# ICAR-National Agricultural Higher Education Project

## Project Completion Report (23.03.2020 to 31.12.2023)

**Component 1b: Centre for Advanced Agricultural Science and Technology (CAAST)**

**MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR – 440001, MAHARASHTRA**

**Sub-Project: CENTRE OF EXCELLENCE FOR ADVANCED RESEARCH ON ANIMAL FOOD SAFETY**


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**Name of the AU: MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR – 440001, MAHARASHTRA**

**Project Title: CENTRE OF EXCELLENCE FOR ADVANCED RESEARCH ON ANIMAL FOOD SAFETY**

## EXECUTIVE SUMMARY:


- The existing laboratory facilities (WRRL) was upgraded with Clean Room with Biosafety Cabinet Class III and Anaerobic Work Station, Chemical Residue Testing Laboratory, Nutrition Laboratory, Molecular Laboratory, and Virtual Class Room under NAHEP-CAAST-MAFSU Project entitled **Centre of Excellence for Advanced Research On Animal Food Safety**. The said facilities are being used by P.G., Ph.D. students, faculties and industrial personnel to undertake quality research/continuing education in the areas of food safety.
- The centre has developed various protocols/SoPs for Microbiological analysis, Chemical residue analysis and Nutritional analysis of foods of animal origin.
- The centre has conducted the National trainings (62), National Level Quiz (3), International training programs (32) and Short Visits (3) and benefited a total of 12,762 participants of which, students (7284), faculties (3990), Industrial personnel's (493), Field Veterinarians (777), Scientists (195), Lab personnels and farmers (25) were benefitted for enhancing the skills and knowledge of faculties, students, researchers, entrepreneurs and farmers.
- The MAFSU centre has established collaborative partnerships with National (17), and International HEIs/Universities by signing MoU (05) with Penn State University, USA; Texas Tech University, USA, Washington State University, USA, The Experimental Zooprophylactic Institute, Palermo, Italy, and Veterinary Medicine and Pharmacy in Kosice, Slovakia and Industrial MoU (2) with M/s Vista Processed Foods Pvt. Ltd., Taloja and Poultry Breeders Coordination Association (PBCA), Pune.

# INTRODUCTION

## Background information on scope and purpose of the proposed CAAST

The production of safe and wholesome animal-origin foods from healthy livestock and poultry is essential for protecting the health of consumers since the science of human nutrition has underlined the importance of proteins of animal origin due to the content of almost all essential amino acids. As a result, the food of animal origin, viz. milk, meat, egg, fish and their products are gaining greater significance in today's world which includes the production of safe animal origin foods, which starts with animal health and hygiene maintained during food processing and preservation.

Thus, animal health and hygiene play an important role in addition to regular testing of animal and food products for making provision of safe food for society. Unless the food produced is not from healthy and pathogen free animal, the consideration of only external hygiene is not sufficient, therefore in order to have healthy society, simultaneously both the aspects i.e. health of animal and hygiene of food are essential in food safety. In and around Mumbai city, many livestock farms, poultry farms, zoological parks, slaughter houses, international trades and large canine population exists. Therefore, a need for modern and advanced facilities for diagnosis of infectious diseases and testing of animal origin food such as meat, milk, fish, chicken, eggs, etc. is felt, in order to prevent transmission of zoonotic diseases, reduce the hazards due to chemical contaminants and to increase the total GDP of country.

The various disciplines in Maharashtra Animal and Fishery Sciences University, Nagpur (MAFSU) viz. Veterinary Public Health, Veterinary Microbiology, Animal Biotechnology, Veterinary Medicine, Veterinary Parasitology, Veterinary Pathology, Livestock Products and Technology, Veterinary Physiology and Animal Nutrition, etc. are routinely involved in activities of the project and actively involved in testing of animal origin foods. The Department of Veterinary Public Health, Mumbai Veterinary College has established the "**Western Region Referral Laboratory (WRRL) for Meat and Meat Products Quality Standards"** with funding from the Indian Council of Agricultural Research, New Delhi under National Agricultural Technology Project (ToE mode) in the year 2004 and has received the **NABL Accreditation for Testing of Pesticide Residues in Foods of Animal Origin** for the first time in India. These facilities are upgraded to "**Centre of Excellence for Advanced Research on Animal Food Safety (CoEARAFS)"** in order to facilitate the various stakeholders to avail various unique facilities under one roof to resolve the different food safety disputes.

**Key Objectives:**

1. To upgrade existing NABL accredited laboratory "Western Region Referral Laboratory for Meat and Meat Products Quality Standards" to "Centre of Excellence for Advanced Research on Animal Food Safety".
2. To develop, standardize and validate protocols/SoPs on advanced techniques and to provide the generated data to Government food legislatives agencies for setting up MRL values/standards for animal origin foods as per international code.
3. To conduct national/international capacity building training programmes for skill development of faculties, students, researchers, entrepreneurs and farmers etc. by national and international food safety experts.
4. To establish collaborative partnership with government agencies, international institutes and food processing industries to address various food safety issues.

The developed facilities have been utilised so far by 33 P.G. and Ph.D. students from constituent colleges of MAFSU for successful completion of their respective research projects.

The centre has developed **four protocols/SoPs** for detection and quantification of pesticides and antibiotic residues in chicken meat, animal feed, fodder and milk samples. Also, developed **six protocols/SoPs** for detection and quantification of heavy metals in chicken meat, fish, eggs, water, bovine milk and serum, standardized the **two protocols** for Real Time PCR assay for detection of *Leptospira interrogans* and *Listeria* spp. in chicken meat and environmental samples.

**Four Technologies** were developed for extension of shelf-life of chicken sausages and chicken patties as a natural method of preservation i.e. Edible film of starch and chitosan incorporated with red cabbage extract and beet root extract. Edible coating of nanoparticles of chitosan and oregano essential oil for enhancement of quality and shelf life of chicken patties. Also, Development of composite film incorporated with thyme essential oil and black pepper essential oil and its effect on quality of chicken patties. Edible coating of nanoparticles of chitosan and cinnamon essential oil for improvement of quality and shelf life of chicken patties.

Two students have successfully completed the P.G. research on persistence detection of oncogenic mi-RNA biomarker in raw, boiled and pasteurized milk and Bovine Milk derived mi-RNA and its stability in milk which will definitely help for early detection and supply of healthy milk to common consumers.

During CoVID-19 period, the center has conducted various national and international capacity building training programs by virtual mode and successfully completed almost 80% of procurement of laboratory equipments under the financial head Capital Cost. The facilities developed under the project is used for skill development and knowledge upgradation of students/faculties and other stakeholders. Total 62 national trainings including 27 online, 18 offline/hybrid mode, 3

national quiz and 14 trainings were for deputed faculties (8) and students (6) of constituent colleges of MAFSU were conducted.

A total of 32 international trainings were conducted which included 4 online, 2 hybrid mode, 21 onsite programs for the faculties at USA, Australia, Mexico, UK, Italy, Korea and Thailand and 5 onsite programs for students at USA and Thailand. Four Academic Officers including the Vice Chancellor, DI and Dean, Faculty of Veterinary Sciences, Director of Research, and Principal Investigator visited the USA to sign MoUs with Penn State University, USA; Texas Tech University, at Lubbock and Amarillo, USA and Washington State University, USA for collaborative International partnership for higher enrolment of P.G. and Ph.D. students and faculties. One faculty attended an International Conference organized by the American Society for Microbiology (ASM & ESCMID), at Boston, Massachusetts, USA.

Various national collaboration with government agencies were carried out in the areas of food processing industries to address various food safety issues. Financial assistance was provided for the research of 64 M.V. Sc. and 2 Ph. D. students for the purchase of consumables such as glasswares, chemicals, ELISA kits, PCR kits, primers, etc. for the students from constituent colleges of MAFSU amounting to Rs. 1,17,28,220.70. The center has established a Digital Interactive Language software in seven constituent colleges of MAFSU equipped with foreign languages content (English, German, French and Spanish) and English Voice (Indian, UK, and US) and IELTS for oral skill enhancement for students/faculties. Under the Environmental Sustainability Plan, Dustbins along with different Dustbin Garbage Bags according to the Biomedical Waste Segregation Colour scheme were distributed to various departments of the college for disposal of biological waste. Lab Safety and Fire Safety Instructional Banners were distributed to constituent colleges of MAFSU for spreading awareness about Fire Safety and Hazard. Renovation and Maintenance of the Garden for an environmentally sustainable campus of Mumbai Veterinary College, Parel Mumbai was undertaken for ensuring a green and environmentally healthy campus. Repair of the Training Hall at The Department of Veterinary Public Health, Mumbai Veterinary College for the smooth conduct of training conducted under Capacity Building was undertaken under the NAHEP CAAST Project. The renovation of the Sensory Evaluation Laboratory was carried out for conducting the sensory evaluation of various products developed in the department. Repair of women's student/ staff restrooms was carried out under the NAHEP Project done as part of the efforts to make campuses physically and socially gender friendly; especially providing adequate and suitable facilities to women students and faculty. Repair work of the International Student/Teacher Guesthouse was undertaken under the Project to ensure a pleasant and comfortable stay for the international participants and guests.

1. Key activities carried out under the project during the entire period

## 1.1. Interventions carried out by AU which helped to improved research effectiveness

| *Key interventions* | *Remarks/Photographs* |
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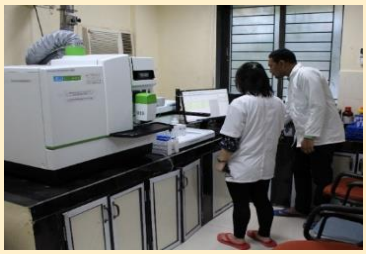
| 1. **Upgraded six research facilities :** Clean Room with Biosafety Cabinet Class III & Anaerobic Work Station, Chemical Residue Testing Laboratory, Nutrition Laboratory, and Molecular Laboratory are established for conducting innovative multidisciplinary teaching, research and extension activities. A total of 64 M.V. Sc. and 2 Ph. D. students were completed their research work and they have been selected in different government and private organizations. Further, M.V.Sc. students from constituent colleges of MAFSU benefited with these upgraded facilities along with provided the financial support of Rs. 1,17,28,220.70 for conducting smoothly research work. |  Clean Room with Biosafety Cabinet Class III & Anaerobic Work Station  Nutrition Laboratory   ICP-MS LC-MS/MS  GC-ECD Chemical Residue Testing Laboratory   Molecular Laboratory (RT-PCR) Texture Analyzer Facility |

Microwave Digester System (MDS)

**Fig 1. Upgraded Facilities developed under NAHEP-CAAST.**

**2. Digital infrastructure developed under NAHEP (Virtual Class Room with 40 seating capacity)** has not only continued in the academic activities but also widened the horizon of the learning avenues for students/faculties/industry personnels. A total of 165 trainings, workshops, webinars, organizing certificate courses, guest lecture series, entrepreneurial activities, upgradation in existing scientific educational materials, industrial collaborations and student skill development activities were conducted by faculties and industry experts.

- The center has established a Digital Interactive Language software in seven constituent colleges of MAFSU. Each system in the laboratory has been equipped with Foreign languages content (English, German, French and Spanish) and English Voice (Indian, UK, and US) and IELTS for oral skill enhancement for students/faculties.

This application gives access to students to learn the different foreign languages and enable them to qualify in examinations to get admission in foreign University for higher studies.

**Fig. 2. Virtual Class Room with 40 seating capacity**

2. **Provided ELISA kits, PCR kits, glasswares, chemicals, primers, etc.** worth Rs. 1,17,28,220.70 for successful completion of respective research projects of 64 M.V.Sc and 2 Ph.D. students is mapped under NAHEP Project to enhance the research outcomes of the young scholars pursuing research in the thematic areas of the Project.

**Details attached in Annexure I**

3. **International Short Visit for developing research collaborations by signing of MoU**

1. **Col. (Dr.) Prof. A. M. Paturkar**, Hon'ble *Vice Chancellor,* MAFSU, Nagpur, visited to U.S.A. during 4th-19th September, 2022 for establishing collaboration with India Center at Grove School of Engineering, City University, NY (CUNY). Also, signed statements of Shared Interest with CUNY, thus creating concrete linkages with CUNY, CREST, BCC, BMCC and many other allied institutes.


**Fig. 3. Col. (Dr.) Prof. A. M. Paturkar, Hon'ble Vice Chancellor visited New York and San Francisco under NAHEP -CAAST -MAFSU.**

2. **Dr. S.V. Upadhye,** DI & Dean, Faculty of Veterinary Science, MAFSU, Nagpur, **Dr. N. V. Kurkure**, Director of Research, MAFSU,

Nagpur, and **Dr. R. J. Zende,** PI, NAHEP-CAAST visited **Penn State University,** and **Texas Tech University, Amarillo,** USA during 2nd to 16th February, 2023, for signing Letter of Intent/MoU between Texas Tech University and MAFSU for development collaborative research and students/faculties exchange programs between these two Universities.

**Fig. 3(a). Signing of MoU with Penn State University, and Texas Tech University, Amarillo, USA**

## 4. Faculty International Training Programs

i. **Dr. Shailesh Dayaram Ingole,** Professor, Department of Veterinary Physiology, Mumbai Veterinary College, MAFSU, has successfully completed Faculty International Training Program in Penn State University, USA during 14th February, 2023 to 27th March, 2023. Area of training program was "Application of Genomics and Bioinformatics to Study Metagenomes related to Milk Production Traits of Dairy Cattle**".**

Fig.4. Dr. S. D. Ingole, during Faculty International Training Program at Penn State University, USA.

ii. **Dr. Vilas Mahadeo Vaidya,** Assistant Professor, Department of Veterinary Public Health, Mumbai Veterin ary College, MAFSU, has successfully completed Faculty International Training Program in Penn State University, USA during 14th February, 2023 to 27th March, 2023. Area of training program was "Application of Next Generation Sequencing to understand the molecular epidemiology of antimicrobial resistance in food borne pathogens".

Fig.5. Dr. V. M. Vaidya, during Faculty International Training Program at Penn State University, USA.

iii. **Dr. Vivek Harishankar Shukla**, Assistant Professor, Department of Livestock Products Technology, Mumbai Veterinary College of MAFSU, has successfully completed Faculty International Training Program in Penn State University, USA during 14th February, 2023 to 27th March, 2023. Area of training program was "Development of edible coating and films for quality enhancement and preservation of meat products".

