

Annual Report (2022-23)

(July 2022- June 2023)

1. Introduction

The department of Veterinary Pathology came into being as independent Department, in July 1991, as one of the constituent departments of the Dr. G. C. College of Veterinary and Animal Sciences. Earlier, it was one of the components of the then Department of Veterinary Microbiology, Pathology and Parasitology established in July 1986 with the formation of the College of Veterinary and Animal Sciences, HPKV, Palampur. Pathology is one of the core disciplines in the Veterinary Medical Profession.

With the start of M. V. Sc from academic year 1996-97 it attained the status of Post Graduate Department. Besides undergraduate B.V.Sc and A.H. courses, as per VCI regulation, department have been offering Post Graduate courses to M.V.Sc and Ph. D. students. A significant time of the faculty and supporting staff is contributed towards Post-mortem and disease investigation services rendered by the Department in addition to the teaching, Research and Extension-cum-consultancy activities.

2. Teaching

a) Undergraduates Courses:

S. No.	Course No.	Course Title	Cr. Hrs.	Name of Teacher(s)
1st Semester				
1	Veterinary Pathology	Veterinary Pathology	4+2	Dr R K Asrani Dr R D Patil Dr Rakesh Kumar Dr Sonali Mishra
2	Veterinary Clinical Practice	Veterinary Clinical Practice	0+6	Dr R K Asrani Dr R D Patil Dr Rakesh Kumar Dr Sonali Mishra
3	Advisory Meeting	Advisory Meeting	1+0 (NC)	Dr R D Patil Dr Rakesh Kumar
4	Compulsory Internship Programme	Compulsory Internship Programme	-	Dr R K Asrani Dr R D Patil Dr Rakesh Kumar
2nd Semester				
1	Veterinary Pathology	Veterinary Pathology	4+2	Dr R K Asrani Dr R D Patil Dr Rakesh Kumar Dr Sonali Mishra

2	Veterinary Clinical Practice	Veterinary Clinical Practice	0+6	Dr. R K Asrani Dr R D Patil Dr Rakesh Kumar Dr Sonali Mishra
3	Advisory Meeting	Advisory Meeting	1+0 (NC)	Dr R D Patil Dr Rakesh Kumar
4	Compulsory Internship Programme	Compulsory Internship Programme	-	Dr R K Asrani Dr R D Patil Dr Rakesh Kumar

b) Postgraduate Courses:

S. No.	Course No.	Course Title	Cr. Hrs.	Name of Teacher(s)
M.V. Sc. Courses (2nd Semester) (2021-22)				
1	VPL-602	Techniques in Pathology	0+2	Dr R D Patil Dr Rakesh Kumar Dr R K Asrani
2	VPL-603	Animal Oncology	1+1	Dr Rakesh Kumar
3	VPP-604	Clinical Pathology	1+1	Dr R D Patil Dr Rakesh Kumar
4	VPL-606	Necropsy Conference	0+1	Dr R K Asrani Dr R D Patil Dr Rakesh Kumar
5	VPP-607	Systemic Pathology	2+1	Dr Rakesh Kumar Dr R D Patil
6	VPP-610	Avian Pathology	2+1	Dr R D Patil Dr Rakesh Kumar
7	VPP-699	Master's Research	1-18	Dr R K Asrani Dr R D Patil
M.V. Sc. Courses (1st Semester) (2021-22)				
1	VPL-602	Techniques in Pathology	0+2	Dr Rakesh Kumar Dr R D Patil Dr R K Asrani
2	VPL-605	Necropsy Procedures and Interpretations	1+1	Dr Rakesh Kumar Dr R D Patil Dr R K Asrani
3	VPL-691	Master's Seminar	1+0	Dr R K Asrani
4	VPL-692	Special Problem in MVSc	0+1	Dr R D Patil
5	VPL-699	Master's Research	1-18	Dr R K Asrani Dr R D Patil Dr Rakesh Kumar

M.V. Sc. Courses (1st Semester) (2022-23)				
1	VPL-601	General Pathology	2+1	Dr Rakesh Kumar Dr R K Asrani
2	VPL-602	Techniques in Pathology	0+2	Dr R D Patil Dr Rakesh Kumar
3	VPL-605	Necropsy Procedures and Interpretations	1+1	Dr Rakesh Kumar Dr R D Patil Dr R K Asrani
4	VPL-608	Pathology of Infectious Diseases of Domestic Animals	2+1	Dr Rakesh Kumar Dr R D Patil

c) Numbers of students graduated

Degree	During last academic year	Accumulated total
M.V. Sc.	04	07

d) National and International Level Competition UG/MSc/PhD

Competition	No. of students qualified	No. of students appeared	% age of qualified	Distinguished rank, if any
SRF	Nil	Nil	Nil	-
ICAR NET	05	05	100%	-
UGC NET	02	02	100%	-

e) Student got admission in National and International institutes

Department	Name of the student with admission No.	Name of Advisor	Institute of Admission	Programme of study
Veterinary Pathology	Dr. Rahul Singh (V-2020-30-019)	Dr. R. D. Patil	LUVAS, Hisar, Haryana	Ph. D

f) Student got job/placement in India or abroad

Department	Name of the Student with Admission No.	Name of Advisor	Nature of Job/Designation	Organization
Veterinary Pathology	Dr. Mridul Soni (V-2020-30-017)	Prof. R. K. Asrani	Clinical Pathologist	Max Vets - Multi Specialty Animal Health Care, New Delhi
Veterinary	Dr. Priyanka	Dr. R. D. Patil	Assistant	RPS Veterinary

