



वार्षिक प्रतिवेदन 2023

ANNUAL REPORT 2023

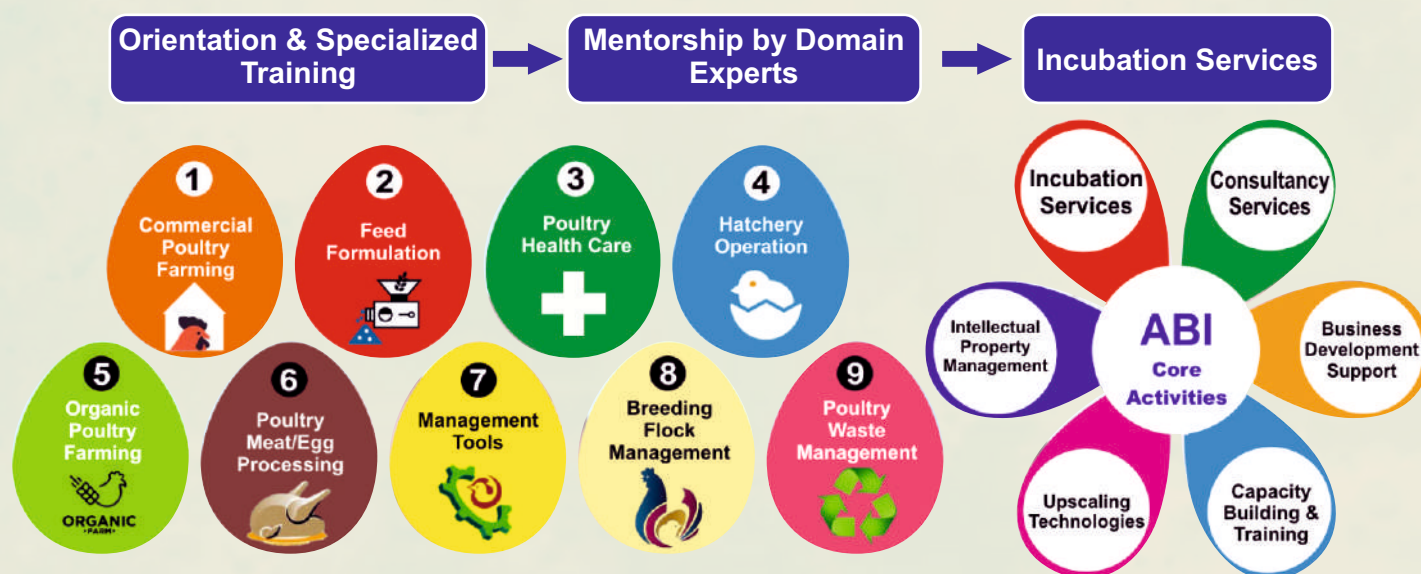


भाकृअनुप-केन्द्रीय पक्षी अनुसंधान संस्थान
इज्जतनगर - 243122, बरेली (उ.प्र.) भारत

ICAR-CENTRAL AVIAN RESEARCH INSTITUTE
IZATNAGAR- 243122 (UP) INDIA

CARI OFFERS:

- Elite pure lines, parents and commercial stocks of diversified poultry species.
- Low input improved desi (indigenous) chicken varieties suitable for small scale/backyard poultry production.
- Analysis of feed ingredients and compounded feeds for proximate principles and quality control
- Processing techniques for poultry meat and egg based value added and functional products with extended shelf life.
- Preparation of bankable projects for raising institutional finance under various Government schemes for establishing poultry and feed production units.
- Business support for budding poultry entrepreneurs through Agri-business Incubation (ABI) activities.
- Windows® based "MAKEFEED POULTRY" and "MAKEFEED DAIRY" software for formulating least cost and balanced rations.
- Advanced training on ducks, Japanese quails, turkey, Guinea fowls, broilers and layers production management covering all aspects of their breeding, production, nutrition, housing & shelter, processing and health care etc.
- Short-term training for poultry farmers/entrepreneurs on poultry production.
- Consultancy services including contract research projects for validation of commercial products
- Post-graduate education NDPH, M.V.Sc. & Ph.D. in Poultry Science.
- Technology dissemination through farmer's fair, field demonstration and their commercialization through licensing of technologies.