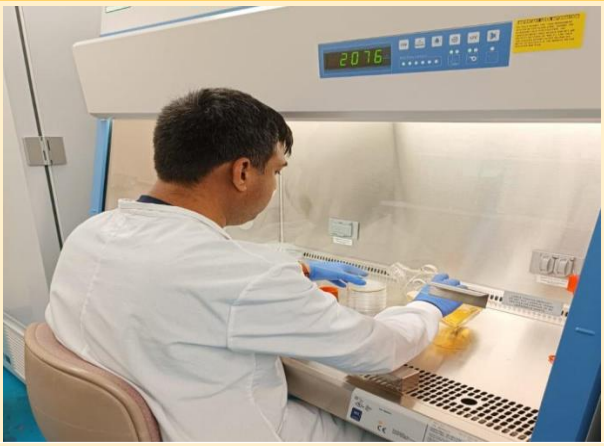



Fig.6. Dr. V. H. Shukla, during Faculty International Training Program at Penn State University, USA.

iv. **Dr. Bhupesh Kamdi,** Assistant Professor, Department of Veterinary Pathology, Post Graduate Institute of Veterinary and Animal Sciences, Akola has successfully completed Faculty International Training Program at University of Adelaide, Australia during 15th February to 15th March, 2023 in the area of "Gut Microbiota in Laying Hen".


Fig.7. Dr. Bhupesh Kamdi, during Faculty International Training Program at University of Adelaide, Australia.

v. **Dr. Chandrashekhar Sambhaji Mote**, Assistant Professor, Veterinary Pathology, KNP College of Veterinary Science, Shirwal has successfully completed Faculty International Training Program at University of Adelaide, Australia during 15th February to 15th March, 2023 in the area of "Transcriptome of *Salmonella* Typhimurium vaccine suspended in various diluents".

Fig. 8. Dr. C. S. Mote, during Faculty International Training Program at University of Adelaide, Australia.

vi. **Dr. G. M. Chigure**, Assistant Professor, Department of Veterinary Parasitology College of Veterinary and Animal Sciences, Parbhani, attended his Faculty International Training Program at **Queretaro, Mexico** during 19th February to 20th March, 2023 in the area of **Emerging Foodborne and Parasitic Zoonoses: One Health Concept.**

Fig. 9. Dr. G. M. Chigure, during Faculty International Training Program at Queretaro, Mexico.

**vii. Dr. V S. Dhaygude,** Assistant Professor, Department of Veterinary Pathology, Krantisinh Nana Patil College of Veterinary Science College of Veterinary Science, Shirwal, attended his Faculty International Training Program at Experimental Zooprophylactic Institute, Via G. Marinuzzi 3, 90129 Palermo, Italy (WOAH Referral Lab for contagious agalactia) during 5th Sept. to 5th Oct. 2023 in the area of Advanced diagnostic methods for contagious agalactia and

Fig. 10. Dr. V S. Dhaygude, during Faculty International Training Program at Palermo, Italy.

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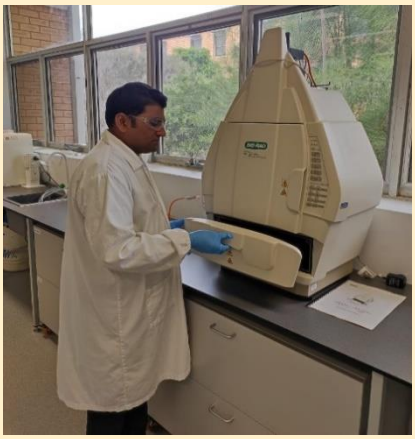
| brucellosis in context to food safety and zoonosis. | |
| viii. **Dr. Riddhi Pankaj Naringrekar,** Assistant Professor, Dept. of Veterinary Parasitology, Mumbai Veterinary College, Parel, Mumbai-400012 attended his Faculty International Training Program at Experimental Zooprophylactic Institute, Via G. Marinuzzi 3, 90129 Palermo, Italy (WOAH Referral Lab for contagious agalactia) during 11th Sept. to 5th Oct. 2023 in the area of Advances in diagnosis of Toxoplasmosis or other parasitic zoonosis |  <br>Fig. 11. Dr. R. P. Naringrekar, during Faculty International Training Program at Palermo, Italy. |
| ix. **Dr. M. M. Vaidya,** Assistant Professor, Dept of Veterinary Physiology, College of Veterinary and Animal Sciences, Udgir, Maharashtra-413517 attended his Faculty International Training Program at School of Agriculture, Food and Ecosystem Sciences, Faculty of Science Dookie Campus, The University of Melbourne, Victoria 3647 Australia during 7th Sep. to 6th October, 2023 in the area of Effect of polygrain supplementation on enteric methane emissions and calf health. |  <br>Fig. 12. Dr. M. M. Vaidya, during Faculty International Training Program at Melbourne, Australia. |
| x. **Dr. Mahesh Gupta,** Assistant Professor, Dept of Veterinary Physiology, Nagpur, Veterinary College, Nagpur-440007 attended his Faculty International Training Program at School of Agriculture, Food and Ecosystem Sciences, Faculty of Science Dookie Campus, The University of Melbourne, Victoria 3647 Australia during 7th Sep. to 6th October, 2023 in the area |  <br>Fig. 13. Dr. Mahesh Gupta, during Faculty International Training Program at Melbourne, Australia. |

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| of Impact of heat stress and trace mineral supplementation on dairy cattle immune status and calf health. | |
| **xi.** **Dr. P. R. Suryawanshi,** Assistant Professor, Dept. of Veterinary Microbiology, College of Veterinary and Animal Sciences, Parbhani, Maharashtra-431402 attended his Faculty International Training Program at School of Veterinary Medicine and Science, University of Nottingham Sutton Bonington Campus, Loughborough, Leicestershire LE12 5RD, UK during 10th Sep. to 10th Oct., 2023 in the area of Antimicrobial Resistance and Rapid Identification of Food Borne Zoonotic Pathogen Through Next Generation Sequencing. |  <br>Fig. 14. Dr. P. R. Suryawanshi, during Faculty International Training Program at Nottingham, UK. |
| **xii.** **Dr. R. N. Waghamare,** Assistant Professor, Dept. of Veterinary Public Health, College of Veterinary and Animal Sciences, Parbhani**,** attended his Faculty International Training Program at School of Veterinary Medicine and Science, University of Nottingham Sutton Bonington Campus, Loughborough, Leicestershire LE12 5RD during 10th Sep. to 10th Oct., 2023 in the area of Phage Characterisation encompasses Food Safety owing to Phage biocontrol as a tool to reduce AMR through food-borne Pathogens. |  <br>Fig. 15. Dr. R. N. Waghamare, during Faculty International Training Program at Nottingham, UK |

**xiii. Dr. G. P. Bharkad,** Associate Professor, Dept. of Veterinary Parasitology, College of Veterinary & Animal Sciences, Udgir, Maharashtra attended his Faculty International Training Program at Department of Microbiological Sciences, Van Es Hall, North Dakota State University, USA during 11th September to 11th October, 2023 in the area of Emerging and re-emerging diseases under One Health, techniques in detection of food borne pathogen and antimicrobial resistance.

Fig. 16. Dr. G. P. Bharkad, during Faculty International Training Program at North Dakota State University, USA.

**xiv. Dr. S. N. Rindhe,** Assistant Professor, Department of Livestock Products Technology, College of Veterinary and Animal Sciences, Parbhani-431402, Maharashtra attended his Faculty International Training Program at Department of Food and Nutrition, Bio Nanocomposite Research Center, Kyung Hee University, Dongdaemun-gu, Seoul, Republic of Korea- 02447 during 18th September to 17th October, 2023 in the area of Advanced Food Packing Technology.

Fig. 17. Dr. S. N. Rindhe, during Faculty International Training Program at Seoul, Republic of Korea

**xv. Dr. K. S. Rathod,** Assistant Professor, Dept of Livestock Products Technology, Nagpur, Veterinary College, Nagpur-440007 attended his Faculty International Training Program at Asian Institute of Technology (AIT), P.O. Box 4, Klong Luang, Pathumthani, 12120, Thailand during 18th Sepember to 17th October 2023 in the area of Food Safety, Bio-processing and Preservation.

Fig. 18. Dr. K. S. Rathod, during Faculty International Training Program at Pathumthani, Thailand

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| **xvi. Dr. Shital M. Jawale,** Assistant Professor, Dept of Animal Nutrition, Nagpur, Veterinary College, Nagpur- 440007 attended her Faculty International Training Program at Department of Infectious Diseases and Immunology, College of Veterinary Medicine, Gainesville, University of Florida, PO Box 110880, Gainesville, FL 32611-0880 during 18th September to 17th October 2023 in the area of "Nutritional Immunology in Monogastric Animals" (Nutritional Immunology, Next Generation Sequencing & other biotechnological tools). |  <br>Fig. 19. Dr. Shital M. Jawale, during Faculty International Training Program at Florida, USA. |
| **xvii. Dr. Megha Purushottamrao Kaore,** Assistant Professor, Dept of Veterinary Pathology, Nagpur, Veterinary College, Nagpur- 440007 attended her Faculty International Training Program at Department of Infectious Diseases and Immunology, College of Veterinary Medicine, Gainesville, University of Florida, PO Box 110880, Gainesville, FL 32611-0880 during 22nd September to 17th October 2023 in the area of Pathophysiological changes and its prevention by gut-associated protein (Next generation sequencing and other biotechnological tools) |  <br>Fig. 20. Dr. Megha P. Kaore, during Faculty International Training Program at Florida, USA. |

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| **xviii. Dr. S. N. Jadhav, Assistant Professor,** Department of Veterinary Biochemistry, KNP College of Veterinary Science, Shirwal attended his Faculty International Training Program at Asian Institute of Technology (AIT), Pathumthani, Thailand during 18th September to 17th October 2023 in the area of Probiotics and Postbiotics as alternate for Biotherapeutics in Livestock Production". |  <br>Fig. 21. Dr. S. N. Jadhav, during Faculty International Training Program at Pathumthani, Thailand. |
| **xix.. Dr Jagdish Ganpat Gudewar,** Assistant Professor, Dept. of Veterinary Parasitology attended his Faculty International Training Program at Oklahoma State University, College of Veterinary Medicine, 205 McElroy Hall, Stillwater, Oklahoma, 74078, United States during 25th September to 24th October, 2023 in the area of Advanced Techniques for Detection of Food Borne Pathogens and Emerging Zoonoses. |  <br>Fig. 22. Dr. J. G. Gudewar during Faculty International Training Program at Oklahoma, United States. |
| **xx. Dr. R. R. Pharande,** Assistant Professor, Dept. of Veterinary Microbiology, Mumbai Veterinary College, Mumbai, Maharashtra attended his Faculty International Training Program at Texas Tech University, School of Veterinary Medicine. Evans Drive, Amarillo TX 79106, USA during 16th October, 2023 to 10th November 2023 in the area of Application of Genomics and Bioinformatics for Studying Food borne Pathogens |  <br>Fig. 23. Dr. R. R. Pharande, during Faculty International Training Program at Texas, USA. |

**xxi. Dr. S. V. Bharucha,** Assistant Professor, Dept. of Veterinary Physiology, Mumbai Veterinary College, Mumbai, Maharashtra attended her Faculty International Training Program at Texas Tech University, School of Veterinary Medicine. Evans Drive, Amarillo TX 79106, USA during 16th October, 2023 to 10th November 2023 in the area of Identification of bioactive molecules and identify molecular markers such as microRNA in the regulation of immune response in food animals.

Fig. 24. Dr. S. V. Bharucha, during Faculty International Training Program at Texas, USA.

## 5. Student International Trainings

i. **Dr. Bhakti K. Zade**, M.V.Sc student, Department of Veterinary Public Health, and **Dr. Mandakranta Bhuyan**, M.V.Sc student, Department of Veterinary Physiology, Mumbai Veterinary College, Mumbai visited the Department of Infectious Diseases and Microbiology, University of Pittsburgh, USA for International training on "Cutting edge research advancements in one health" from 1st November – 30th November, 2023.

Fig. 25. *Dr. Bhakti and Dr. Mandakranta during their International Training Program.*

ii. **Dr. Piyush Pravin Kulkarni**, Master of Veterinary Sciences (M. V. Sc.), Department of Veterinary Public Health, **Dr. Rathod Rohit Kailasrao**, Department of Livestock Products Technology, Nagpur Veterinary College, Nagpur - 440006 and **Dr. Sirsat Mohini Suresh**, Department of Veterinary Pathology, Mumbai Veterinary College, Mumbai- 400012 visited the International College, Maejo University, Chiang Mai, Thailand, 50290 for their international training on "Food Safety

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| issues on Food of Animal origin" from 1st December to 15th December 2023. |  <br>Fig. 26. Dr. Piyush, Dr. Rohit and Dr. Mohini during their Student International Training Program |

## *1.2.* How the facilitative units helped to enhance learning outcomes

| *Facilitative unit* | *Activity/achievement* | *Remarks/Photographs* |
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| **A. Microbiological Laboratory**<br>**i. Integrated Clean Room with Biosafety Cabinet Class III & Anaerobic Work Station.** | • Two Hands on Training on Food Microbiological techniques were conducted.<br>• Total 26 participants benefited from this training.<br>• A total of 9 M.V. Sc. students from constituent colleges of MAFSU completing their PG research availed this facility and also upgraded their technical skills. |  <br>Fig. 27. Microbiological Laboratories developed under NAHEP-CAAST-MAFSU. |
| **ii. Texture analyzer** | • 10 P.G. students from constituent colleges of MAFSU were trained for analysis on this equipment and have utilized these facilities for the successful completion of their research work. |  <br>Fig. 28. Texture analyzer under NAHEP-CAAST-MAFSU. |
| **iii. Molecular Laboratory (RT-PCR)** | • Two P.G. students have standardized the protocols for Real-Time PCR assay for the detection of *Leptospira interrogans* and *Listeria* spp. in chicken meat and environmental samples.<br>• One P.G. Student from the Department of Animal Biotechnology, MVC utilized this facility to complete her research work.<br>• Total 12 industrial personnel was trained by using this facility. |  <br>Fig. 29. Student working on RT-PCR. |