Pathology	(V-2020-30-018)		Professor	College, Mahendergarh, Haryana
Veterinary Pathology	Dr.Sahil Choudhary (V-2020-30-020)	Prof. R. K. Asrani	Veterinary Pathologist	Venky's (India) Limited, Mohali, Punjab

3. Research

a. Postgraduate Research

i) Ongoing Masters Programme:

Three (03)

S. No.	Name of the student	Admission No.	MAJOR ADVISOR	TITLE OF RESEARCH PROBLEM
1	Dr. Abhishek Verma	V-2021-30-022	Dr. R. D. Patil	Studies on pathology of pneumonia in bovine calves with special reference to respiratory viral infections
2	Dr. Ankita	V-2021-30-023	Dr. Rakesh Kumar	Studies on anti-neoplastic effect of <i>Inula racemosa</i> plant against chemically induced mammary tumor in laboratory rat model
3	Dr. Smriti Jamwal	V-2021-30-024	Prof. R. K. Asrani	Studies on ameliorating effect of <i>Inula racemosa</i> plant against DEN (Diethylnitrosamine) induced liver damage in laboratory rat model

ii) Postgraduate Research Salient Achievements

S. No.	Title of Research problem	Salient Research Achievements
1.	Studies on the protective effects of medicinal plant extract against salmonella infection in poultry	Protective effects of 80% methanolic root extract of <i>Saussurea costus</i> at 0.5, 1 and 2 G/L through drinking water was evaluated against <i>Salmonella enterica</i> serovar Typhimurium infection in 300 day-old Delham Red birds. <i>S. Typhimurium</i> exhibited typical clinical signs, decreased body weight, the increased activities of AST, ALT and creatinine, and decreased total protein concentration. Grossly, hepatomegaly, necrotic foci, liver paleness, splenomegaly and fibrinous pericarditis were seen. Microscopically, severe multifocal areas of necrosis, infiltration of heterophils and lymphocytes, sinusoidal dilation, degenerative changes and increased cellular granularity. Severe homogenous

		eosinophilic areas of necrosis, reticuloendothelial cell hyperplasia, depletion of lymphoid follicles and blood-filled sinuses were seen in the spleen. The dose- dependent protection of <i>Saussurea costus</i> extract was recorded against <i>S. Typhimurium</i> -induced tissue damage in chicken.
2.	Studies on pathology of <i>Escherichia coli</i> infection in bovine calves and exploration of <i>in vitro</i> antimicrobial potential of certain plant extracts	To determine the pathology caused by <i>Escherichia coli</i> infection in bovine calves. Total 222 faecal samples were collected from dead, clinically sick and apparently healthy calves up to one year of age. Necropsy of 30 calves revealed enteritis in 86.67% cases. Histopathologically, vascular changes, villous denudation and sloughing, cryptal necrosis, hyperplastic activity of enterocytes, increased goblet cell activity and inflammatory infiltration were noted. <i>E. coli</i> was found to be the major cause and prevalence was found to be 47.75%. Molecular pathotyping revealed enteropathogenic <i>E. coli</i> in 25.67% faecal samples. 25 different serotypes of all the 106 <i>E. coli</i> isolates were identified with serotype 0119 (12.26%) being most common. Moreover, the plant extracts of <i>Artemisia nilagirica</i> , <i>Asparagus adscendens</i> , <i>Phyllanthus urinaria</i> , <i>Physalis peruviana</i> and <i>Tinospora cordifolia</i> were found to have antimicrobial potential against multidrug resistant <i>E. coli</i> at different concentrations.
3.	Studies on pathology of respiratory viral diseases in bovine calves	The pathology of pneumonia due to respiratory viral infections was studied in 30 cattle calves. 228 samples were collected from necropsy (30 tissues), clinically sick calves (130) and apparently healthy calves (68). Pneumonia was found to be the main cause of death in bovine calves less than one year of age. Male calves showed maximum mortality i.e., 80%. Maximum mortality was observed in 3-12 months of age group with 24/30 (80%) cases. Bronchointerstitial pneumonia (46.67%), suppurative bronchopneumonia (13.33%), fibrinous bronchopneumonia (16.67%) and interstitial pneumonia (23.33%) seen at necropsy cases. In bovine respiratory syncytial virus (BRSV) and bovine parainfluenza virus type 3 (BPIV3) cases, necrotising bronchiolitis and bronchitis, multiple number of syncytial cells in alveolar lumen and inflammatory infiltration were seen. Using AgELISA, the prevalence of each of the bovine herpes virus-1 and BRSV was 56.67%, BPIV3 46.67% and bovine viral diarrhoea virus 26.67% in necropsy cases. The prevalence of BRSV was found to be 50% in necropsy cases and 23.73% in clinical samples using nested RT-PCR. The prevalence of BPIV3 was found to be 40% in necropsy cases

		with maximum positivity rate in 3-12 M age (33.33%) using RT-PCR.
4.	Studies on the protective effects of medicinal plant extract against <i>Escherichia coli</i> in poultry	Protective effects of 70% 70% aqua-ethanolic extract of <i>Artemisia annua</i> at 0.5, 1 and 2 G/L through drinking water was evaluated against <i>E. coli</i> (0101) infection in 300 day-old Delham Red birds. <i>E. coli</i> exhibited typical clinical signs, decreased body weight, the increased activities of AST, ALT and creatinine, and decreased total protein and albumin concentration. Grossly, fibrinous perihepatitis, fibrinous pericarditis, airsacculitis, splenomegaly and peritonitis were seen. Microscopically, liver and heart revealed severe perihepatitis, pericarditis, vacuolar changes, leukocytic infiltration, degenerative changes and enhanced cytoplasmic granularity. Spleen revealed reticuloendothelial cell hyperplasia and an increase in eosinophilic coagulum material. Air sacs exhibited varying degree of fibrinous airsacculitis. The dose- dependent protection of <i>Artemisia annua</i> extract was recorded against <i>E. coli</i> -induced tissue damage in chicken.