Project report formulation, Statutory compliance, Marketing format design, Marketing strategies, Social media platform, Client feedback analysis



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IZATNAGAR- 243 122 (UP) INDIA

ICAR-CARI Annual Report 2023

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Preface



Dr Ashok K. Tiwari
Director

ICAR-Central Avian Research Institute
Izatnagar-243 122 (UP) India

The poultry industry in India has appeared as the most dynamic and fastest-growing segments in the agricultural sector with an annual growth rate of 8.51% in egg and 7.52% in broiler production. The poultry sector is posting an annual turnover of 10,000 million dollars and satisfying the hunger of 20 million people through employment. Around 4 lakh farmers are engaged in poultry farming activities with 85% of them having less than 2 Hectare of land. Urban demand still accounts for 80% of domestic consumption. South India accounts for the majority of the total poultry production and consumption in the country. Andhra Pradesh, Karnataka, Kerala, Tamil Nadu in the south and Maharashtra in the west and Haryana, Punjab in the north are key regions in this aspect. In the recent past, poultry industry in North India specially Uttar Pradesh, is taking a big boom with a contribution of 47.32% and 2.6% meat and egg production in the country. U.P. Poultry Development Policy-2022 is a welcome development that is helping poultry farmers in this state. Technological support is therefore crucial for the sustained growth of poultry sector. Being, a premier poultry institute, this institute has shared a much of burden to bridge the gap for reaching the needy farmers with technological advancements.

ICAR-Central Avian Research Institute (CARI) was established on the 2nd November, 1979 at Izatnagar, Bareilly, Uttar Pradesh to provide all-round support to the growth of poultry sector. The Institute has been continuously updating and reorienting its R&D focus with the latest developments taking place globally and in accordance with the changing needs of the domestic poultry sector. The institute has also made significant contributions towards the evaluation and standardization of alternate and newer feed resources to help in lowering the feed cost besides developing feed formulae for computing low-cost ration under different climates and regions of the country. The institute has developed the protocols for about two dozen value-added processed products utilizing poultry egg, meat, and byproducts and developed methods for their shelf-life extension. The universal semen extender for different poultry species was developed which can maintain fertility till 24 h. Besides, the institute has also contributed significantly in frontier research like post-harvest loss, molecular genetics and biotechnology, metagenomics etc. The institute's HRD program has been providing trained manpower for manning large commercial poultry houses in the country. This institute is only one of its kind wholly dedicated to poultry science research, education, and extension in the country. I am very happy and delighted to present annual reports containing the developments made by our institute during the year 2023.

It is our great pleasure to express our deep gratitude to Dr. Himanshu Pathak, Secretary (DARE) & DG ICAR, Dr. Raghavendra Bhatta, DDG (Animal Science) & Dr. Gyanendra Kumar Gaur, ADG (AP&B) of Indian Council of Agricultural Research, New Delhi for their support, guidance and constant motivation for the progress of the institute. I also sincerely acknowledge the hard work and support rendered by the staff of our institute and congratulate the Editorial Team for bringing out this report with their sincere efforts. This report will be great value to the researchers, academicians, entrepreneurs, poultry industry personnel, public health specialists, and also to the students.