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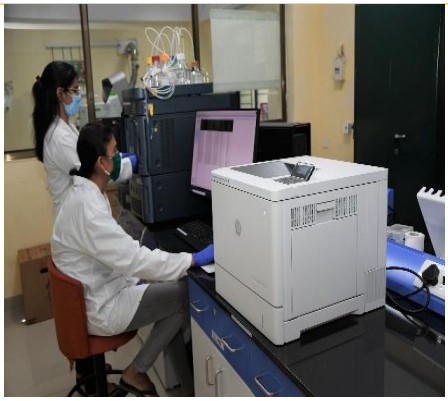
| **B. Chemical Residue Testing Laboratory**<br><br>***i. LC-MS/MS*.** | • Developed and validated four protocols for detection and quantification of antibiotic (one), pesticide (Three) residues using LC-MS/MS.<br>• Two P.G student from Department of Veterinary Public Health completed her thesis work on "Detection of Selected Antibiotic Residues in Chicken Meat samples using liquid chromatography-Tandem Mass Spectrometry (LC-MS/MS)" and "Detection of Selected Pesticide Residues in Chicken samples using liquid chromatography-Tandem Mass Spectrometry (LC-MS/MS)".<br>• Two P.G students from Department of Animal Nutrition completed their thesis work on "Standardization and validation of methods for detection of pesticides residues in animal feed, fodder and milk using liquid chromatography tandem mass Spectrometry (LC-MS/MS)" and "Surveillance and detection of pesticide residues in animal feed, fodder and milk from different farms in Konkan region of Maharashtra".<br>• This facility is also used for generation of data for pesticide and antibiotic residues in animal origin foods in 420 samples. |  <br>Fig. 30. Chemical Residue Testing Laboratories LC-MS/MS under NAHEP-CAAST-MAFSU. |

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| | • This facility was used for conducting 2 hands-on-training on Detection and Quantification of Antimicrobial Residue in Meat by Liquid Chromatography-Tandem Mass Spectrophotometry (LC-MS-MS). A total of 49 participants benefitted from these trainings. | |
| ***ii. ICP-MS*** | • Developed and validated the protocol for detection and quantification of heavy metals from chicken meat, egg and fish using ICP-MS. Using developed protocols, the centre is generating data on heavy metal residues in foods of animal origin.<br>• A total of 2 trainings on Detection and Quantification of Heavy Metal Residues In Chicken Meat and Foods of Animal Origin By Inductively Coupled Plasma - Mass Spectrometry was conducted. A total of 55 beneficiaries benefitted from this training program.<br>• One Ph.D. student and two P.G students utilized this facility to complete their thesis work. |  <br>Fig. 31. Heavy Metal Residue Testing Laboratories ICP-MS under NAHEP-CAAST-MAFSU. |

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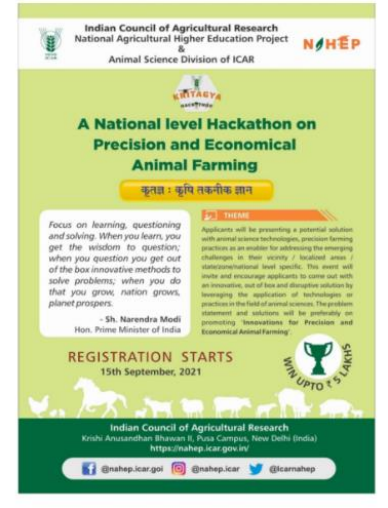
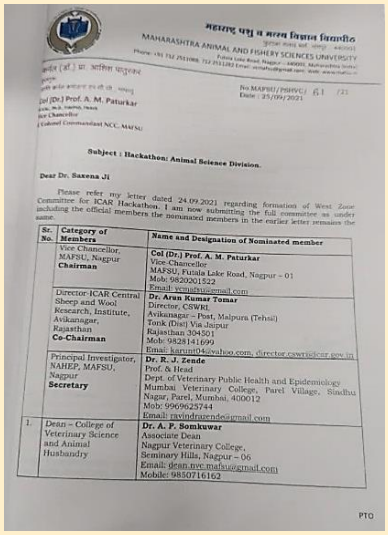
| ***Iii GC-ECD*** | • Developed and validated protocols for detection and quantification of pesticide (Three) residues using GC-ECD.<br>• One Hands on Training on Detection and Quantification of Pesticide Residues in Animal Origin Foods by Gas Chromatography was conducted.<br>• Total 16 participants benefited from this training.<br>• A total of 144 samples of Foods of Animal Origin were analyzed for the presence of the pesticide residues. |  <br>Fig. 32. Pesticide Residue Testing Laboratories GC-ECD under NAHEP-CAAST-MAFSU. |
| **C. Nutrition Laboratory** | • Performed proximate analysis of animal origin food and food products i.e. milk, milk products (butter, paneer, cheese), meat and fish for determination of protein, fat, moisture, ash, carbohydrate, energy as per IS method.<br>• A total of 274 samples of Animal Origin Food was analyzed for the nutritional proximate analysis. |  <br>Fig. 33. Proximate Analysis of Animal Origin Food under NAHEP-CAAST-MAFSU. |
| **D. Virtual Class Room** | • Total 165 activities including Official meetings, online/offline trainings, workshops, webinars, organizing certificate courses, guest lecture series, entrepreneurial activities. | |


Fig. 34. Virtual Classroom developed under NAHEP-CAAST-MAFSU.


Fig. 35. Meetings conducted before and after Virtual Conference Room

## *1.3. Out-of-box initiatives undertaken by the AU*

*Please provide the details on out-of-box initiatives undertaken by the AU in one-two paragraph.*

| *Out-of-box initiative* | *Activity/achievement* | *Remarks/Photographs* |
|---|---|---|
| **1. Hackathon meeting** | **Hackathon Event:** (24/09/2021-14/12/2021) West zone committee headed by **Hon'ble Col. (Dr.) Prof. A. M. Paturkar** as Chairman, Dr. Arun Kumar Tomar as Co-Chairman and Dr. R. J. Zende as Secretary of the committee. Five other committee members formed under the MAFSU, Nagpur for the evaluation of the teams categorised under West Zone states included as **Maharashtra, Gujarat, Rajasthan, Goa, and, Diu & Daman**. From these states, 24 teams participated in the Kritagya Hackathon. In the concept Evaluation round, the teams were shortlisted on the basis of their innovative ideas and themes. In **conceptual round, 7 teams were selected out of the 24 teams (30%) in the West Zone** by Five members committee by following the given criteria/guidelines. |  <br>  <br>Fig. 36. Invitation for The Hackathon Event. |

| | | |
|---|---|---|
| **5. Distribution of Dustbins** | Under the Environmental Sustainability Plan and in solidarity with the Swachh Bharat Abhiyaan, Dustbins along with different Dustbin Garbage Bags according to the Biomedical Waste Segregation Colour scheme were distributed to various departments of the college. Dustbins of various types like Two-wheel plastic garbage bins, Stainless Steel Pole mounted bin with Hood, Biomedical Waste bin (Peddle bins), Wet and Dry waste duo bin were distributed. |  <br>Fig. 37. Distribution of Procured Dustbins to various departments of the college.<br>  <br>Fig 38. Biomedical Waste Bins and Stainless-Steel Pole mounted Bin with Hood |
| **6. Development of Green Sustainable Environment for the campus** | Renovation and Maintenance of the Garden for an environmentally sustainable campus of Mumbai Veterinary College, Parel Mumbai was undertaken under the NAHEP – CAAST Project. | |




Before

After

Fig. 39. Restoration and Maintenance of Garden

| | |
|---|---|
| **7. Renovation and Maintenance of Ladies Common Room and Restroom** | Repair of women's student/ staff restrooms was carried out under the NAHEP Project done as part of the efforts to make campuses physically and socially gender friendly; especially providing adequate and suitable facilities to women students and faculty.<br>LED Street lights were installed to make the streets on the campus safer for female students and staff in the evening hours. |

Before

After

Fig. 40. Renovation and Maintenance of Ladies Common Room and Restroom

**Fig. 41**. Installation of LED Lights

| | |
|---|---|
| **8. Repair of Existing Training Hall** | Repair of the Training Hall at The Department of Veterinary Public Health, Mumbai Veterinary College for the smooth conduct of various trainings for capacity building with total seating capacity of up to 50 people. |

Before


After

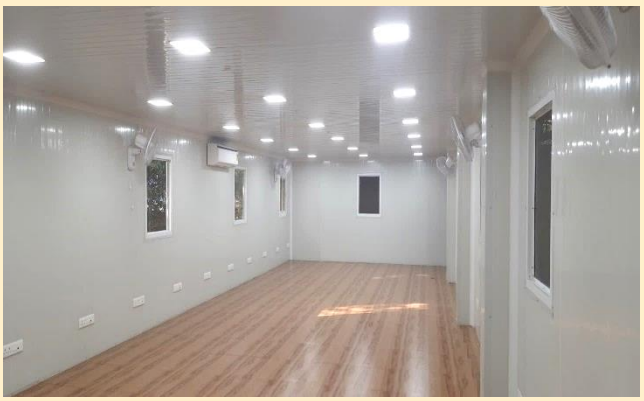


Fig. 42. Repair of Existing Training Hall and Sensory Evaluation Lab

| | |
|---|---|
| **Renovation and Repair of Sensory Evaluation Lab** | The renovation of the Sensory Evaluation Laboratory carried out under NAHEP provides an upgraded and independent facilitative set-up for carrying out the sensory evaluation of various products developed under the aegis of the center. |

***Before***

***After***

Fig. 43. Renovation and Repair Sensory Evaluation Laboratory

| | |
|---|---|
| **9. Renovation and repair of International Student/Teacher Guesthouse** | Repair work of the International Student/Teacher Guesthouse was carried out like Fixing of Materials for wire fencing, fixing of Flooring materials, Toilet Blocks, etc. to ensure a quality and pleasant stay for the students and teachers visiting from abroad for educational purposes. |

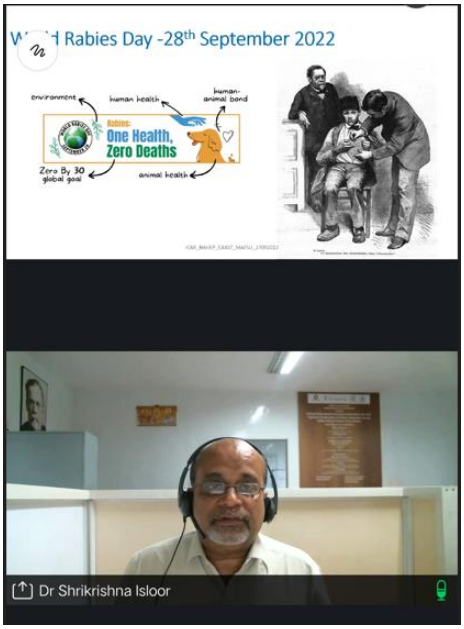
Before

After

Fig. 44. Fixing of Materials for wire fencing in International Guesthouse

Fig. 44(a). Repair of International Guesthouse

| | | |
|---|---|---|
| **10.Fire Compliance Awareness in constituent colleges** | Lab Safety and Fire Safety Posters were distributed to constituent colleges of MAFSU for spreading awareness and knowledge about the usage of fire safety equipments in case of an emergency. |  <br>Fig 45. Fire Safety Compliance Posters |

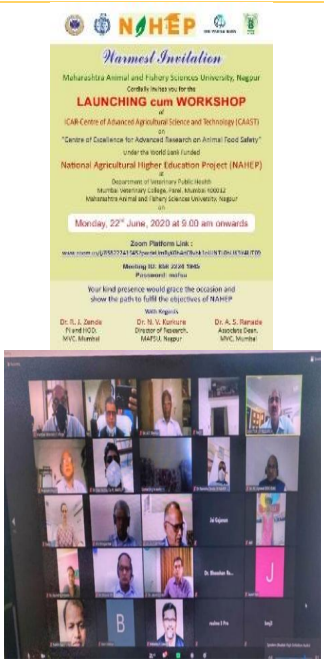
| | | |
|---|---|---|
| | |  |
| **11. Celebration of International Days** | Following International Days were celebrated in the NAHEP CAAST MAFSU, Mumbai Centre –<br>1. National Webinar was organized on the Occasion of "National Milk Day" on 26th November,2020 and 2021 consecutively for generating awareness.<br>Total beneficiaries: 129<br>2. On the Occasion of World Zoonoses Day, the Centre organised International Webinar on Zoonoses Aspects, One Day National Seminar and Knowledge Sharing workshop on 6th July, 2020, 2022 and 2023 respectively for spreading of awareness and to facilitate exchange of knowledge among experts and other stakeholders.<br>Total beneficiaries: 596<br>3. On the occasion of World Food Safety Day, Knowledge Sharing Workshop and A National Seminar was celebrated on 7th June, 2022 and 2023, respectively to share knowledge about the concept of Food Safety and its importance in the public health aspect.<br>Total beneficiaries: 444 |  <br>Fig 46. Glimpses of World Rabies Day Celebration 2022<br>  <br>Fig 47. World Food Safety Day - 2023 |

| | | |
|---|---|---|
| | 4. National E- Quiz was conducted on the Occasion of World Rabies Day-2022 on 28th September, 2022 to spread awareness about Rabies, a fatal zoonotic disease, endemic to the country and the subsequent eradication strategies undertaken by the Govt. agencies.<br>Total beneficiaries: 471<br>5. "Tree Plantation Program, Poster and Photography Competition" was organized on World Environment Day Theme: Waste to Wealth on 5th June, 2023 to create awareness about the importance of a sustainable environment and to promote eco-friendly vision for future.<br>Total beneficiaries: 16 |  <br>Fig 48. Glimpses of World Zoonoses Day – 2023<br>  <br>Fig 49. Glimpses of World Environment Day – 2023 |
| **12.E-waste Management Awareness** | A National Webinar was conducted on " E-Waste Management" on 25th April, 2022 for dissemination of knowledge regarding Management of E -waste that is generated.<br>Total beneficiaries: 133 |  <br>Fig 50. Glimpses of E-waste Management Awareness |

| | | |
|---|---|---|
| **12. Agri Education Fair – 2023** | A total of 251 beneficiaries including organizing committee members and distinguished speakers from scientific and industrial areas participated in the Agri Education Fair held under NAHEP-CAAST-MAFSU, at Mumbai Veterinary College on 14th October, 2023. A total of 26 schools from Mumbai registered which included 26 principals, 29 teachers and 139 students along with 40 Volunteers and Stall members. The event helped the students gain insights about various career opportunities in the veterinary and allied fields. |  <br>*Fig 51. Glimpses of Agri Education Fair*<br>  <br>*Fig 52. Glimpses from Agri Education Fair – 2023* |
| **13. Student Engagement Conclave cum Training Nurturing Agripreneurship: Scope and Opportunities for Economic Development** | The centre organized a Student Engagement Conclave – 2023 on 5th and 6th November, 2023 at Nagpur Veterinary College, Nagpur. Around 350 beneficiaries from all the country participated in the event. The DDG, ICAR - Dr. R. C. Agrawal and NC, NAHEP – CAAST- Dr. Anuradha Agrawal graced the function with their presence. Various distinguished speakers from scientific and industrial areas participated in the Student Engagement Conclave. |  <br>  <br>*Fig 53. Glimpses from Student Engagement Conclave* |