b. Research Projects in Progress

S. No.	Title of Project	PI	Funding Agency	Budget	Year of start	Duration
1.	Live stock, Poultry, Fish & Wild Life Disease Investigation- A Departmental Project	Prof. R. K. Asrani (HOD)	Deptt. funded	Nil	1991	Continuous
2.	Strengthening the Animal Cancer Diagnostic Laboratory	Prof. R. K. Asrani	State Govt (TSP)	18.00 Lacs	2022-23	One year
3.	Refresher course on Post-mortem Diagnosis with Emphasis on Veterolegal Investigations	Dr. Rakesh Kumar	RKVY	9.5 Lacs	2022-23	One year

c. Summary of research finding during the year

A) Livestock, Poultry, Fish and Wild-Life Disease Investigation (A Departmental Project):

During the period a total of 801 necropsies performed including 20 cattle, 02 buffalo, 29 sheep and goats, 08 dogs, 08 fish, 04 rabbits, 713 poultry and 17 wild animals and birds.

Some of the important diseases/disease conditions recorded in animals are:

- **In cattle:** Suppurative bronchopneumonia, Interstitial pneumonia, Chronic fasciolosis, Hydatodosis, Chronic Catarrhal enteritis, Toxaemia and septicaemia, Ruminal impaction due to foreign materials, Peritonitis etc.
 - **In buffalo:** Anaphylaxis (Wasp stings), Toxaemia and Hydroalantois.
 - **In sheep and goats:** PPR, Haemonchosis, Verminous pneumonia, Severe anaemia, Suppurative bronchopneumonia, Abomasitis, Haemorrhagic enteritis, Parasitic enteritis, Interstitial Pneumonia, Endoparasitism, Tapeworm infection, Ruminal acidosis, Grain overload etc.;
 - **In canines:** Snake bite, Haemorrhagic gastroenteritis, Parvo viral infection, Suppurative bronchopneumonia, Fibrinous peritonitis, Nephritis and/or hepatitis, Parasitic enteritis etc.;
 - **In rabbits:** Muroid enteropathy, Suppurative bronchopneumonia, Pulmonary congestion and oedema, Intussusception etc.;
 - **In fish:** Cotton wool disease, *Aeromonas hydrophilla* infection, Acute bacterial septicaemia etc. ;
 - **In poultry:** Ranikhet Disease, Fowl pox (Cutaneous and/or Diphtheritic form), Salmonellosis, *E. coli* infection, Aspergillosis, Ascariasis, Colisepticemia, Coligranuloma, Omphalitis, Necrotic enteritis, Egg peritonitis, Coccidiosis (Cecal and/or intestinal), Parasitic/haemorrhagic enteritis, Granulomatous pneumonia, Mycotic ingluvitis, Air-sacculitis with caseous exudation, Catarrhal enteritis, Fibrinous pericarditis, Nephropathy, Visceral gout, Cannibalism (vent pecking), Ascites, Fibrinous peritonitis, Hydropericardium, Crop impaction, Liver rupture, Salpingitis, Nephrosis, Heat stress, Necrotic hepatitis, Intussusception etc.;
 - **In wild animals and birds:** Hepatic encephalopathy and Acute respiratory failure (choke) in Leopards; Necrohaemorrhagic enteritis associated with pulmonary oedema in a Barking deer; Traumatic shock, Pulmonary congestion and Catarrhal enteritis in Sambhar deers; Acute severe enteropathy in a Brown Babook Owl; Cannibalism in a Asian Barred Owl; Visceral gout in a Wild Kite; Enteritis in a Civet cat; Multiple organ failure in a Chakor; Hypovolemic shock in a Peafowl; and Candidiasis (Thrush) with/ without enteropathy in Kalij Pheasants.
- **36 autopsies, 51 biopsies and 487 clinical samples were diagnosed** by histopathological/ cytological examinations including inflammatory (Malasseziasis, Demodicosis, Fibrinopurulent dermatitis, Bacterial dermatitis, Mycotic dermatitis, Pododermatitis, Fungal infections, Otitis externa and interna, Cystitis, Pyogranulomatous mycotic inflammation etc.), non-inflammatory (Haematuria, Crystaluria, Ascites, haemopericardium etc.) and neoplastic (Papilloma, Sq. cell carcinoma, Canine transmissible venereal tumor, Sebaceous gland carcinoma, Mast cell tumor, Fibrosarcoma, Osteosarcoma, Fibroadenoma, etc.) conditions.
- **Animal Disease outbreaks investigation:** Four (04) outbreaks attended and investigated by the faculty on Lumpy Skin Disease and concurrent haemoprotozoan infections and/or foreign body obstructions among cattle population at a cow sanctuary situated in Thanakalan, District Una, Spontaneous mortalities in Sambhar deer (*Rusa unicolor*) at Mini

Zoo, Rewalsar, District Mandi, Acute haemorrhagic enteropathy due to bacterial & parasitic origin among Bulls in Sperm Station, Palampur Distt. Kangra, Severe Thrush (Candidiasis) associated with immunosuppression in Kalij pheasants in Nehru Pheasantry, Manali of District Kullu, Himachal Pradesh.

B). Strengthening the Animal Cancer Diagnostic Laboratory (19 lakhs): TSP Project started in the month of March, 2022 and three laboratory equipment's (Rotavapor R- 300, BUCHI Make; Rotary microtome, CUT 4062, Slee medical GmbH Make; and Biochemistry analyzer, Mispa Viva Model, Agappe Make) were purchased through CPDU to strengthen the Animal Cancer Diagnostic Laboratory in the Department.

