcastle disease virus.

A total of 2291 faecal samples from different species of livestock were analyzed; of which 521 samples were found positive for various parasitic infestations.

Seven thousand one hundred and twenty milk samples were screened for mastitis, of which 5302 were found positive.

One hundred and fifty five poultry feed samples were analyzed for aflatoxins and 65% samples were found to contain aflatoxins above 30 ppb.

Out of a total of 30 samples of goat meat collected from the local market, 17(56.6%), 1 (3.3%) and 1 (3.3%) samples have been found contaminated with E. coli, Salmonella and Yersinia, respectively.

Indian patent was granted for the technique of “Spot test to detect urea in milk and solution thereof” by the Indian Patent Office vide patent number-250500 dated 6-1-2012.
A total of 4858 quarter milk samples from cows and buffaloes and 174 clinical samples were subjected to bacteriological examination. Staphylococci were found to be predominant organism accounting for 62.10% of the infections. Majority of isolates showed sensitivity towards Cefoperazone and Ceftriaxone, Gentamicin, Enrofloxacin and Chloramphenicol.

Treatment trials with different combinations of antibiotics Chloramphenicol and Ceftiofur sodium preparations revealed high cure rate against streptococci and E. coli whereas none of these found very effective against Staphylococcal infections. For treating mastitis cases both in cows and buffaloes, a combination of Ketoprofen and Enrofloxacin by intra muscular route was found more effective in treating streptococcal mastitis in comparison to staphylococcal mastitis.

A total of 92 semen samples received from different semen banks located in Jagadhri and Gurgaon were screened for microbial load to produce quality semen. Out of 92 semen samples, 7 samples were found positive for staphylococci, streptococci, E. coli Pseudomonas aeruginosa ,Proteus spp. and Bacillus spp. with the range of 5.0x103-0.5x104 CFU/ml.

Results indicated that the acute phase proteins in milk and serum of cow can be rapid and sensitive marker of sub clinical mastitis.

Comparison of different diagnostic tests viz. California mastitis test (CMT), Spot Trypsin inhibition activity (TIA), Electrical conductivity test (ECT), Somatic cell count (SCC) , NAGase test , acute phase proteins and cultural examination indicated that acute phase proteins are the best for identification of infected animals but subsequent bacteriological sampling is required to determine etiological agents and antimicrobial sensitivity so that proper treatment and control measures can be instituted.

Recommendation for brucellosis control

Rose Bengal test for surveillance of brucellosis under field conditions

Calf-hood vaccination is recommended for young animals between the age of 4 and 10 months.

 Conjunctival route of vaccination is recommended for adult animals including milking and pregnant animals.

 Dairy farms which are negative for brucellosis should also adopt vaccination of animals.

 Entrepreneurs are advised to get all their animals be tested for brucellosis prior to start a new dairy venture.

 Mass vaccination against brucellosis is recommended on dairy farms and also in rural areas.

 Brucellosis positive animals in production may be retained for obtaining produce from them but manage them separately.
A total of 947 animals were diagnosed with skin diseases: sarcoptic mange (191), demodectic mange (59), allergy (104), dermatomycosis (82), bacterial dermatitis (110), flea allergy dermatitis (34), tick induced pruritus (273), etc.

A total of 3484 laboratory samples were tested at Veterinary Diagnostic Laboratory. The detailed interpretation included pathological samples 2548 (Haematological – 2165; Urinalysis – 201; Biopsy – 24; post-mortem – 158), parasitological – 508; biochemical – 275 and vaginal smears – 153. Species wise sample distribution comprised of buffaloes (1506), cow (743), bullock (64), canine (813), equine (115), camel (93), sheep and goat (12) and miscellaneous including tiger, deer, neel gai (blue bull) and poultry – 138.

Canines on vegetarian diet are more prone to skin diseases as evidenced by the clinical investigations.

Veterinary Unit, Uchani, Karnal

A total of 10,999 cases were diagnosed and treated for different disorders and 1288 milk samples were tested for mastitis.

Xylazine-Ketamine as induction and propofol as maintenance in continuous drip was found safer anaesthetic combination in buffaloes subjected to diaphragmatic herniorrhaphy.

Transmissible venereal granuloma in bitches, male dogs and vaginal granulomas in bovines and equines can be treated successfully with repeated doses of vincristin and prednisolone.

Department of Veterinary Medicine

For effective treatment of equine impactive colic, parental administration of Ketoprofen and fluid therapy along with oral administration of liquid paraffin, fluid therapy and metoclopramide is recommended.

EMA-1 gene fragment of *Theileria equi* is a potential candidate for reliable diagnostic test. The standardized ELISA has been used as alternative test to CI ELISA for sero-epidemiological surveys for *T. equi*. Equine piroplasmosis caused by *T. equi* is endemic in Haryana.

Department of Veterinary Pathology

*Salmonella* and *E. coli* infections in natural cases caused heavy mortality in chicks. Most common serotype of *E. coli* associated with colibacillosis was O2 while among Salmonella infection *S. Gallinarum* 9, 12 and *Salmonella* Enteritidis 9, 12 gm were the most important.

Polymyxin B was most sensitive for both *Salmonella* (100%) and *E. coli* (96%) infection and there was re-emergence of chloramphenicol sensitivity for Salmonella (83.33%) infection.

La Sota vaccination enhanced the severity of colibacillosis as evidenced by clinical signs, immunological response and pathological lesions.
Supplementation of Ashwagandha root powder @ 0.5% in feed reduced the severity and recovery period of *Salmonella Gallinarum* infection in chicks as evident by clinical signs, hemato-biochemical parameters, enhanced cellular and humoral immune response and gross, histopathological lesion score.