## 1.4. Collaborations with industry and other HEIs for bringing relevancy

| *Collaborations* | *Activity/achievement/purpose* | *Remarks/ Photographs* |
|---|---|---|
| ***International MoU*** | | |
| | • Academic Officers Dr. S. V. Upadhye, DI & Dean Vet MAFSU, Nagpur, Dr. N. V. Kurkure, Director of Research, MAFSU and Dr. R. J. Zende, Principal Investigator signed MoU with the University and interacted with different faculties for future collaboration regarding research, extension and other activities.<br>• Explored the possibility of developing collaborative research program.<br>• Student/ Faculty Exchange Program was discussed.<br>The prospect of a Twinning Degree Program was explored. |  <br>*Fig. 54. Signing of MoU by the officials* |

| | | |
|---|---|---|
| | On the Occasion of the Launch of NAHEP-CAAST-MAFSU, the centre organized International Webinar on Food Safety on 22nd June, 2020.<br>Total no. of beneficiary - **90.** |  <br>*Fig. 55. International Webinar on Food Safety* |
| **1. Penn State University, USA.** | • One Week International E-Training Programme on "Introduction to Bio-informatics Microbial – Omics" during 22nd March, 2021 - 26th March, 2021. Total no. of beneficiary **311.** |  <br>*Fig. 56. Glimpse from the International E-Training Programme.* |
| | • Dr. Shailesh Dayaram Ingole (Professor, Department of Veterinary Physiology, MVC), Dr. Vilas Mahadeo Vaidya, (Assistant Professor, Department of Veterinary Public Heath, MVC) and Dr. Vivek Harishankar Shukla (Assistant Professor, Department of | |

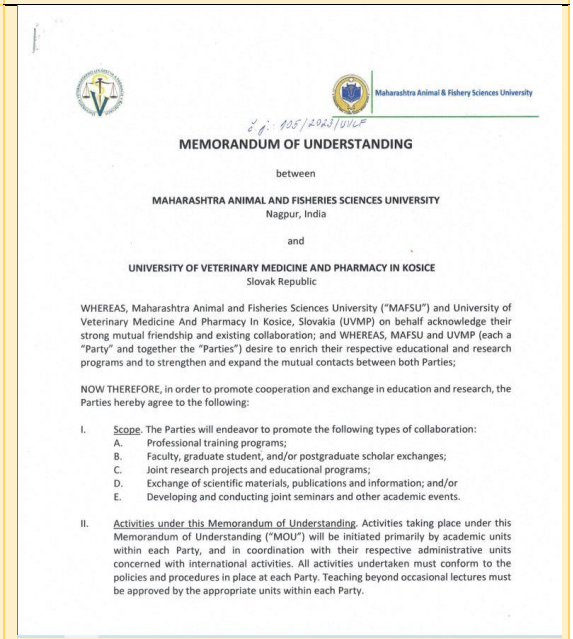
| | | |
|---|---|---|
| | Livestock Products Technology, MVC) of Maharashtra Animal and Fishery Sciences University (MAFSU), Nagpur have completed their Faculty International Training Program at Penn State University, USA during 14th February to 27th March, 2023.<br>• Two M. V. Sc. Students Dr. Bhakti Zade, Department of Veterinary Public Health and Dr. Mandakranta Bhuyan, Department of Veterinary Physiology, completed their Student International Training Program at Department of Infectious Diseases and Microbiology, University of Pittsburgh, USA for International training on "Cutting edge research advancements in one health" from 1st November – 30th November, 2023. |  <br>*Fig. 57. Faculty International Program conducted at Penn State University, USA.*<br>  <br>  <br>*Fig. 58. Students during their Student International Training Program* |
| | • Invited Dr. B. M Jayarao, Director, Pennsylvania Animal Diagnostic Laboratory, Penn State, for conducting Ten Days International Training on | |

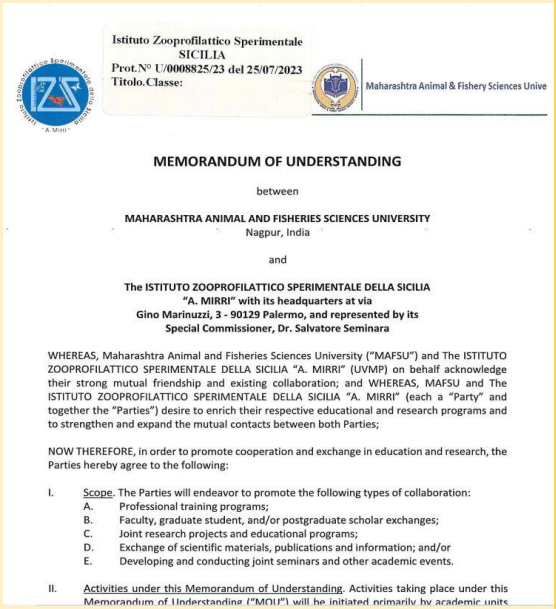
| | | |
|---|---|---|
| | "Principles and Practices of Epidemiology" (Hybrid Mode) during 3rd -12th July, 2023 (10 days) in hybrid mode to MAFSU faculties (87) at Department of Veterinary Public Health, Mumbai Veterinary College. Total no. of beneficiaries: 203 |  *Fig. 59. Dr. B. M. Jayarao in a group discussion.* |
| | • Invited Dr. Suresh Kuchipudi, Clinical Professor and Head of Microbiology Section, Associate Director, Animal Diagnostics-Lab 224, Huck Life Sciences, University Park, Dr. Meera Nair, Assistant Clinical Professor, Animal Diagnostic Laboratory, Pennsylvania University and Dr. Maurice Byukusenge, Assistant Professor, Veterinary Medicine at University of Rwanda, Kigali online as a speaker to deliver lectures on trends in ONE Health and Food Safety during the International Training Program organized under NAHEP. | |
| **2. Texas Tech University, USA.** | • Dr. R. J. Zende, Principal Investigator along with other two Academic Officers Dr. S. V. Upadhye, DI & Dean, Faculty of Veterinary Science, MAFSU, Nagpur and Dr. N. V. Kurkure, Director of Research, MAFSU signed a Letter of Intent (LoI) between MAFSU, Nagpur and Texas Tech University, (TTU) |  *Fig.60. Signing of MoU between officials.* |

USA and visited Centre of Excellence on Food Safety diagnostic lab in TTU, USA and discussed with the concerned faculties for developing collaborative research in emerging areas of different aspects of Food Safety.

- Dr. Devendra Shah, Professor, Dept. of Microbiology and Immunology, Texas Tech University was invited online to deliver topic during International Training Program.
- Dr. S. V. Bharucha, Assistant Professor, Dept. of Veterinary Physiology, and Dr. R. R. Pharande, Assistant Professor, Dept. of Veterinary Microbiology, Mumbai Veterinary College attended Faculty International Training Program at Texas Tech University, School of Veterinary Medicine. Evans Drive, Amarillo TX 79106, USA during 16th October, 2023 to 10th November 2023 in the area of Identification of bioactive molecules and identify molecular markers such as microRNA in the regulation of immune response in food animals and Application of Genomics and Bioinformatics for Studying Food borne Pathogens respectively.

*Fig.61. Dr. Pharande during his Faculty International Training*

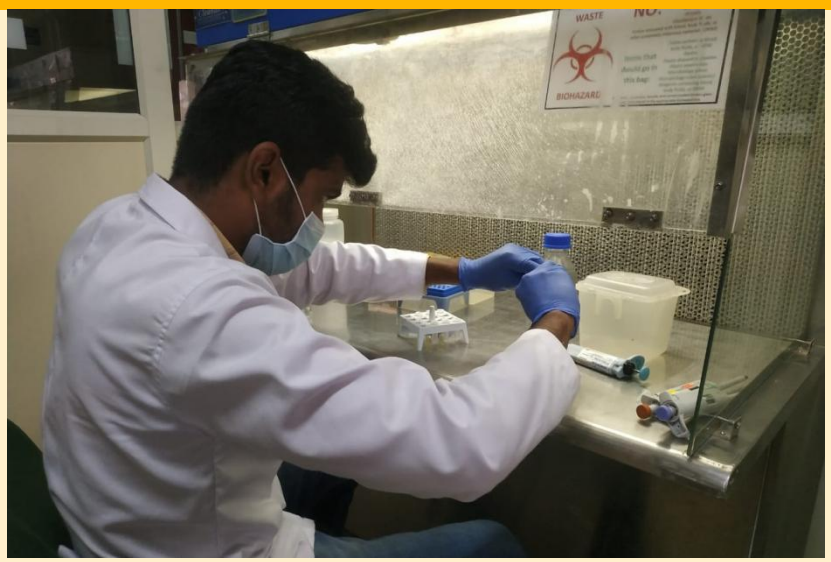
| | | |
|---|---|---|
| | • Ms. Vishakha V Kulkarni and Dr. Yoshitha Korsapati joined for their Ph.D. degree programs in the University. | |
| **3. Washington State University, USA.** | MAFSU signed a Memorandum of Understanding between MAFSU, Nagpur and Washington State University, USA to enrich the research collaboration and produce effective outcomes. | |
| **4. The University of Veterinary Medicine and Pharmacy, Kosice, Slovak Republic.** | • MAFSU signed a Memorandum of Understanding between MAFSU, Nagpur and The University of Veterinary Medicine and Pharmacy in Kosice, Slovakia for enriching their respective research and training programs and to strengthen and expand the mutual contacts.<br>• The Vice Chancellor, MAFSU conducted a joint meeting on 7th September, 2023 to discuss about the potential development of Collaborative Research program, Student/ Faculty exchange program and Twinned Degree Program.<br>• International Training on "Advanced Rapid Diagnostic Techniques for Infectious Diseases" (Hybrid Mode) Organized In collaboration with The University of Veterinary Medicine and Pharmacy in Kosice, Slovakia during 7th |  <br>Maharashtra Animal & Fishery Sciences University<br>MEMORANDUM OF UNDERSTANDING<br>between<br>MAHARASHTRA ANIMAL AND FISHERIES SCIENCES UNIVERSITY<br>Nagpur, India<br>and<br>UNIVERSITY OF VETERINARY MEDICINE AND PHARMACY IN KOSICE<br>Slovak Republic<br>WHEREAS, Maharashtra Animal and Fisheries Sciences University ("MAFSU") and University of Veterinary Medicine And Pharmacy In Kosice, Slovakia (UVMP) on behalf acknowledge their strong mutual friendship and existing collaboration; and WHEREAS, MAFSU and UVMP (each a "Party" and together the "Parties") desire to enrich their respective educational and research programs and to strengthen and expand the mutual contacts between both Parties;<br>NOW THEREFORE, in order to promote cooperation and exchange in education and research, the Parties hereby agree to the following:<br>I. Scope. The Parties will endeavor to promote the following types of collaboration:<br>A. Professional training programs;<br>B. Faculty, graduate student, and/or postgraduate scholar exchanges;<br>C. Joint research projects and educational programs;<br>D. Exchange of scientific materials, publications and information; and/or<br>E. Developing and conducting joint seminars and other academic events.<br>II. Activities under this Memorandum of Understanding. Activities taking place under this Memorandum of Understanding ("MOU") will be initiated primarily by academic units within each Party, and in coordination with their respective administrative units concerned with international activities. All activities undertaken must conform to the policies and procedures in place at each Party. Teaching beyond occasional lectures must be approved by the appropriate units within each Party.<br>*Fig.62. Signed copy of MoU.*<br>  <br>ICAR-NAHEP-CAAST<br>CENTRE OF EXCELLENCE FOR ADVANCED RESEARCH ON ANIMAL FOOD SAFETY<br>*Fig. 63. Dr. Mangesh Bhide delivering his lecture during the training program.* |

| | | |
|---|---|---|
| | September- 15th September, 2023 (9 days).<br><br>Total no. of beneficiaries: **406** | |
| **5.The Experimental Zooprophylactic Institute, Palermo, Italy.** | • MAFSU signed a Memorandum of Understanding between MAFSU, Nagpur and The Experimental Zooprophylactic Institute, Palermo, Italy for enriching their respective research and training programs and to strengthen and expand the mutual contacts.<br><br>• Dr. Vitthal Shrirang Dhaygude, Assistant Professor, Department of Veterinary Pathology, Krantisinh Nana Patil College of Veterinary Science, Shirwal Experimental and Dr. Riddhi Pankaj Naringrekar, Assistant Professor, Dept. of Veterinary Parasitology, Mumbai Veterinary College, Parel, Mumbai-400012 have completed their Faculty International Training Program at The Experimental Zooprophylactic Institute, Palermo, Italy from 5th Sept. to 5th Oct. 2023. |  <br>Istituto Zooprofilattico Sperimentale SICILIA<br>Prot.N° U/0008825/23 del 25/07/2023<br>Titolo.Classe:<br>Maharashtra Animal & Fishery Sciences Unive<br>**MEMORANDUM OF UNDERSTANDING**<br>between<br>**MAHARASHTRA ANIMAL AND FISHERIES SCIENCES UNIVERSITY**<br>Nagpur, India<br>and<br>**The ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SICILIA "A. MIRRI" with its headquarters at via Gino Marinuzzi, 3 - 90129 Palermo, and represented by its Special Commissioner, Dr. Salvatore Seminara**<br>WHEREAS, Maharashtra Animal and Fisheries Sciences University ("MAFSU") and The ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SICILIA "A. MIRRI" (UVMP) on behalf acknowledge their strong mutual friendship and existing collaboration; and WHEREAS, MAFSU and The ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLA SICILIA "A. MIRRI" (each a "Party" and together the "Parties") desire to enrich their respective educational and research programs and to strengthen and expand the mutual contacts between both Parties;<br>NOW THEREFORE, in order to promote cooperation and exchange in education and research, the Parties hereby agree to the following:<br>I. Scope. The Parties will endeavor to promote the following types of collaboration:<br>A. Professional training programs;<br>B. Faculty, graduate student, and/or postgraduate scholar exchanges;<br>C. Joint research projects and educational programs;<br>D. Exchange of scientific materials, publications and information; and/or<br>E. Developing and conducting joint seminars and other academic events.<br>II. Activities under this Memorandum of Understanding. Activities taking place under this Memorandum of Understanding ("MOU") will be initiated primarily by academic units<br>*Fig.64. Signed copy of MoU.*<br>  <br>• *Fig.65. Faculty International Program conducted at* The Experimental Zooprophylactic Institute, Palermo, Italy |