C). Refresher course on Post-Mortem Diagnosis with Emphasis on Veterolegal Investigations (9.5 lakhs): RKVY Project started in the month of March, 2022 and a total of four batches of five days Refresher course on 'Post-Mortem Diagnosis with emphasis on Veterolegal investigations' was organized by the Department of Veterinary Pathology for State Veterinary Officers (Total 81 nos participants) including wild life/zoo Veterinarians from 05th December, 2022 to 3rd March, 2023.

d. Scientific Publications and Presentations

i) Publications

1. **Kumar R.**, Poonam, Soni M., **Asrani R.K.**, **Patil R.D.**, Kumar A. and **Gupta V.K.** (2022). Pathomorphology of canine oral cavity affections: a report of four cases. *Haryana Veterinarian*, 61(SI-2): 154-156. (NAAS rating: 5.58)
2. **Kumar R.**, Gupta I, Bisht A, Kumar A, **Mishra S**, **Gupta VK** and **Asrani RK.** (2022). Occurrence of Newcastle disease in backyard poultry: A pathomorphological study. *Indian Journal of Veterinary Pathology*. 46(4): 339-341. (NAAS rating: 5.54)
3. **Kumar R.**, Patel SK, Rana J and Emran TB. (2023). Tomato flu: need to look beyond the frame. *International Journal of Surgery: Global Health*. 6:e132.
4. Dharampal, **Kumar R.**, Soni M, Singh R, Chodhary S and **Asrani R.K.** (2023). Subcutaneous myxoma of the neck in a dog: A case report. *Indian Journal of Veterinary Pathology*. 47(1): 105-106. (NAAS rating: 5.54)
5. Singh R, **Patil R.D.**, Priyanka, Verma A., **Kumar R.**, **Asrani R.K.** and **Gupta V.K.** (2023). Staphylococcal pneumonia: Etiopathology and prevalence in dairy calves in Himachal Pradesh. *Indian Journal of Veterinary Pathology (Accepted)* (NAAS rating: 5.54)
6. Jamwal S, **Kumar R.**, **Asrani R.K.** et al. (2023). Fibrocystic disease of mammary gland in a Guinea pig: A case report. *Indian Journal of Veterinary Pathology (Accepted)* (NAAS rating: 5.54)

ii). Presentations

1. *Aeromonas hydrophila* and *Saprolegnia* spp. co-infection outbreak in rainbow trout fish (*Oncorhynchus mykiss*) of Himachal Pradesh. Research paper (**Poster Presentation, TS2-P7**) presented by **Dr. R.D. Patil** during XXXVth Annual Convention and National Conference of the Indian Association of Veterinary Microbiologists, Immunologists and Specialists in Infectious Diseases (IAVMI)-2023. Compendium, p:52-53.
2. Jaagsiekte Sheep Retrovirus (JSRV): Whole genome sequencing and phylogenetic Analysis. Research paper (**Oral Presentation**) presented by Dr. **Sonali Mishra** during XXXVth Annual Convention and National Conference of the Indian Association of Veterinary Microbiologists, Immunologists and Specialists in Infectious Diseases (IAVMI)-2023.

iii). Manuals, Books, Booklets and Bulletin

Manuals -

1. Veterinary Clinical Practice Manual: Diagnostic Laboratory Pathology Section (2023). Compiled and edited by **Prof. R. K. Asrani, Dr. R. D. Patil, Dr. Rakesh Kumar** and **Dr. Sonali Mishra**. Total pages-70.

Booklets-

1. **Kumar R., Asrani R. K. and Patil R. D.** (2023). Essentials of Necropsy Examination with Emphasis on Veterolegal Investigations. Published and inaugurated by the department during the Refresher Course on 'Post-Mortem Diagnosis with Emphasis on Veterolegal Investigations' under RKVY Project. Total Pages: 83.

Book Chapters:-

1. **Kumar R. and Asrani R.K.** (2023). Book chapter on "Necropsy Examination Techniques". Anatomical Techniques: New Era Tools In Health And Disease.
2. **Asrani R.K. and Kumar R.** (2023). Book chapter on "Commonly used Special Stains in pathology Laboratory". Anatomical Techniques: New Era Tools In Health And Disease.
3. **Patil, R.D., Bisht, E., Sharma, R. and Asrani R.K.** (2023). Recent advances in the application of biosensors in disease diagnosis of livestock and poultry (Accepted). Edited book on "Advances in Animal Health and Production in the North Western Himalayan Region". ICAR-IVRI, Regional Station, Palampur.
4. **Patil, R.D., Verma, A., Sharma, R. and Asrani R.K.** (2023). Pathology of bovine tuberculosis with reference to advancement in its early diagnosis (Accepted). Edited book on "Advances in Animal Health and Production in the North Western Himalayan Region". ICAR-IVRI, Regional Station, Palampur.

Refresher Course Compendium:-

1. **Kumar, R., Asrani, R.K. Patil, R.D., Kumar, S. and Mishra S.** (2023). Training Compendium prepared and released during the Refresher Course (total 4 batches) on 'Post-Mortem Diagnosis with Emphasis on Veterolegal Investigations' under RKVY Project by Department of Veterinary Pathology, DGCN COVAS, CSK HPKV, Palampur. Total Pages: 104.