*Ocimum sanctum* leaf powder supplementation in feed reduced the severity and recovery period of colibacillosis in chicks as evidenced by clinical signs, biochemical parameters, immunological response and pathological lesions.

**Department of Veterinary Parasitology**

- A geoinformatics laboratory has been established in the department with software, hardware and digital data and being used for research as well as PG teaching.
- A livestock geodatabase based on the 18th Livestock Census 2007 has been created.
- Spatial analysis revealed that any capital intensive programme for the prevention and control of parasitic diseases in buffaloes in Haryana will return maximum benefits both, in terms of per buffalo and per sq km area, in Beri Tehsil of Jhajjar district.
- Elite Murrah tract is mapped based on villages harbouring buffaloes yielding more than 15 kg of milk per day (peak production).
- All the three different combinations of anthelmintics (fenbendazole + morantel, morantel and levamisole + levamisole + fenbendazole) were highly effective (> 99%) and effective against resistant *Haemonchus contortus* also. The efficacy of these combinations of anthelmintics has been reported for the first time in India.
- Combinations of fenbendazole and morantel, morantel and levamisole and levamisole and fenbendazole were more effective than administered individually. The larval culture studies indicated that the worms surviving individual drug were mostly *Haemonchus contortus* and no worms survived the three different combinations of anthelmintics.

**Department of Veterinary Pharmacology and Toxicology**

- Oral administration of imidacloprid (insecticide) in male rats is less toxic at dose levels of 22.5 and 45.0 mg/kg daily for 90 days on the basis of reduction in body weight gain and biochemical alterations.
- Imidacloprid @ 22.5 and 45.0 mg/kg daily for 90 days did not affect sperm concentration, motility, vitality and morphology in male rats indicating no reproductive toxicity.
- Imidacloprid appears to be weak mutagen when administered orally in Swiss Albino mice @ 22 mg/kg daily for 28 days.

**Veterinary & Animal Husbandry Extension Education**

- The major constraints affecting adoption of sheep production technologies were ‘inadequate and timely non-availability of credit facility’, ‘high cost of treatment’,
lack of extension personnel for technical guidance’, ‘inadequate knowledge about services and facilities provided by Government’, ‘non-availability of training facilities’, ‘non-remunerative prices for products’, ‘middle men as exploiters’, ‘disease outbreak’, ‘non-availability of grazing lands throughout the year’, ‘high cost of medicines’, etc. These results were based on a study conducted on randomly selected sheep farmers of five districts (Sirsa, Fatehabad, Hisar, Bhiwani and Jind) located in Hisar division of Haryana.

- A study was conducted by the department to document the constraints of the mixed-dairy farming system.
- Content analysis of animal husbandry news published in vernacular newspapers for one year period during 2011-12 was done.

**BUSINESS PLANNING AND DEVELOPMENT UNIT**

- The ‘Technology Business Incubator’ was inaugurated and dedicated to the entrepreneurs on 15.7.2011 by Dr. Hardeep Kumar, worthy Vice-Chancellor, LLRUVAS.
- The various technologies, diagnostic kits developed and other achievements of BPD (VPU) are now available at the website of LLRUVAS home page “Technology Transfer”.
- The “Milk Urea Detection Technology” has been granted Patent No.: 250500 dt. 6.1.2012 to Dr. Gulshan Narang and Dr. R. S. Khokhar, Deptt. VPHE.
- A total of eight patent applications were filed (five from Deptt. VPB, Inventors: Dr. Sandeep Gera and PG student; two from Deptt. LPM, Inventors: Dr. R. K. Sharma and PG students and one from Deptt. LPT, Inventors: Dr. Nita Khanna and PG student).
- M/s Vanshikha Milk Plastic and Agro Products, Hisar signed MOU for licensing of “Milk Urea Detection Technology” on 23.7.2011 with a licensing fee of Rs. 8.0 lacs.
- BPD Unit, AAU, Anand entered into MOU with BPD Unit, CCS HAU Hisar on 30.9.2011 for co-incubation of Milk Urea Detection Technology.
- License agreement executed by NRDC, New Delhi with M/S Hester Biosciences Limited, Ahmedabad, Gujarat for the process of ‘Schizont Cell Culture Vaccine against Bovine Tropical Theileriosis’ on 1.11.2011 with a lump sum fee of Rs. 2.75 lacs and 2.5% royalty for 7 years.
- National Meat and Poultry Processing Board, MOFPI, Govt. of India signed MOU with LLRUVAS on 3.11.2011 for providing technical inputs for boosting the meat and poultry industry in the country.
- The Deans, COVSc & AH, Mhow (M.P.) and COVASc, RUVASc, Bikaner, Rajasthan have shown interest in HS Antibody ELISA and Milk Urea Detection Kits and have requested for the supply of these kits for revalidation in their laboratories.
- A revenue of Rs. 33,000/- has been generated through sale of HS ELISA Kit.
- Several technology demonstration, awareness and market sensitization programs were organized on the occasions of inauguration of Technology
Business Incubator, foundation stone laying ceremony of LLRUVAS, Farm Darshan, Industrial Motivational Campaign (MSME), National Workshop on Farmers led Innovation (Haryana Kisan Ayog), IPR-cum-BPD Advisory Board Meeting, Agribusiness Awareness Camp (SFAC), Pashudhan Diwas, Global Agribusiness Conference 2012, Kisan Mela, World Veterinary Day, etc.

- The LPT Deptt. in association with BPD (VPU) Unit, bagged First Prize for Best Display amongst the constituent departments of LLRUVAS during Kisan Mela 2012.

- The Milk Urea Detection Kits were made available at ATIC Gate No. 4, CCS HAU, Hisar and Veterinary Clinics subunit, Uchani, Karnal. A revenue of approx. Rs. 12,000/- has been generated through sale of Kits.