| *National MoU* | | |
|---|---|---|
| **ICAR-National Meat Research Institute (NMRI), Hyderabad.** | Hands on Training program for one week at NRC Meat, Hyderabad was organized during 22nd-28th September, 2022 for P.G. students Total no. of beneficiary -13 |  *Fig.66. P. G students training at NRC Meat, Hyderabad 2022* |
| **ICAR-Indian Veterinary Research Institute (IVRI), Izatnagar.** | Hands on training on "Antimicrobial Resistance (AMR) in Food-borne Pathogens" at ICAR-IVRI, Izatnagar, UP was conducted during 20th to 25th February 2023.<br>Total no. of beneficiary-**12**. |  *Fig.67. Faculty training at ICAR-(IVRI), Izatnagar 2023* |
| **ICAR-National Dairy Research Institute (NDRI), Karnal.** | International e-training program on "Gene Cloning: Advances and Applications in Veterinary Sciences" was carried out during 31st May, 2021 to 4th June, 2021. Total no. of beneficiary **485**. |   *Fig.68. Faculty e-training program at ICAR-(NDRI) 2021* |
| **ICAR-National Institute of Animal Nutrition and Physiology, Bengaluru.** | Hands on Training program for one week at NIANP, Bengaluru was organized during 22nd-28th September, 2022 for P.G. students Total no. of beneficiary -**10**. |  *Fig.69. P. G students training at ICAR-(NIANP), Bengaluru 2022* |

| | | |
|---|---|---|
| **ICAR-National Institute of High Security Animal Diseases, Bhopal.** | On the Occasion of World Zoonoses Day organized International Webinar on Zoonoses Aspect organized on 6th July, 2020.<br>Total number of participants : **102**. |  <br>*Fig.70. Glimpses of World Zoonoses Day-2022* |
| **ICAR-National Institute of Veterinary Epidemiology and Disease Informatics.** | One week hands-on training for students of constituent colleges of One Week National Training Program at ICAR-NIVEDI, Bengaluru from 20th -24th November, 2023.<br>Total no. of beneficiary - **15** |  <br>*Fig.71. P. G students training at ICAR-(NIVEDI), Bengaluru 2023* |
| **ICMR-National Institute of Virology, Pune.** | Faculty National Training Program on "Next Generation Sequencing" organized by ICMR-National Institute of Virology, Pune during 16th to 20th October 2023.<br>Total no. of beneficiary - **08** |  <br>*Fig.72. P. G Faculty training Program at ICMR-(NIV), Pune 2023* |

*1.5. Please provide the details on relevant collaboration with industry for bringing relevancy and improving research effectiveness in the AU in one-two paragraph.*

| *Collaborations* | *Activity/achievement/purpose* | *Remarks/Photographs* |
|---|---|---|
| **Industrial MoU<br>M/S Vista Processed Foods Pvt. Ltd, Taloja, Dist. Raigad (MS)** |  <br><br>*Fig.73.* Dr. Rohan Malkar *at Vista Processes Foods Taloja, Dist. Raigad (MS)*<br>**Risk Assessment of *Listeria* spp. in Chicken Meat production chain**<br>1. To study the occurrence of *Listeria* spp. in poultry farms and chicken production chain at different stages.<br>2. To isolate and identify *Listeria* spp. by cultural method and confirm by Real-Time PCR assay.<br>3. To study the correlation of occurrence of *Listeria monocytogens*. | |

2. Achievements made through CAAST under NAHEP

## 2.1. Output-outcome monitoring

| S. N. | Particulars | Apr'2020 to Dec'2023 | |
|---|---|---|---|
| | | Target | Achievement |
| 1. | % increase in the number of technologies commercialized | 13 | - |
| 2. | % increase in faculty research effectiveness | 25% | 100% |
| 3. | Number of direct beneficiaries of the project | - | 12,762 |
| 4. | Number of female beneficiaries | - | 4976 |
| 5. | % increase in JRF / SRF / ARS | 10 | 10%<br>JRF – 66, SRF – 04 |
| 6. | % increase in the number of students who were admitted in foreign universities | - | 5% |
| 7. | % increase in PG student placements | 10% | 90% |
| 8. | Number of industry- sponsored projects and positions in cutting-edge areas of Agri-Science | - | 03 |
| 9. | Number of faculty training programs (National) undertaken by AU | 24 | 8 |
| 10. | Number of faculty training programs (international) undertaken by AU | … | 21 (Faculty) + 3 (Short visit+<br>6 (Online/ Hybrid Training Program) |
| 11. | Number of student training programs (National) undertaken by AU | 29 | 53 |
| 12. | Number of student training programs (international) undertaken by AU | - | 05 |

**Observations**

- The existing laboratory facilities (WRRL) was upgraded with Clean Room with Biosafety Cabinet Class III and Anaerobic Work Station, Chemical Residue Testing Laboratory, Nutrition Laboratory, Molecular Laboratory, and Virtual Class Room under NAHEP-CAAST-MAFSU Project entitled Centre of Excellence for Advanced Research On Animal Food Safety.
- The centre has developed various protocols/SoPs for Microbiological analysis, Chemical residue analysis and Nutritional analysis of foods of animal origin.

- The MAFSU centre has established collaborative partnerships with National (17), and International HEIs/Universities by signing MoU (05) with Penn State University, USA; Texas Tech University, USA, Washington State University, USA, The Experimental Zooprophylactic Institute, Palermo, Italy, and Veterinary Medicine and Pharmacy in Kosice, Slovakia and Industrial MoU (2) with M/s Vista Processed Foods Pvt. Ltd., Taloja and Poultry Breeders Coordination Association (PBCA), Pune.
- Faculties and Students attended 96 national and international trainings in total.

## 2.2. Knowledge Management Collaterals

| I. Knowledge Collaterals | Apr'2020 to Mar'2023 |
|---|---|
| 1. Publications | Project Progress Reports (5) + Brochures (56) + 1 (Zoonoses Compendium) + 1 (Agri Fair Report) + SEC (1) + 1 (Calendar) |
| 2. Research Articles | 9 |
| 3. Annual Reports | 1 |
| 4. Books | - |
| 5. Success Stories | 5 |
| 6. Newsletter | 14 |
| 7. Magazines | - |
| 8. Blogs | - |
| **< Details of the Knowledge Management Collaterals with detailed list of authors, title, publication period, URL links etc., in Annexure-II>** | |

| II. Mobile and Web Applications | Apr'2020 to Dec'2023 |
|---|---|
| 1. Mobile Applications Developed | Nil |
| 2. Web Applications Developed | Nil |

| III. Number of IPR (Intellectual Property Rights) Registered/Obtained | Apr'2020 to Dec'2023 |
|---|---|
| 1. Copyrights | Nil |

| | |
|---|---|
| 2. Patents | 1. Granted patent on "Indirect -ELISA Kit for Diagnosis of Hydatidosis in Cattle" (195/MUM/2015) on 04/01/2023 to MAFSU, Mumbai Centre.<br>  |
| | 2. Granted patent on "Retail Chicken Slaughter Unit" (1842/MUM/2014) for hygienic meat production on 02/02/2023 to MAFSU, Mumbai Centre.<br>  <br>3. Granted patent for "Chondroitin Sulphate from Buffalo Cartilage" (Patent No: 437845) on 07/07/2023 to MAFSU, Mumbai Centre.<br>  |

| | |
|---|---|
| | 4. Patent applied for "Sero Diagnosis of Cysticercoses in pigs using Flow Through Assay" on 02/04/2018. |
| 3. Others | - |
| **<Details of the Knowledge Management Collaterals with List of documents, authors, publication period is attached in Annexure III>** | |

| **IV. Dissemination and Outreach** | **Apr'2020 to Dec'2023** |
|---|---|
| 1. No. of Posts on Social Media | ()Facebook Link : https://www.facebook.com/Coearafs<br>(3) Instagram Link : https://www.instagram.com/coearafs/<br>(59) YouTube Link<br>: https://youtube.com/channel/UCE8WbbUcjkDlHUTFO1xKKcA |
| 2. No. of Posts on Newspaper | 17 |
| 3. No. of Posts on Magazines | - |
| 4. No. of Unique Promotional or Outreach Collaterals | - |
| **<Please provide the details of the Knowledge Management Collaterals with List of documents, authors, publication period in Annexure- IV** | |

## 2.3. Capacity building programs to improve the research effectiveness

### 1. International trainings for students and faculties

| ***Subject areas*** | ***Host institutes, period of training*** | ***Output of the training*** |
|---|---|---|
| ***Students (05)*** | | |
| **Dr. Bhakti Keshav Zade,**<br>**M.V. Sc., Dept. of Veterinary Public Heath**<br>Cutting edge research advancements in one health. | University of Pittsburgh, 130 DeSoto St. Pittsburgh PA15261, USA<br>31st October to 28th November, 2023 | • This program improved upon or introduced fresh methods that are useful for virology-related work as well as for work pertaining to vaccines in the future. Got acquainted with the fundamental differences between cancer and normal cells which can be investigated using the animal cell culture technique. |
| **Dr. Mandakranta Bhuyan,**<br>**M.V. Sc., Dept. of Veterinary Physiology** | University of Pittsburgh, 130 DeSoto St. Pittsburgh PA15261, USA | • Helped to attain quality knowledge related to research associated to concepts of One Health. The training attended helped to learn newer research methods, exposed to new instruments and helped to build up confidence in utilizing lab resources better. |

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| Cutting edge research advancements in one health | 31st October to 30th November, 2023 | |
| **Dr. Rathod Rohit Kailasrao, M.V.Sc.**<br>**Department of Livestock Products Technology**<br>Food Safety issues on foods of animal origin | International College, Maejo University, Chiang Mai, Thailand, 50290<br>1st December - 15th December, 2023 | • Helped to attain quality knowledge related to research associated to concepts of food safety and quality assurance. The training attended helped to learn newer research methods, exposed to new instruments and helped to build up confidence in utilizing lab resources better. |
| **Dr. Sirsat Mohini Suresh, M.V.Sc.**<br>**Department of Veterinary Pathology**<br>Food Safety issues on foods of animal origin | International College, Maejo University, Chiang Mai, Thailand, 50290<br>1st December - 15th December, 2023 | • Helped to attain quality knowledge related to research associated to concepts of One Health. Working principle of gas-liquid chromatography, high-performance liquid chromatography, Mass spectrometry, texture analyzer, Atomic absorption spectrometry, GC-MS etc |
| **Dr. Piyush Pravin Kulkarni, M.V.Sc.**<br>**Department of Veterinary Public Health**<br>Food Safety issues on foods of animal origin | International College, Maejo University, Chiang Mai, Thailand, 50290<br>1st December - 15th December, 2023 | • Strengthen the knowledge related to research associated with the concept of food safety and quality assurance. Understanding of Automated approximated analyser, milk and milk production, Meat and meat product proximate analysis. |
| ***Faculties (21)*** | | |
| **Dr. S. D. Ingole, Professor, Dept. of Veterinary Physiology**<br>Application of Genomics and Bioinformatics to study metagenomes related to milk production traits of dairy cattle. | Penn State University, Pennsylvania, USA,<br>15th Feb to 25th March, 2023. | • Accustomed with the laboratory safety and hazard control and SOP for hazardous work. Laboratory waste management and its disposal was helpful while working in the laboratory.<br>• Got acquainted with chemical safety and emergency preparedness on working in the laboratory. This is an essential part of safe research.<br>• The milk miRNAs were isolated from normal, subclinical mastitis and pasteurized milk and also from boiled normal, subclinical mastitis and pasteurized milk<br>• On isolation of total RNAs from milk the reverse transcription was performed using Taqman 5x primers for milk miRNAs miR22, miR27b, miR141, miR186, and miR92a followed by preparation of PCR reaction mix with Taqman Probe 20x for normal, subclinical mastitis and pasteurized milk. |

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| | | The PCR reaction plate was prepared and run the RT-PCR.<br>• Enhanced knowledge of Flow Cytometry could be used for cell sorting and microbial analysis of milk.<br>• The training will be beneficial to develop a Genomic Laboratory to work on milk miRNAs. |
| **Dr. V. M. Vaidya, Assistant Professor, Dept. of Veterinary Public Health.**<br>Application of next generation sequencing to understand the molecular epidemiology of antimicrobial resistance in food borne pathogens. | Penn State University, Pennsylvania, USA<br>15th Feb to 25th March, 2023 | • Well acquainted with the techniques for extraction of Genomic DNA from *Salmonella, Listeria,* and *Staphylococcus hyicus* isolates for sequencing on MinION and Next Generation Alumina.<br>• Learned the use of command lines on Roar for bioinformatic tools for sequencing data analysis<br>• Acquired knowledge of identification of antimicrobial resistance genes of foodborne pathogens using Centre for Genomic Epidemiology server and Res finder for different antibiotics.<br>• The knowledge acquired will be used to upgrade the research activities of the institution and enhance the level of research done by the PG and Ph.D. students. |
| **Dr. Vivek H. Shukla, Assistant Professor, Dept. of Livestock Products Technology.**<br>Food packaging and food preservation | Penn State University, Pennsylvania, USA<br>15th Feb to 25th March, 2023 | • Edible film coatings were prepared which were applied over the different meat products and various modes of application of edible films along with their advantages and disadvantages were learned. |
| **Dr. Bhupesh Kamdi, Assistant Professor, Dept of Veterinary Pathology.**<br>Gut Microbiota in Laying Hen | Adelaide, Australia<br>15th February to 15th March, 2023 | • Got an exposure and hands on to various modern equipment's like PCR, q-PCR (Quant Studio 6 & 7 flex, Applied biosystem), Tapes station (Agilent technologies), Robotic nucleic acid extractor (Epmotion, Eppendorf), Nano-drop (Thermoscientific). |
| **Dr. Chandrashekhar Sambhaji Mote, Assistant Professor, Veterinary Pathology.**<br>Transcriptome of Salmonella Typhimurium vaccine suspended in various diluents | Adelaide, Australia<br>15th February to 15th March, 2023 | • Learned molecular data analysis at genomic levels using Transcriptome analysis and Microbiota analysis in various bacterial and viral diseases of animals and humans. |