4. Extension

a. Extension Publication

Popular Articles:

1. डॉ एकता बिष् एवं डॉ राकेश कुमार । ग्लैंडर्स: घोड़ों और मनुष्यों के लिए एक गंभीर खतरा गिरिराज हिंदी समाचार पत्र । 24 मई से 30 मई और 31 मई से 6 जून, 2023 (पेज संख्या-5) ।
2. Smriti Jamwal, Rakesh Kumar, Abhishek Verma, Ankita, R.D Patil and R. K Asrani. January 2023. Gumboro disease: A potential opponent to poultry owners. Poultry Punch. Page No-84-86.
3. Patil RD and Sharma M. (2022). Machaliyo me parjivi janit rog aur unka nivaran. Giriraj-Weekly (16-20 November, 2022), 45 (7):5.
4. जोशी गौरव संतोष राव, डॉ राकेश कुमार*, बिसेन हर्ष कृष्ण कुमार, डॉ आर डी पाटिल एवं डॉ आर के असरानी। गाय और भैसों के विषाणु जन्य रोग। पशुधन प्रहरी, 6 मई 2023।

5. श्रेया कटोच, राकेश कुमार*, स्मृति जंबाल, जोशी गौरव संतोष राव, बिसेन हर्ष कृष्ण कुमार, एकता बिष्ट और आर के असरानी। ब्रूसिलोसिस :मवेशियों और मनुष्यों की एक खतरनाक व्याधि। पशुधन प्रहरी, 6 मई 2023।
6. बिसेन हर्ष कृष्ण कुमार, डॉ राकेश कुमार*, जोशी गौरव संतोष राव, डॉ आर डी पाटिल एवं डॉ आर के असरानी। भेड़ और बकरियों के विषाणुजन्य रोग। पशुधन प्रहरी, 6 मई 2023।
7. अंकिता, राकेश कुमार*, स्मृति जंबाल, अभिषेक वर्मा और डॉ आर के असरानी। पश्चिमी हिमालय क्षेत्र के मांस पशुओं में परजीवी रोग । पशुधन प्रहरी, 18 मई 2023।

Lectures published in the compendium:

1. Gupta D and Kumar R. 2023. A brief introduction to anatomy of animals. Chapter in compendium on Refresher course on “Post-mortem Diagnosis with Emphasis on Veterolegal Investigations”. 2023. Page No 1-13.
2. Kumar R, Jamwal S, Joshi G and Ankita. 2023. Post-mortem techniques in different animal species. Chapter in compendium on Refresher course on “Post-mortem Diagnosis with Emphasis on Veterolegal Investigations”. 2023. Page No 27-35.
3. Kumar R, Jamwal S, Verma A, Ankita and Bisen H. 2023. Collection, preservation and dispatch of samples. Chapter in compendium on Refresher course on “Post-mortem Diagnosis with Emphasis on Veterolegal Investigations”. 2023. Page No. 36-39
4. Asrani RK, Kumar R, Verma A, Jamwal S and Bisen H. 2023. General considerations in vetero-legal cases. Chapter in compendium on Refresher course on “Post-mortem Diagnosis with Emphasis on Veterolegal Investigations”. 2023. Page No 40-46.
5. Patil N, Mishra S, Kumar R, Jamwal S, Katoch S. 2023. Post mortem examination and disposal of wild animal carcass. Chapter in compendium on Refresher course on “Post-mortem Diagnosis with Emphasis on Veterolegal Investigations”. 2023. Page No 47-53.
6. Patial V, Kumar R, Asrani RK, Patil RD, Verma A. 2023. Burn and firearm injuries in animals. Chapter in compendium on Refresher course on “Post-mortem Diagnosis with Emphasis on Veterolegal Investigations”. 2023. Page No 54-64.
7. Kumar S, Kumar R, Kumar R and Bisht E. 2023. Fraudulent substitution of meat and its recognition. Chapter in compendium on Refresher course on “Post-mortem Diagnosis with Emphasis on Veterolegal Investigations”. 2023. Page No 90-97.
8. Gupta VK, Asrani RK, Kumar R, Patil RD and Mishra S. 2023. Post-mortem report writing in veterolegal investigations. Chapter in compendium on Refresher course on “Post-mortem Diagnosis with Emphasis on Veterolegal Investigations”. 2023. Page No 98-104.
9. Patil RD, Sharma M, Shah T and Asrani RK (2023). “Machaliyo me hone wali bimariya, phchan, karan avm nidan’. Compendium edited and published by Department of Fisheries, DGCN COVAS, CSK HPKV, Palampur during training programme from 10-12 January, 2023. Training compendium, PP:1-13.
10. Patil RD Sharma M, Shah T and Asrani R K (2023). “Traut machaliyo me hone wali bimariya avm Rogtham’ (In Hindi). Compendium edited and published by Department of Fisheries, DGCN COVAS, CSK HPKV, Palampur during training programme from 16-18 March, 2023. Training compendium, 4:20-31.
11. Patil RD, Sharma M, Shah T and Asrani RK (2023). “Machaliyo me hone wali bimariya, phchan, karan va nidan’ (In Hindi). Compendium edited and published by Department of Fisheries, DGCN COVAS, CSK HPKV, Palampur during training programme from 10-12 January, 2023. Training compendium, PP:31-44.