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| **Dr. Gajanan M. Chigure, Assistant Professor, Dept. of Vet. Parasitology.**<br><br>Emerging Foodborne and Parasitic Zoonoses: One Health Concept. | Queretaro, Mexico,<br><br>19th February to 20th March, 2023 | • The International training programme would be useful for planning and execution of research projects, collaborative research projects on detection of parasites of zoonotic importance and tick-borne zoonotic pathogens in Maharashtra state. |
| **Dr. Vitthal Shrirang Dhaygude, Assistant Professor, Department of Veterinary Pathology.**<br><br>Advanced diagnostic methods for contagious agalactia and brucellosis in context to food safety and zoonosis. | Palermo, Italy (WOAH Referral Lab for contagious agalactia),<br><br>5th Sept. to 5th Oct. 2023 | • Protocols for various diagnostic techniques like Isolation of Mycoplasma spp, obtaining pure culture, ELISA, Real Time PCR, Sequencing, LAMP- PCR, histopathology, Immunohistochemistry, Serological techniques like agglutination, CFT, vaccine production etc was demonstrated and thoroughly understood. |
| **Dr. Riddhi Pankaj Naringrekar,**<br><br>**Assistant Professor,**<br><br>**Dept. of Veterinary Parasitology.**<br><br>Advances in diagnosis of Toxoplasmosis or other parasitic zoonosis. | Palermo, Italy (WOAH Referral Lab for contagious agalactia),<br><br>11th Sept. to 5th Oct. 2023 | • Various diagnostic protocols techniques like LAMP-PCR, histopathology, obtaining pure culture, ELISA, Real Time PCR, Sequencing, Immunohistochemistry, Serological techniques like agglutination, CFT, vaccine production etc was demonstrated and thoroughly understood. |
| **Dr. Mangesh Mahadeo Vaidya,**<br><br>**Assistant Professor,**<br><br>**Dept of Veterinary Physiology.**<br><br>Effect of polygain supplementation on enteric methane emissions and calf health | Melbourne, Australia,<br><br>7th Sep. to 6th October, 2023 | • Enhanced understanding of working in the field with Green Feed technology, which is a modern technology for methane emission study from the ruminant's species. |
| **Dr. Mahesh Gupta, Assistant Professor, Dept of Veterinary Physiology,**<br><br>Impact of heat stress and trace mineral | Melbourne, Australia,<br><br>7th Sep. to 6th October, 2023 | • The program enhanced the knowledge about the experiment on effect of trace mineral supplementation and heat stress in calf immunity and cattle health. |

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| supplementation on dairy cattle immune status and calf health. | | |
| **Dr. Prashant Ramchandra Suryawanshi**<br>**Assistant Professor**<br>**Dept. of Veterinary Microbiology,**<br>Antimicrobial Resistance and Rapid Identification of Food Borne Zoonotic Pathogen Through Next Generation Sequencing. | Leicestershire, UK.<br>10th Sep. to 10th Oct., 2023 | • Bacteriophages an alternative to antibiotics with detailed hands on the Growth curve of L. monocytogenes strains, Adsorption curve were learnt. |
| **Dr. Rupesh Nagesh Waghamare, Assistant Professor, Dept. of Veterinary Public Health,**<br>Phage Characterisation encompasses Food Safety owing to Phage biocontrol as a tool to reduce AMR through food-borne Pathogens | Leicestershire, UK.<br>10th Sep. to 10th Oct., 2023 | • The training provided a deeper understanding of advanced phage characterization techniques and their applications in control of food borne pathogens. |
| **Dr. Gopal Pundlikrao Bharkad,**<br>**Associate Professor,**<br>**Dept. of Veterinary Parasitology,**<br>Emerging and re-emerging diseases under One Health, techniques in detection of food borne pathogen and antimicrobial resistance | North Dakota ,USA<br>11th September to 11th October,2023 | • DNA isolation, cloning, rDNA preparation and gene expression study were carried out which will help for the planning the future research work. |
| **Dr. Sandeep Narayan Rindhe, Assistant Professor, Department of** | Seoul, Republic of Korea, 18th September to 17th October, 2023 | • Learned about how to prepare the Carbon Quantum Dot and Sulfur Quantum Dots and their incorporation in biodegradable films for food packaging application. |

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| **Livestock Products Technology,**<br><br>Advanced Food Packing Technology | | |
| **Dr. Kishor Sheshrao Rathod**<br><br>**Assistant Professor, Dept of Livestock Products Technology,**<br><br>Food Safety, Bio-processing and Preservation | Pathumthani, 12120, Thailand,<br><br>18th September to 17th October, 2023 | • Detail understanding of digitally controlled Green House system, Recent innovations in invitro food/feed testing methods, Ongoing Research work related to Application of stem cell in Artificial meat synthesis. |
| **Dr. Shital Mahesh, Jawale, Assistant Professor, Dept of Animal Nutrition,**<br><br>"Nutritional Immunology in Monogastric Animals" (Nutritional Immunology, Next Generation Sequencing & other biotechnological tools) | Florida, USA,<br><br>18th September to 17th October 2023 | • The program enhanced knowledge about the immunopathogenesis of chemical induced colitis in mice model and recent molecular technique like real-Time PCR, next generation sequencing for metagenomic analysis of microbiota using free software, Easy Map. |
| **Dr. Megha Purushottamrao Kaore, Assistant Professor, Dept of Veterinary Pathology,**<br><br>**Pathophysiological changes and its prevention by gut-associated protein**<br><br>(Next generation sequencing and other biotechnological tools) | Florida, USA,<br><br>22nd September to 17th October 202 | • Basic procedure of handling of flow cytometry was learned. Interpretation of data generated from different panels of fluorochrome in nutritional immunology, and cancer immunotherapy and treatment evaluation of given microbiota was learned. |
| **Dr. Sameer Niwas Jadhav**<br><br>**Assistant Professor** | Pathumthani, Thailand, 18th September to 17th October, 2023 | • To learn about the facility of Invitro gut simulator viz stomach small intestine large intestine designed for Invitro food Research and to understand |

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|---|---|---|
| **Department of Veterinary Biochemistry,**<br>**Probiotics and Postbiotics**<br>as alternate for Biotherapeutics in Livestock Production" | | Automated proximate analyzer, Invitro digestibility testing method |
| **Dr Jagdish Ganpat Gudewar,**<br>**Assistant Professor,**<br>**Dept. of Veterinary Parasitology** | Oklahoma, United States. 25th September to 24th October, 2023 | • Learned good laboratory practices and enhanced knowledge about biosecurity measures to be adopted while following laboratory procedures.<br>• Learned modern teaching methodologies for UG teaching.<br>• Learned Western blotting, ELISA technique, Molecular cloning, colony PCR. |
| **Dr. Rajesh R. Pharande,**<br>**Assistant Professor,**<br>**Dept. of Veterinary Microbiology,**<br>Application of Genomics and Bioinformatics for Studying Food borne Pathogens | Texas, USA,<br>16th October, 2023 to 10th November 2023 | • Handling and sample preparation for MALDI-TOF were learned to identify food-borne pathogens. NGS data handling and analysis of the quality of NGS data were learned. Various software used for NGS data were known along with their advantage and disadvantage Knowledge about the handling of equipment for LFA was learned. Preparation of LFA strips and learn about key components of LFA Application of LFA in the detection of food-borne pathogens. |
| **Dr. S. V. Bharucha,**<br>**Assistant Professor,**<br>**Dept. of Veterinary Physiology,** | Texas, USA,<br>16th October, 2023 to 10th November 2023 | • Bloodborne Pathogen Training was created for those who are occupationally exposed to human / animal biological materials for protecting the safety and health of researchers at risk of exposure to bloodborne diseases. |
| ***<The list of beneficiaries along with additional International Level training details is provided in Annexure-V >*** | | |

**2. National Training for students and faculties**

| *Subject areas* | *Host institutes, period of training* | *Output of the training* |
|---|---|---|
| **Students** | *Details provided in Annexure VI* | |
| **Faculty** | | |

## 2.4. Input and activity monitoring

| | Capital | Revenue |
|---|---|---|
| Total funds sanctioned during 2020-2023 by PIU (INR Lakhs) | 640.50 | 1164.50 |
| Total funds received till December 31, 2023 (Cumulative) (INR Lakhs) | 640.50 | 1077.56 |
| Total expenditure up to December 31, 2023 (INR Lakhs) | **640.35** | **1058.53** |

| Input / Activity indicator | Sub- head / category | Apr'2020 to Dec'2023 Expenditure / input in INR lakhs | | Activity elaboration |
|---|---|---|---|---|
| | | Utilization | Planned | |
| **Goods and equipment** | | | | |
| | **Equipment, Plant & Machinery** | **2,61,83,175.00** | **2,65,00,000.00** | Integrated Clean room with Biosafety Cabinet Class III and Anaerobic workstation (Air shower, negative pressure lab, dynamic pass box, ducting facility, etc.), Ultrapure water purification system with accessories (8 Lit/hr), ICPMS with accessories (with high sensitivity simultaneous multi-element analysis, wide dynamic range, isotope comparison), Microwave digester with accessories (minimum 12 vessel capacity), GC-ECD/FID, Texture analyser with accessories (with multiple – cylindrical, conical and radiused cylinder probes). |
| | **Office equipment** | **13,29,688.00** | **14,00,000.00** | Air conditioner (split -2, cassette- 4 of two tons capacity each), Regular Photocopier (Heavy duty), Interactive Smart board, Digital kiosk machine (slanted, touch screen), Access control and security system (CCTV camera-8 with peripherals and biometry entry). |

| Input / Activity indicator | Sub- head / category | Apr'2020 to Dec'2023 Expenditure / input in INR lakhs | | Activity elaboration |
|---|---|---|---|---|
| | | Utilization | Planned | |
| | **Laboratory equipment** | **2,98,10,690.00** | **2,88,50,000.00** | LC-MS MS-QQQ with accessories, Real-time PCR machine with accessories, Dark Field Microscope with accessories, Kel plus analyzer with accessories, Socs plus-solvent extraction, Fibra plus with accessories , Fluorescent Microscope with accessories , Vitek machine with accessories, Analytical balance with 05 decimal – 1, Refrigerator (2 double door refrigerators, 1 deep freezer of -20˚C), Fume Hood. |
| | **Furniture & fixtures** | **10,44,716.00** | **11,00,000.00** | Table with microphone system and accessories, revolving chairs, Modular Furniture for Lab equipment (Tables for keeping lab equipment). |
| | **Computers and Peripherals** | **27,46,496.00** | **30,00,000.00** | Virtual class room for trainees (n=30) [Server, web cam, monitor, software, smart board, recording system and other accessories], Laptop with accessories, Printers with accessories. |
| | **Books and Journals** | **1,97,608.00** | **2,00,000.00** | Purchase of project related books (Food safety, zoonoses, antimicrobial residue, analytical techniques) |
| **Civil works** | Minor repair and renovation work | **29,93,174.00** | **30,00,000.00** | Repair & Renovation /refurbishing/ modification of existing laboratory |
| **Human capacity building** | National level training | **47,26,457.00** | **22,00,000.00** | 60 National Trainings were conducted which include 18 offline trainings, 28 online trainings and 08 and 06 onsite trainings for |

| Input / Activity indicator | Sub- head / category | Apr'2020 to Dec'2023 Expenditure / input in INR lakhs | | Activity elaboration |
|---|---|---|---|---|
| | | Utilization | Planned | |
| | | | | faculties and students respectively. |
| | International level training | **89,46,025.00** | **1,00,00,000.00** | 25 international trainings were conducted which includes 4 online, 21 onsite programs for the faculties. |
| | Short visit/ seminars | **21,74,721.00** | **15,00,000.00** | **Dr. S.V. Upadhye**, DI & Dean, Faculty of Veterinary Science, **Dr. N. V. Kurkure**, Director of Research and **Dr. R.J. Zende**, PI NAHEP-CAAST visited and successfully signed MoU with Penn State and Texas Tech University, USA during 2nd to 14th Feb, 2023.<br><br>2 International Trainings (Hybrid Mode) by visiting faculties from Foreign Institute and Dr. R.S. Gandge attended International Conference at Boston, USA from 19th – 22nd September, 2023. |
| | Meetings and workshops | **11,98,175.00** | **10,00,000.00** | The amount was utilized to meet the expenditure during meetings and workshops. |
| **Consultancy** | National level consultancies | **-** | **10.00** | |
| **Recurrent cost / Miscellaneous** | Travel | **14,98,376.00** | **15,00,000.00** | The expenditure was incurred on training /conference for students, meeting of staff for collaboration with national partners etc. |
| | Contractual services | **1,83,83,062.00** | **2,80,00,000.00** | Salary of contractual staff, skilled personnel, |

| Input / Activity indicator | Sub- head / category | Apr'2020 to Dec'2023 Expenditure / input in INR lakhs | | Activity elaboration |
|---|---|---|---|---|
| | | Utilization | Planned | |
| | | | | were incurred from this head. |
| | Operational costs | **6,36,08,182.00** | **6,50,00,000.00** | Expenditure on operating laboratories, purchase of spare parts etc. was done through this head. Expenditure for International Training to students (5 students) was incurred. |
| | Institutional charges | **53,18,356.00** | **62,50,000.00** | |
| **Total** | | **16,98,88,901.00** | **1805.00** | |
| **Observations** | | | | |
| **The funds has been effectively utilized released for the purpose for which it has been sanctioned under the sub heads *viz*. Capital and Revenue.** | | | | |