Pamphlets:

1. Prepared and released a pamphlet on “Viral Diseases of Large and Small Ruminants” authored by: R.K Asrani, Rakesh Kumar and R.D Patil
2. Prepared and released a pamphlet on “Necropsy Techniques in Canines and Felines” authored by: Rakesh Kumar, R.K Asrani, R.D Patil and Sonali Mishra
3. Prepared and released a pamphlet on “Urine Examination” authored by: R.K Asrani, Rakesh Kumar and R.D Patil
4. Prepared and released a pamphlet on “Post-mortem Procedures and Technique in Ruminants” authored by: Rakesh Kumar, R.K Asrani and R.D Patil
5. Prepared and released a pamphlet on “Post-mortem Changes in Animals” authored by: R.K Asrani, Rakesh Kumar, Sonali Mishra and R.D Patil
6. Prepared and released a pamphlet on “Veterolegal Necropsy and Report Writing” authored by: Rakesh Kumar, R.K Asrani, Sahil Choudhary and R.D Patil
7. Prepared and released a pamphlet on “Necropsy Technique in Poultry” authored by: Rakesh Kumar, R.K Asrani, Ankita and R.D Patil
8. Prepared and released a pamphlet on “Important Viral Diseases of Canines” authored by: R.D Patil, Rakesh Kumar, Smriti Jamwal and R.K Asrani
9. Prepared and released a pamphlet on “Collection, Preservation and Dispatch of Clinical Samples” authored by: R.D Patil, Rakesh Kumar, Sonali Mishra and R.K Asrani
10. Prepared and released a pamphlet on “Cytology: A Rapid Diagnostic Technique” authored by: Rakesh Kumar, R.K Asrani and R.D Patil
11. Prepared and released a pamphlet on “Histopathological Tissue Processing Technique” authored by: Rakesh Kumar, R.K Asrani, Abhishek Verma and R.D Patil

Posters:

1. Prepared and released a poster on “Viral Diseases of Large and Small Ruminants” authored by: R.K Asrani, Rakesh Kumar and R.D Patil
2. Prepared and released a poster on “Necropsy Techniques in Canines and Felines” authored by: Rakesh Kumar, R.K Asrani, R.D Patil and Sonali Mishra
3. Prepared and released a poster “Urine Examination” authored by: R.K Asrani, Rakesh Kumar and R.D Patil
4. Prepared and released a poster on “Post-mortem Procedures and Technique in Ruminants” authored by: Rakesh Kumar, R.K Asrani and R.D Patil
5. Prepared and released a poster on “Post-mortem Changes in Animals” authored by: R.K Asrani, Rakesh Kumar, Sonali Mishra and R.D Patil
6. Prepared and released a poster on “Veterolegal Necropsy and Report Writing” authored by: Rakesh Kumar, R.K Asrani, Sahil Choudhary and R.D Patil
7. Prepared and released a poster on “Necropsy Technique in Poultry” authored by: Rakesh Kumar, R.K Asrani, Ankita and R.D Patil
8. Prepared and released a poster on “Important Viral Diseases of Canines” authored by: R.D Patil, Rakesh Kumar, Smriti Jamwal and R.K Asrani
9. Prepared and released a poster on “Collection, Preservation and Dispatch of Clinical Samples” authored by: R.D Patil, Rakesh Kumar, Sonali Mishra and R.K Asrani
10. Prepared and released a poster on “Cytology: A Rapid Diagnostic Technique” authored by: Rakesh Kumar, R.K Asrani and R.D Patil
11. Prepared and released a poster “Histopathological Tissue Processing Technique” authored by: Rakesh Kumar, R.K Asrani, Abhishek Verma and R.D Patil

Folders (In Hindi):

1. डॉ राकेश कुमार, डॉ. अंकिता, डॉ. अभिषेक वर्मा, डॉ. सोनाली मिश्रा, डा. जोशी गौरव एवं डॉ आर के असरानी । पश्चिमी हिमालय क्षेत्र के मांस पशुओं में परजीवी रोग ।
2. डॉ राकेश कुमार, डॉ श्रेया कटोच, डॉ एकता बिष्ट, डॉ आर डी पाटिल और डॉ आर के असरानी । ब्रूसीलोसिस ।
3. स्मृति जामवाल, डॉ राकेश कुमार, डॉ. अभिषेक वर्मा, डॉ. अंकिता, डॉ आर के असरानी । हिमाचल प्रदेश के आम औषधीय पौधे उनके जातीय पशु चिकित्सा उपयोगों के साथ ।
4. डॉ राकेश कुमार, डॉ एकता बिष्ट, डॉ अभिषेक वर्मा, डॉ आर डी पाटिल और डॉ आर के असरानी । ग्लैंडर्स
5. राकेश कुमार, आर. के. असरानी, डा. जोशी गौरव, डा. बिसेन हर्ष । भेड़ एव बकरियों के विषाणुजन्य रोग।
6. राकेश कुमार, आर. के. असरानी, डा. जोशी गौरव, डा. बिसेन हर्ष । गाय एव भैसों के विषाणुजन्य रोग।
7. डॉ राकेश कुमार, डॉ आर के असरानी, डॉ आर डी पाटिल। रेबीज एक घातक बीमारी।

5. Participation in workshop/ conferences, trainings etc.

a) Trainings:

S. No.	Date	Title	Name of Participants
1	22 nd to 27 th , August, 2022	6 days Induction Training Programme in the premises of Human Resource Development and Placement Centre, CSK HPKV, Palampur.	Dr. Rakesh Kumar

b) Conferences/workshops/seminars/symposia:

S. No.	Date	Title	Name of Participants	Nature of participation
1	17 th to 19 th November, 2022	International Veterinary Pathology Congress-2022 (IVPC-2022) organized by Department of Veterinary Pathology, College of Veterinary Science, PVNRTVU, Rajendranagar, Hyderabad.	Dr. Rakesh Kumar	Participation and paper presentation
2	13 th -15 th February, 2023	Participated in three days National Symposium on Trends and Innovation in Pharmaceutical, Bio-Chemical and Bio Sciences organized by Sai School of Pharmaceutical Education & Research, Sri Sai University, Palampur (Online mode).	Dr. R. D. Patil	Participation
3	7 th to 8 th April, 2023	XXXV th Annual Convention and National Conference of the Indian Association of Veterinary Microbiologists, Immunologists and Specialists in Infectious Diseases (IAVMICON23) at DGCN COVAS, Palampur.	Dr. R. D. Patil, Dr. Sonali Mishra	Participation and paper presentation

4	27 th to 28 th April, 2023	Two-days Seminar on 'Krishi Vigyan Mein Techniki Shabdavali Ka Upyog Evm Mahatv' organized by 'Commission for Scientific and Technical Terminology', Ministry of Human Resource Development (Department of Higher Education), Government of India at Himachal Pasturelands, ICAR-Indian Grassland and Fodder research Institute, Palampur.	Dr. R. D. Patil, Dr. Rakesh Kumar, Dr. Sonali Mishra	Participation
5	9 th December, 2022	'Interactive Meet with Veterinarians' on 133 rd Foundation Day Celebrations of ICAR-IVRI organized by ICAR-IVRI Regional Station, Palampur.	Dr. R. D. Patil, Dr. Rakesh Kumar	Participation
6	17, March, 2023	One day "Stakeholders Meet of Medicinal Plant Sector of Himachal Pradesh" held at CSK HPKV, Palampur.	Dr. Rakesh Kumar	Participation
7	9 th June, 2023	Interface Meeting Series 2023 on Advances in Animal Health and Production organized by ICAR-IVRI (Online mode).	Dr. R. D. Patil, Dr. Sonali Mishra	Participation

6. Workshop/seminar/trainings etc. Organized

Programs Organised:

1. Five-days Refresher course on "Post-mortem Diagnosis with emphasis on Veterolegal Investigations" organized by the Department of Veterinary Pathology (**Prof. R. K. Asrani** acted as Course Director; **Drs. R. D. Patil** and **Rakesh Kumar** acted as Course Coordinators and **Dr. Sonali Mishra** acted as Course Co-coordinator) in four (04) batches for State Veterinary Officers (Total 81 nos) including wild/zoo veterinarians from 5th-9th December 2022, 16th to 20th January 2023, 6th to 10th February 2023 and 27th February to 3rd March 2023.

Programs where faculty participated as resource person:

1. Faculty of the department (**Prof. R. K. Asrani, Dr. R. D. Patil, Dr. Rakesh Kumar** and **Dr. Sonali Mishra**) acted as a resource person and delivered course lectures and /or practical demonstrations during five-days Refresher course on "Post-mortem Diagnosis with emphasis on Veterolegal Investigations" organized by the Department of Veterinary Pathology in four (04) batches for State Veterinary Officers (Total 81 nos) from 5th-9th December 2022, 16th to 20th January 2023, 6th to 10th February 2023 and 27th to 3rd March 2023.
2. Faculty of the department (**Prof. R. K. Asrani, Dr. R. D. Patil, Dr. Rakesh Kumar** and **Dr. Sonali Mishra**) acted as Subject specialist/resource person and demonstrated the departmental activities including the disease investigation work through tissue specimens/charts of animal diseases during the three days Regional Agricultural Fair 2023: Parvatiya Krishak Maha Sangam Palampur organized by Directorate of Extension Education, CSK HPKV, Palampur on 12th to 14th June, 2023.
3. **Dr. R D Patil** acted as a resource person and delivered course lecture to 4th Professional Year students of B.V. Sc. & A. H. on 'Carcass management and disposal during disasters'

during the Workshop-cum-Certificate Course on Veterinary Emergency Response Operations organized by Veterinary Emergency Response Unit (VERU) North Zone, DGCN COVAS, Palampur on 22nd September, 2022.

4. **Dr. R D Patil** acted as a Co-coordinator as well as resource person during three days training program on 'Diseases and Health Management in Aquaculture' organized by Department of Fisheries, DGCN COVAS, Palampur and delivered a training lecture (In Hindi) to State fish farmers on 'Machaliyo me hone wali bimariya, phchan, karan avm nidan' and also conducted visit as well as practical demonstration at Govt. Fish Farm, Kangra on 11th January, 2023.
5. **Dr. R D Patil** acted as a resource person and delivered a training lecture (In Hindi) to Fish farmers on 'Trout machaliyo me hone wali bimariya avm rogtham' during three days training program on 'Seed production and Grow culture of Trout' organized by Department of Fisheries, Dr. G. C. Negi College of Veterinary and Animal Sciences, CSK HPKV, Palampur on 18th March, 2023.
6. **Dr. R D Patil** acted as a resource person and delivered a training lecture (In Hindi) to Fish farmers on 'Machaliyo me hone wali bimariya phchan, karan avm nidan' during five days training program on 'Women Emporment Through Fish Farming' organized by Department of Fisheries, Dr. G. C. Negi College of Veterinary and Animal Sciences, CSK HPKV, Palampur on 25th March, 2023.
7. **Drs. R D Patil** and **Rakesh Kumar** acted as a resource person and delivered training lectures-cum-practical exposure during 28 days Training and Skill Internship (SERB-Vritika) on 'Application of Medicinal Plants in Aquaculture Industry for Growth and Control of Fish Diseases' organized by Department of Fisheries, DGCN COVAS, Palampur (Period: 21st to 29th January, 2023).