## 2.5. NAHEP outreach and other unique initiatives undertaken

### a) Case studies/success stories developed under NAHEP

| • Illustrative: Success stories | • |
|---|---|
| **Dr. Badhe Shekhar R.**<br>Ph.D. in Service student, Department of Livestock Products Technology, Nagpur Veterinary College, Nagpur. | • Dr. Badhe Shekhar R., in Service Ph.D. student, Department of Livestock Products Technology, Nagpur Veterinary College has completed his experimental research work on "Development of Smart Packaging Indicator for Real Time Monitoring Freshness of Paneer" with financial assistance from NAHEP project. He developed indicator solution for monitoring the quality of paneer and optimised the level of chemicals for the preparation of indicator solution. The level of different indicator chemicals standardized using alone or in combination to developed a chromogenic dye that give colour change on reaction with metabolites released from stored Paneer. He also filed the patent of his research work (Patent Application No. 202221030430). |
| **Livestock Products Technology** | • Four Technologies developed for extension of shelf-life of chicken sausages and chicken patties as a natural method of preservation i.e. Edible film of starch and chitosan incorporated with red cabbage extract and beet root extract. Edible coating of nanoparticles of chitosan and oregano essential oil for enhancement of quality and shelf life of chicken patties. Also, Edible coating of nanoparticles of chitosan and cinnamon essential oil for improvement of quality and shelf life of chicken patties. These technologies are ready to transfer for different stakeholders of packaging industries for commercial purpose. |
|  <br>**Dr. R. J. Zende** | • Appointed as Technical Consultant/ Expert by World Health Organization for Food Safety<br>• Appointed as an International Higher Education Expert to participate in QS Global Academic Survey, 2022 for QS World University Ranking by Penn State Global, USA.<br>• Received Dr. A.T. Sherikar Outstanding Public Health Veterinarian Award -2022 and Dr. P.D. Deshpande Best Research Paper on Epidemiology Award. |

| | |
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|  <br>**Dr. Shailesh Ingole** | • Honored with Fellow of the Scholars Academic and Scientific Society (FSASS), India<br>• MAFSU Best Research Publication Award for the year 2021. |
|  <br>**Dr. Vilas M. Vaidya** | •<br>• Received Indo Asian Best Teacher Award 2021 and MAFSU Best Researcher Award-2022.<br>• Dr. P. D. Deshpande Best Research Paper on Epidemiology Award |

| | |
|---|---|
| **Enhanced Student Learning Outcomes under NAHEP Facilities** | **1. National Trainings**<br><br>73 students from MAFSU and its constituent colleges attended National Level Hands-on training at various reputed National Research Institutes availing the benefits of the centre by learning novel techniques.<br><br>At National Research Centre on Meat, Hyderabad, the students learnt various techniques of Bioinformatics and Omics technology used and their scope in the near future, topics/techniques which were taught to the students such as Food Safety Management System (FSMS), Food fraud and authenticity across global food supply chain-a proteomic insight, Hands on training on Construction of lateral flow assays strips, Lecture on DNA bar-Coding for food authentication, etc.<br><br>At NIANP, Bengaluru, students had the hands on training on Processing of samples, hands on training on Spermatogonial stem cell Isolation, purification, culture and preservation Evaluation of sperm kinetmatics and functional assay, isolation and quantification of nucleic acid and protein from bovine spermatozoa, In vitro gas production technique SF6 Tracer technique for enteric methane quantification, Xylan extraction for production of nutraceuticals and HPLC analysis of nutraceutical, Production of azolla, grain sprouts and silage for livestock and hydroponics, Demonstration of climate change facility and data recording, integration and interpretation. |

| | |
|---|---|
| | At NIVEDI, students got an opportunity to learn molecular techniques such as PCR- Uniplex, Multiplex PCR, RT-PCR, Different Epidemiological Information System such as Q-GIS – Q Geographical Information System Software for Epidemiological Aspect, Epi – Info App for Data analysis, etc. in a hands – on method.<br><br>The level of exposure to various recent trends in research alongwith the knowledge about the principles and workings of latest machinery and equipments help the students with upgrading their skills. This also ensures higher job and education opportunities. |
| | **2. International Trainings** –<br><br>The International Training Program helped students to attain quality knowledge related to research associated to the concepts of One Health. It also helped them in getting acquainted with the novel research being conducted outside the country and the subsequent progress achieved through the project. Further, the students received quality training on high-tech machines and an overall idea of the laboratory working patterns at the international level in countries like the USA, Slovakia, Thailand, etc. |

- **Knowledge management and outreach initiatives (development of collaterals, newsletter, social media outreach activities, creation of website, experiential learning workshop, exposure visits,**
- **(provide the details of the documents/articles/reports/modules/social media outreach/ website creation/experiential learning workshop/exposure visits etc. developed under NAHEP along with the suitable photograph of the cover-page and web-link (if available) – brief summary, cover page,**

| • Sr. No | • Category of the collateral | • Brief summary | • Snapshot/cover page | • Weblink (if any) |
|---|---|---|---|---|
| 1 | • Website development | • Website for broadcasting the project-related activities is developed. | • Snapshot included in attached folder | • https://nahepmvcmafsu.edu.in |

b) **Unique initiatives undertaken**

**1. Digital infrastructure**

(development of digital/smart classroom, virtual reality facility, digital library system, other digital education and administrative infrastructure, Agri Diksha, AMS implementation etc.)

- **Established a digital classroom cum conference room for conducting online lectures, project presentations and for scheduling meetings using Cisco Webex platforms.**

**2. Digital initiatives:**

(Organizing trainings through online, conducting online examinations, administering attendance, developing of web applications, e-learning modules etc.

| Sr.No. | Category of the collateral | Digital initiative | Practice before introduction of the initiative | Practice after introduction of the initiative |
|---|---|---|---|---|
| 1 | Organized online national & International trainings (61) | Online using Cisco Webex | Offline / on-site trainings were conducted | Using online platform, we got national and international responses from a huge number of participants |
| 2 | Conducted online examinations (Viva) | Online using Cisco Webex | NA | online viva exams were held |
| 3 | Developed project website | Using HTML, CSS, Javascript | Broadcasting of project related events and information | Broadcasting of project related events and information |
| 4 | Established a virtual classroom | NA | Each meeting required one of the representatives to present the data in front of a committee at some defined location | Using this facility, most of the faculties can attend such meetings and covey most of the relevant information by saving time & money which can now be utilized in other productive works |

3. Potential impact of the intervention:

**Observations**

**Teaching-**

Under the NAHEP CAAST MAFSU Project, various National and International training programs were conducted in order to develop teaching skills of university faculties by inviting subject experts across the country. A total of 21 faculties were trained overseas in the HEIs/ Universities in food safety areas to enhance their knowledge and nurture the PG and Ph.D. students.

**Research-**

The project has been implemented from 2020-2023, through MAFSU Mumbai center, in seven constituent colleges of MAFSU. Under this project Western Region Refer Laboratory for Meat and Meat Products Quality Standards" is upgraded to "Centre of Excellence for Advanced Research on Animal Food Safety" to carry out quality research work in animal origin foods. After implementation of NAHEP-CAAST MAFSU project, the existing facilities has been upgraded to the state of art facilities having all the sophisticated equipment's which now is been utilised by P.G. and Ph.D. students from constituent colleges of MAFSU for successful completion of their research. Further, the developed facility and infrastructure is kept open for all the students and faculties from different colleges of the country for conducting collaborative students and industry research in the future. Also, the equipments are used for providing hands on training on different aspect of food safety issues and animal origin food.

The centre has developed four protocols/SoPs for detection and quantification of pesticides, antibiotic residues and developed six protocols/SoPs for detection and quantification of heavy metals in animal origin foods and Standardized Real Time PCR assay for detection of food borne pathogen in chicken and environmental samples. Four Technologies were developed for improvement of quality and extension of shelf-life of chicken sausages and chicken patties.

**Extension-** The developed facilities helps in enhancing knowledge about advanced technologies to students which help in publishing research articles in high impact journals**.**

The language laboratory developed under NAHEP helped to learn foreign languages and improve their English speaking and enhanced vocabulary which encourage student to appear competitive exams for enrolment in overseas Universities. Further, under Capacity Building Programs, Faculties and Students attended 96 national and international trainings in total.

Hon'ble Shri Ajit Pawar, Deputy Chief Minister, Govt. of Maharashtra, in the presence of Hon'ble Shri Sunil Kedar, Minister of Animal Husbandry, Dairy Development, Govt. of Maharashtra, Hon'ble Shri. Dattatray Bharane, State Minister of Animal Husbandry, Dairy

Development and Fisheries, Govt. of Maharashtra, Hon'ble Dr. Prabhat Kumar, National Coordinator, ICAR-NAHEP-CAAST, New Delhi inaugurated the **Centre of Excellence for Advanced Research on Animal food Safety** established under NAHEP-CAAST on 16th February, 2022. During this program Dr. Prabhat Kumar pointed out that MAFSU centre has developed facility which is helpful to meet the demand for testing of animal origin food products and further helps to provide safe food for human consumption and therefore Dr Prabhat Kumar Ji requested Hon'ble Shri Ajit Pawar, Deputy Chief Minister, Govt. of Maharashtra to provide more funds for the development of this very old Veterinary Institute for creating more infrastructure. Thus, Hon'ble Shri Ajit Pawar, Deputy Chief Minister, Govt. of Maharashtra sanctioned Rs. 100 Crore funds to the Mumbai Veterinary College, Parel, Mumbai.

4. **Challenges faced and lessons learned while implementing the project at AU:**

| **Challenges** | |
|---|---|
| 1 | The lockdown period was totally unexpected and the center could not conduct technical activities as per the schedule. International training and offline training are not conducted as per the schedule (communicated to NAHEP). |
| 2 | Due to COVID-19 'no movement during lockdown and restricted movement during phased unlock period by people and goods, the planned activities of procurement, civil work training, visits travel, etc. could not be carried out. Hence, there has been low rate of utilization of funds under these heads in the initial period. |
| 3 | Purchase of imported equipment were also delayed due to the pandemic situation. |
| | |
| **Lessons learned** | |
| 1 | Due to social distancing measures in place, most of the capacity-building programs were conducted through virtual mode. For strengthening the digital infrastructure, have made significant efforts such as the development of online training, webinar, workshop examination platform, virtual learning platforms. |
| 2. | It was observed how the involvement of people from Multidisciplinary background results in better research effectiveness for the University. The strong support and assistance provided by the ICAR through the NAHEP CAAST Project has tremendously elevated the research efficiency and provided the ability and infrastructure to delve deep into the critical areas of research in Advanced Food Safety in Foods of Animal Origin. |

# 4. Sustainability Plan

## 4.1. Sustainability plan of the AU

- *Does the AU have any sustainability plan for to make AU future ready and globally recognized? (Yes / No)*
- *If yes, details thereof?*

| | |
|---|---|
| 1 | Testing of samples and Revenue generation |
| 2 | Organization of Capacity Building Training Program |
| 3 | Extramural Research grants from different National and International Agency |
| 4 | Development and Sale of value-added products |
| 5 | Development of Diploma Courses (Six months/one year) |
| 6. | The University will also seek Financial Assistance from the various other Governmental Agencies. |

## 4.2. Sustainability plan for improving internal revenue generation through facilities and infrastructure created under the project

| | |
|---|---|
| 1 | Sample testing facility for antibiotic and pesticide residue analysis in animal origin food by LC-MSMS |
| 2 | Commercial Sample testing of heavy metal residues in animal origin food by ICP-MS |
| 3 | AU is to initiate the microbial testing of animal origin food and water using integrated clean room developed under NAHEP-CAAST |

5. Contribution of each individual in project

## 5.1. Name of Vice Chancellors(s) during project duration and contributions each PI, Co-PI and team along with their photographs

| Name | Gender | Designation in AU and contact details (email, mobile) | Role in project (PI/Co-PI/RA/SRF etc.) | Major contribution/output |
|---|---|---|---|---|
|  <br>*Col. (Dr.) Prof. A. M. Paturkar* | Male | **Vice-Chancellor**<br>Maharashtra Animal and Fishery Sciences University, Futala Lake Road, Telangkhedi, Nagpur- 440 001<br>0712-2511784,0712-2511785,0712-2511273<br>pshvcmafsu@gmail.com | Project Implementing Officer | Overall monitoring of activities at University Level. |
|  <br>**Dr. Sharad. R. Gadakh**<br>Feb, 2023 to August, 2023 | Male | **Vice-Chancellor**<br>Maharashtra Animal and Fishery Sciences University, Futala Lake Road, Telangkhedi, Nagpur- 440 001<br>0712-2511784,0712-2511785,0712-2511273<br>pshvcmafsu@gmail.com | Mentor | |
|  <br>**Dr. Niteen V. Patil**<br>August, 2023 – till date | Male | **Vice-Chancellor**<br>Maharashtra Animal and Fishery Sciences University, Futala Lake Road, Telangkhedi, Nagpur- 440 001<br>0712-2511784,0712-2511785,0712-2511273<br>pshvcmafsu@gmail.com | | |
|  <br>**Dr. S. V. Upadhye** | Male | DI & Dean, (Faculty of Vety. Sci.) MAFSU, Nagpur-440001.<br><br>deanvet@mafsu.in | Monitoring Authority | Monitoring individual activities under the Program. |

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|  **Dr. N. V. Kurkure** | Male | Director of Research, MAFSU, Nagpur-440001<br><br>dr@mafsu.in | Monitoring Authority | Implementation and Monitoring of Project Activities at College Level |
|  **Dr. A. S. Ranade** 2020-Jan 2023 | Male | Associate Dean & Project Implementing Officer, Mumbai Veterinary College, Mumbai-400012 | Project Implementing Officer | |
|  **Dr. Sarita U. Gulavane** 2020-Jan 2023 | Female | Associate Dean & Project Implementing Officer, Mumbai Veterinary College, Mumbai-400012<br><br>admvc@mafsu.in | Project Implementing Officer | |
|  **Dr. R. J. Zende** | Male | Professor & Head<br>Principal Investigator, NAHEP-CAAST,<br>Mumbai Veterinary College, Mumbai-400012<br>ravindrazende@gmail.com<br>ravindrazende@mafsu.in | Principal Investigator | • Effective implementation of the project activities<br>• Development of collaborative partnership with national & international institutes, government agencies, and food processing industries to address various food safety issues. |

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|  <br>**Dr. S.D. Ingole** | Male | Professor and Co-PI<br><br>Mumbai Veterinary College, Mumbai-400012<br><br>ingoleshailesh@gmail.com | Co-PI | • Nodal Officer, International Training Programme<br>• Nodal Officer, ESP<br>• Chairman of Purchase Committee<br>• Purchase of items under ESP |
|  <br>**Dr. R.V. Gaikwad** | Male | Professor & Co-PI,<br>Dept. of Veterinary Clinical Medicine<br>Mumbai Veterinary College, Mumbai-400012 | Co-PI | • Nodal Officer, EAP |
|  <br>**Dr. V.M. Vaidya** | Male | Associate Professor & Co-PI, Procurement, Nodal Officer<br>Dept. of Veterinary Public Health. Mumbai Veterinary College, Mumbai-400012.<br>vilasmvaidya@gmail.com | Co-PI | • Procurement Officer |
|  <br>**Dr. V. H. Shukla** | Male | Assistant Professor & Co-PI Incharge, Dept. of Member LPT, Mumbai Veterinary College, Mumbai-400012<br>drvivekivri@gmail.com | Co-PI | • Nodal Officer for National Level training under Capacity Building Activities. |
|  <br>**Dr. B. N. Ramteke** | Male | Professor & Co-PI<br>Dept. of Animal Nutrition<br>Mumbai Veterinary College, Mumbai-400012 | Co-PI | • Member of Recruitment Committee. |

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|  **Dr. (Mrs.) R. S. Gandge** | Female | Professor, Co-PI<br>Dept. of Veterinary Microbiology Mumbai Veterinary College, Mumbai-400012 | Co-PI | • Member of Recruitment Committee. |
|  **Dr. G.P. Bharkad** | Male | Associate Professor, & Co-PI<br>Dept. of Veterinary Parasitology, Mumbai Veterinary College, Mumbai-400012 | Co-PI | • Nodal Officer, Grievance Redressal Mechanism, Mumbai Veterinary College, NAHEP activities. |
|  **Dr. P. V. Meshram** | Male | Assistant Professor & Co-PI<br>Dept. of Veterinary Pathology, Mumbai Veterinary College, Mumbai-400012 | Co-PI | • Procurement Committee Member |
|  **Dr. Sonal Ingle** | Female | Assistant Professor, Co-PI,<br>Dept. of Animal Biotechnology. NVC , Nagpur-440001 | Co-PI | • Recruitment committee member |
|  **Dr. Netra B. Aswar**<br>Oct, 2020 - Feb, 2022 | Female | drnetraaswar@gmail.com | RA | • Microbiological and molecular analysis of food samples for detection of pathogens.<br>• Any other work assigned by the PI/Co-PI. |

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|  <br>**Dr. Prayagraj M Fandilolu**<br>Mar, 2021- Dec, 2021 | Male | fprayagraj@gmail.com | RA | • Chemical and Microbiological, molecular analysis of food samples for detection of pathogens.<br>• Preparation of reports. |
|  <br>**Dr. Anu Anupma**<br>July, 2021 to December, 2023 | Female | anu.02june@gmail.com | RA | • Microbiological and molecular analysis of food samples for detection of pathogens.<br>• Preparation and maintenance of laboratories documents.<br>• Any other work assigned by the PI/Co-PI. |
|  <br>**Dr. Vishal V. Chandanshive**<br>July, 2021 to December, 2023 | Male | vishal96637@gmail.com | RA | • Chemical analysis of pesticides, antibiotics, heavy metals, etc from meat, eggs, fish and other food samples on GC, GCMS, HPLC, LCMS-MS etc. |
|  <br>**Dr. Snehalata P. Kamble**<br>July, 2021 to December, 2023 | Female | snehhh667@gmail.com | RA | • Chemical analysis of pesticides, antibiotics, heavy metals, etc from meat, eggs, fish and other food samples on GC, GCMS, HPLC, LCMS-MS etc. |

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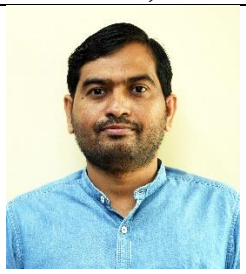
|  **Dr. Smita S. Ghule** April, 2022 to December, 2023 | Female | biosmitas@gmail.com | RA | • Chemical analysis of pesticides, antibiotics, heavy metals, etc from meat, eggs, fish and other food samples on GC, GCMS, HPLC, LC/MS-MS etc. |
|  **Dr. Rajpal S. Khilare** Oct, 2022 – December, 2023 | Male | rajpalkhillare10@gmail.com | RA | • Microbiological and molecular analysis of food samples for detection of pathogens. |
|  **Dr. Prerna R.Shelke** Oct, 2020 - Feb,2022 | Female | preranashelke17@gmail.com | SRF | • Microbiological and molecular analysis of animal origin food samples for detection of pathogens<br>• Assistance to RA |
|  **Dr. Pooja A Jangale** March, 2020-Feb,2022 | Female | poojajangale1995@gmail.com | SRF | • Microbiological and molecular analysis of animal origin food samples for detection of pathogens<br>• Assistance to RA |
|  **Dr. Muskan Kaushal** July, 2021 – April, 2022 | Female | muskankaushal@gmail.com | SRF | • Molecular analysis of animal origin food samples for detection of pathogens, report preparation<br>• Assistance to RA |

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|  **Dr. Sumedha S. Bobade** Dec, 2022 – December, 2023 | Female | sumedha_bobade@rediffmail.com | SRF | • Molecular analysis of animal origin food samples for detection of pathogens<br>• Assistance to RA |
|  **Dr. Nidhi S. Panicker** May 2023 – Dec, 2023 | Female | nidhivph@gmail.com | SRF | • Microbiological and molecular analysis of animal origin food samples for detection of pathogens<br>• Assistance to RA |
|  **Dr. K. L. Yoshitha** May 2023 – Dec, 2023 | Female | kyoshitha@gmail.com | SRF | • Molecular analysis of animal origin food samples<br>• Any other work assigned by the PI/Co-PI/ RA. |
|  **Ms. Nikita Singh** Dec,2020- July, 2021 | Female | nikitasinghi1993@gmail.com | YP-II | • Microbial analysis of meat, egg, fish & other food samples.<br>• Assistance to SRF/ RA |
|  **Ms. Vishakha V Kulkarni** Oct, 2020-Jan, 2022 | Female | vishu199822@gmail.com | YP-I | •Analysis of meat, egg, fish & other food samples for nutritional analysis.<br>• Assistance to SRF/RA and any other work assigned by PI, Co-PI etc. |
|  **Mr. Rohan R Pawar** Mar, 2021- Feb,2022 | Male | rohanpawar688@yahoo.com | YP-I | • Nutritional analysis of meat, egg, fish & other food samples.<br>• Assistance to SRF/RA |

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|  **Mrs. Pritam P. Patil** Dec. 2021 to December, 2023 | Female | patil.pritam2010@gmail.com | YP-II | • Nutritional analysis of meat, egg, fish & other food samples.<br>• Assistance to SRF/ RA and any other work assigned by PI, Co-PI etc. |
|  **Ms. Modha Hetavi.** Dec, 2021 to November, 2022 | Female | hetavim2007@gmail.com | YP-II | • Microbiological analysis of meat, egg, fish & other food samples for detection of pathogens.<br>• Assistance to SRF and RA |
|  **Ms. Anuksha P. Ghadge** Oct 2022- till date | Female | anuksha052000ghadge@gmail.com | YP-II | • Chemical residue analysis of meat, egg, fish & other food samples for detection of heavy metal and antibiotics residues<br>• Assistance to SRF/RA |
|  **Ms. Samiksha S. Pednekar** Jan 2023- till date | Female | samipednekar99@gmail.com | YP-II | • Chemical residue analysis of meat, egg, fish & other food samples for detection of chemical & antibiotic residues<br>• Assistance to SRF/RA |
| **Mr. Abrar Mohd. Farooq. Momaya** April, 2022 – Oct, 2022 | Male | 832momaya@gmail.com | YP-I | • Microbiological analysis of meat, egg, fish, milk & other food samples.<br>• Record keeping related to sample and equipment's<br>• Assistance to SRF/RA |

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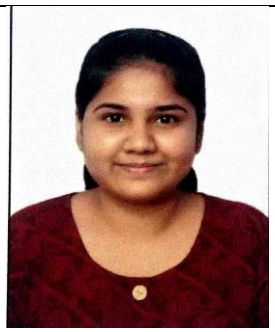
|  <br>**Mr. Akshay Shamrao Kolekar** | Male | akkikolekar42@gmail.com | YP-I | • Nutritional analysis. of meat, egg, fish, milk & other food samples.<br>• Assistance to SRF/RA |
|  <br>**Ms. Pranali S. Sawant**<br>Jan 2023 – December 2023 | Female | pranalisawant0011@gmail.com | YP-I | •Microbiological analysis of meat, egg, fish, milk & other food samples<br>•Record keeping related to sample and equipment's<br>•Assistance to SRF/RA |
|  <br>**Ms. Vaibhavi S. Koli**<br>Jan 2023 – December 2023 | Female | | YP-I | • Nutritional analysis of Meat, egg, fish, milk & other food samples for Microbiological analysis.<br>•Assistance to SRF/RA and any other work assigned by PI, Co-PI etc. |
|  <br>**Ms. Ashwini V Khandekar**<br>Dec, 2020 – Dec,2023 | Female | ashwinikhandekar016@gmail.com | PA-Computer | • Monitoring of computer system.<br>• Maintenance of virtual classroom<br>• Preparation and designing of trainings brochures<br>• Updating NAHEP CAAST-MAFSU project information on NAHEP CAAST-MAFSU Website and social media platform. |

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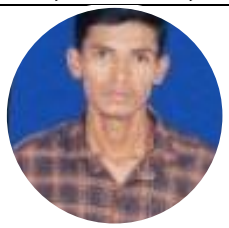
|  <br>**Ms. Priyanka Das**<br>March, 2021-Jan 2023 | Female | pbdas2266@gmail.com | PA-Accounts & Finance | • Day to day maintenance of financial record.<br>• Maintain project finance related documents. |
|  <br>**Mr. Suraj D Lanjekar**<br>March, 2021-Feb,2022 | Male | surajlanjekar007@gmail.com | PA- Personal | • Maintain departmental files and records.<br>• Processing of TA bills.<br>Any other work assigned by PI, Co-PI etc |
|  <br>**Ms. Rupali R. Ghanate**<br>June, 2022 – Dec, 2023. | Female | rupalighanate38704@gmail.com | PA- Laboratory | • Maintain departmental files and records.<br>• Any other work assigned by PI, Co-PI etc. |
|  <br>**Mr. Surajvanshi kumar Suvarna**<br>March, 2021- Feb,2022 | Male | surajvanshikumar16@gmail.coms | PA- Laboratory | • Preparation of chemicals and reagents, autoclaving of instruments/ glassware's, etc. before or during analysis of sample as per the requirement. |
|  <br>**Mr. Sahil M Hake**<br>March, 2021-Feb,2022 | Male | sahilhake010299@gmail.com | Skilled Personnel | • Preparation of chemicals and reagents<br>• Documentation of laboratories work<br>• Assistance to YP-II |
|  <br>**Mrs. Bhagyashree Dhamankar**<br>August,2022- December 2023 | Female | bvanmali23@gmail.com | Skilled Personnel | • Preparation of chemicals and reagents<br>• Documentation of laboratories work<br>• Assistance to YP-II |

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|  **Mr. Tapesh Dhopte** March, 2021- Feb,2022 | Male | - | Unskilled Personnel | Washing, sterilization and preparation of glassware. Cleaning and maintenance of Laboratories |
|  **Mr. Satyajit S. Musale** January, 2021-Feb,2022 | Male | satyajit.musale@gmail.com | Unskilled Personnel | Washing, sterilization and preparation of glassware. Cleaning and maintenance of Laboratories |
| **Mr. Raj Mahesh Khandare** Dec, 2021 – August 2022 | Male | - | Unskilled Personnel | Washing, sterilization and preparation of glassware. Cleaning and maintenance of Laboratories |
|  **Mr. Roshan R. Bait** Dec, 2022 – December 2023 | Male | baitroshan4@gmail.com | Unskilled Personnel | Washing, sterilization and preparation of glassware. Cleaning and maintenance of Laboratories |
|  **Mr. Vikas V. Birje** Dec, 2022- December 2023 | Male | vikasbirje14@gmail.com | Unskilled Personnel | Washing, sterilization and preparation of glassware. Cleaning and maintenance of Laboratories |

## 5.2. Details of visits of PIU-NAHEP officials at your AU along with photographs

1. "Centre of Excellence for Advanced Research on Animal Food Safety" Inaugurated at the hands of Hon'ble Shri Ajit Pawar, Deputy Chief Minister, Govt. of Maharashtra, Hon'ble Shri Sunil Kedar, Minister of Animal Husbandry, Dairy Development, Govt. of Maharashtra, Hon'ble Shri. Dattatray Bharane, State Minister of Animal Husbandry, Dairy Development and Fisheries, Govt. of Maharashtra, Col. Prof. (Dr.) A.M Paturkar, Hon'ble Vice Chancellor, MAFSU, Nagpur and **Hon'ble Dr. Prabhat Kumar, National Coordinator, ICAR-NAHEP-CAAST, New Delhi** on 16th February 2022.


Figure 74. Inauguration of "Centre of Excellence for Advanced Research on Animal Food Safety" under NAHEP -CAAST -MAFSU.

Figure 75. Inauguration of "Centre of Excellence for Advanced Research on Animal Food Safety" under NAHEP -CAAST -MAFSU.

2. **Dr. Anuradha Agrawal,** National Co-ordinator, ICAR-NAHEP-CAAST, visited the "Centre of Excellence for Advanced Research on Animal Food Safety" on 7th June, 2022 on the occasion of World Food Safety Day and World Environment Day, 2022.


Figure 76. Release of Newsletters on the occasion of World Food Safety Day and World Environment Day, 2022 under NAHEP -CAAST -MAFSU


Figure 77. Dr. Anuradha Agrawal, National Coordinator, ICAR-NAHEP-CAAST visited NAHEP-CAAST MAFSU, Mumbai Center

## 3. Visit of World Bank Auditor on 3rd March, 2022


Figure 78. Visit of World Bank Auditor to NAHEP-CAAST MAFSU, Mumbai Center.

Auditors from the World Bank visited the NAHEP-CAAST MAFSU, Mumbai Center for the Post – Procurement Review of the various equipment purchased under the project on 3rd March, 2022.

4. **Dr. R. C. Agrawal,** DDG (Education) & National Director NAHEP, ICAR, New Delhi and **Dr. Anuradha Agrawal,** National Co-ordinator, ICAR-NAHEP-CAAST, visited the "Centre of Excellence for Advanced Research on Animal Food Safety" on 6th July, 2023 on the occasion of World Zoonoses Day 2023. The dignitaries enlightened the participants about the NAHEP – CAAST Project, its goals, its objectives and its extension activities. They also visited the facilities developed under NAHEP – CAAST in the centre.


Figure 79. Visit of Dr. R. C. Agrawal and Dr. Anuradha Agrawal to NAHEP-CAAST MAFSU, Mumbai Center on the occasion of World Zoonoses Day – 2023.

**5. Dr. R. C. Agrawal, DDG (Education) & National Director NAHEP, ICAR, New Delhi** and **Dr. Anuradha Agrawal, National Co-ordinator, ICAR-NAHEP-CAAST**, visited the Nagpur Veterinary College, Nagpur on 5th -6th November, 2023 on the occasion of Student Engagement Conclave cum Training entitled "Nurturing Agripreneurship: Scope and Opportunities for Economic Development" The dignitaries enlightened the participants about the NAHEP – CAAST Project, its goals, its objectives and its extension activities. They also visited the facilities developed under NAHEP – CAAST in the centre.

Fig. 80. Visit of Dr. R. C. Agrawal and Dr. Anuradha Agrawal to Nagpur Veterinary College, Nagpur on the occasion of Student Engagement Conclave cum Training entitled "Nurturing Agripreneurship: Scope and Opportunities for Economic Development".

**PI, NAHEP-CAAST, MVC** **Associate Dean**