7. Honours and awards

- **Dr. R. D. Patil** awarded with Third Prize for Paper (Poster) Presentation during XXXVth Annual Convention & National Conference of Indian Association for Veterinary Microbiologists, Immunologists and Specialists in Infectious Diseases (IAVMICON23), held at DGCN COVAS, Palampur from 7-8 April, 2023.
- **Dr. R. D. Patil** has been elected as Zonal Secretary (North Zone), Indian Association of Veterinary Pathologists for the period of 2023 to 2025.
- **Dr. Rakesh Kumar** received "Prof. S. Ramachandran Memorial Young Scientist award as Best Molecular Oncologist" in International Veterinary Pathology Congress-2022 (IVPC-2022) during 17th November to 19th November, 2022.
- **Dr. Rakesh Kumar** received "Young Scientist Award" in the RSF Awards 2022 ceremony held virtually on 2th August 2022 by the Royal Science Forum, Salem, India.
- **Dr. Rakesh Kumar** received "Best Oral Presentation Award" on the topic "A report on Parasitic Diseases in Meat Animals of Western Himalayan Region" in the 2nd Virtual International Conference on Advances in Food and Agricultural Science and Technology, held on 27th and 28th August, 2022, virtually organized by Chemically Science Review and Letters, India.
- **Dr. Rakesh Kumar** received "Best Oral Presentation Award" on the topic "Effects of root

- extract of *Saussurea lappa* on chemical-induced liver damage in rats” in the 2nd Virtual International Conference on Advances in Food and Agricultural Science and Technology, held on 27th and 28th August, 2022, virtually organized by Chemically Science Review and Letters, India.
- **Dr. Sonali Mishra** awarded with First Prize for oral paper presentation on “Jaagsiekte Sheep Retrovirus (JSRV): Whole Genome Sequencing and Phylogenetic Analysis” presented during IAVMICON 2023 at Palampur.

Publications in last five years

- I. Rakesh Kumar, Pallavi Bhardwaj, MridulSoni, Sahil Choudhary, Rahul Singh, Adarsh Kumar, Rajesh Kumar Asrani, NitinVirmani, V.K. Gupta and B.N. Tripathi. Cytopathological, ultrasonographic and hematological studies on the ameliorative effects of *Saussurea costus* (Falc.) Lipsch root extract against DMBA induced mammary tumors in female Sprague Dawley rats. Indian J. Vet. Pathol., 46(1) : 59-69
- II. Rakesh Kumar*, Ishita Gupta, Anmol Bisht, Abhishek Kumar, Sonali Mishra, Vipin K Gupta and Rajesh Kumar Asrani. (2022). Occurrence of Newcastle disease in backyard poultry: A pathomorphological study. Indian Journal of Veterinary Pathology, 46(4): 339-341
- III. Rakesh Kumar*, Poonam, Mridul Soni, Rajesh Kumar Asrani, R.D Patil, Adarsh Kumar and Vipin K Gupta. (2022). Pathomorphology of canine oral cavity affections: a report of four cases. Haryana Vet. 61(S1-2), 144-146
- IV. Rakesh Kumar*, Rupali Masand, Abhishek Kumar, R.K. Asrani and V.K. Gupta. (2022). Study on incidence, gross and histopathological changes on commonly occurring pathological conditions in rabbits (*OryctolagusCuniculus*) of Himachal Pradesh, India. Haryana Vet. (June, 2022) 61(1), 9-13
- V. Mridul Soni, Rakesh Kumar*, Sahil Choudhary, Rahul Singh, Anmol Bisht, S.P Tyagi and R. K Asrani. (June, 2022) Osteosarcoma in Hind Limb of a Geriatric Dog: A Pathological Study. Haryana Vet. 61(1), 157-158.
- VI. Dharampal, Rakesh Kumar*, Mridul Soni, Rahul Singh, Sahil Chodhary and R.K Asrani. (2023). Subcutaneous myxoma of the neck in a dog: A case report. Indian Journal of Veterinary Pathology, 47(1): 105-106.
- VII. Rakesh Kumar, Shailesh Kumar Patel, Jigyasa Rana and Talha Bin Emran. (2023). Tomato flu: need to look beyond the frame. International Journal of Surgery: Global Health. 6:e132
- VIII. Sahil Choudhary, MridulSoni, Rakesh Kumar*, Ankur Sharma, Rahul Singh, R.D Patil & R. Asrani. Pathomorphological study on Lantana toxicity in a Jersey cattle: A case Report. IJLR. 12(4).

- IX. Rakesh Kumar*, Anmol Bisht, Rupali Masand, Sanjay Kumar, Devina Sharma and Rajesh Kumar Asrani. Pathomorphological study on parasitic conditions in meat animals in Himachal Pradesh. Indian J. Vet. Pathol., 45(4): 310-314.
- X. Rakesh Kumar*, Anmol Bisht, Devina Sharma, Rupali Masand, R. K Asrani. Concurrent parasitic infection in four spontaneous cases of free ranging common myna (*Acridotheres tristis*). Indian Journal of Veterinary Pathology.
- XI. Rakesh Kumar*, Anmol Bisht, Rupali Masand, Sanjay Kumar, Devina Sharma and Rajesh Kumar Asrani. Pathomorphological study on parasitic conditions in meat animals in Himachal Pradesh. Indian J. Vet. Pathol., 45(4) : 310-314.
- XII. Rakesh Kumar*, Mridul Soni, Abhishek Kumar, Anmol Bisht, Devina Sharma and Rajesh Kumar Asrani. A pathological report on rupture of crop associated with parasitism in a hill prinia (*Prinia supercilialis*). AS Veterinary Science Journal.
- XIII. Jog Raj, Hunor Farkas, Zdenka Jakovcevic, Marko Vasiljevic, Rakesh Kumar and Rajesh Kumar Asrani. (2023). Effects of supplemented multicomponent mycotoxin detoxifying agent in laying hens fed aflatoxin B1 and T2-toxin contaminated feeds. Poultry Science. 102(8), 102795.