Annual Report -2023


(Ashok K. Tiwari)
Director





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1. कार्यकारी सारांश

चयनित कुक्कुट प्रजातियों की उत्पादकता वृद्धि

- गिनी फाउल की तीन किस्मों के शरीर के वजन को 0-दिन, 4-सप्ताह, 8-सप्ताह और 12-सप्ताह पर मापा गया। कैरी पर्ल का वजन 0 दिन पर 25.97 ± 0.02 ग्राम, 4 सप्ताह में 321.53 ± 1.54 ग्राम, 8 सप्ताह में 846.86 ± 2.31 ग्राम और 12 सप्ताह में 1156.05 ± 2.86 ग्राम था। लैवेंडर ने विभिन्न आयु अंतराल पर 25.93 ± 0.04 ग्राम, 311.81 ± 12.34 ग्राम, 822.00 ± 4.67 ग्राम और 1129.97 ± 6.72 ग्राम वजन दिखाया। सफेद गिनी फाउल ने सम्बंधित समय बिन्दुओं पर 25.86 ± 0.05 ग्राम, 204.06 ± 2.79 ग्राम, 793.41 ± 3.76 ग्राम और 1035.19 ± 5.94 ग्राम के वजन का प्राप्त किया गया।
- जापानी बटेर में चयन और सुधार कार्यक्रम तीसरी पीढ़ी तक पूरा कर लिया गया है, जिसमें कैरी उत्तम व कैरी ब्राउन में अण्डे सेने की दर 62.35% और 59.72% प्राप्त हुई है। नर कैरी उत्तम, कैरी ब्राउन व कैरी सुनैहरी के शरीर का वजन क्रमशः 200.61 , 171.06 और 187.26 ग्राम पाया गया।
- कैरी ब्राउन और कैरी सुनैहरी की यौन परिवक्वता आयु क्रमशः 43.41 और 50.37 दिन देखी गई एवं इनका 18 सप्ताह का उत्पादन क्रमशः 39.24 और 37.21 अंडे था। कैरी उत्तम और कैरी सुनैहरी में 5-सप्ताह का फीड रूपांतरण अनुपात (एफसीआर) क्रमशः 2.44 , 3.02 और 3.16 था। जापानी बटेर में प्रारंभिक (6-8 दिन) और अंतिम (12-14 दिन) भ्रूण विकास के दौरान उच्च तापमान (39.5°C और 40.5°C) का अंडे सेने की दर (कुल अंडा सेट) पर कोई प्रभाव नहीं देखा गया।
- आर्थिक रूप से महत्वपूर्ण गुणों को बनाये रखने व बढ़ाने के लिए चार ब्रॉयलर शुद्ध लाइनों और एक देशी मुर्गी जनन द्वय पर चयन कार्यक्रम आयोजित किया गया। देशी मुर्गियों की अद्वितीय विशेषताओं का विश्लेषण किया गया और रंगीन ससंश्लेषक मादा लाइन (सीएसएफएल) और देशी मुर्गियों से एक क्रॉस का उत्पादन और मूल्यांकन किया गया।
- ग्रामीण क्षेत्रों में मुर्गी उत्पादन के लिए देशी ब्रायलर क्रॉस जिसका नाम के कैरीब्रो समृद्धि रखा गया है, को विकसित किया है। इसकी विशेषताएं हैं 12 सप्ताह की उम्र में वजन 1850.63 ± 44.45 ग्राम, पहले 6 सप्ताह में आहार रूपांतरण अनुपात (एफसीआर) 2.93 ± 0.07 , ड्रेसिंग प्रतिशत 68.63 ± 0.23 और मांस हड्डी अनुपात $1.09 - 1.33$ ।
- दो रंगीन पैरेंट लाइनों, रंगीन ससंश्लेषक नर लाइन (CSML) और रंगीन ससंश्लेषक मादा लाइन (CSFL) की फर्टिलिटी और हैचबिलिटी की तुलना की गयी। CSFL के कुल 4043 अंडों में 88.42% की अंडे सेने की दर प्राप्त हुई, जिनसे 3097 अच्छे चूजे प्राप्त हुए। इसकी हैचबिलिटी दरें कुल अंडे सेट (TES) आधार पर 77.71% और फर्टाइल अंडे सेट (FET) के आधार पर 87.89% प्राप्त हुई। इसके विपरीत, CSML में 5698 अंडों में 82.78% की कुछ कम फर्टिलिटी दर प्राप्त हुई जिससे 4028 अच्छे चूजे प्राप्त हुए।
- दो लाइनों, SDL और SML की फर्टिलिटी और हैचबिलिटी दरों में महत्वपूर्ण अंतर देखा गया। SML स्ट्रेन में 1666 अंडों से 92.92% की फर्टिलिटी दर प्राप्त हुई, जिससे 1246 अच्छे चूजे प्राप्त हुए और कुल अंडे सेट (TES) आधार पर हैचबिलिटी 75.09% थी। इसके विपरीत, SDL स्ट्रेन में 1772 अंडों में से 95.15% की उच्च फर्टिलिटी दर प्राप्त हुई, जिससे 1402 अच्छे चूजे प्राप्त हुए। इसकी हैचबिलिटी दरें कुल अंडे सेट (TES) आधार पर 81.94% और फर्टाइल अंडे सेट (FET) के आधार पर 86.1% प्राप्त हुई।
- टर्की के 18 हैचों के आधार पर किये गए विश्लेषण में फर्टिलिटी और हैचबिलिटी दर क्रमशः 70.64% व 48.55% (TES आधार पर) पाई गई। कुल 19,544 अंडे सेट किये गए, जिनमें से 5,738 अंडे को बांझ वर्गीकृत किया गया। फर्टाइल अंडों में से 9,489 चूजे हैच हुए, तथा फर्टाइल अंडे सेट (FES) आधार पर हैचबिलिटी दर 68.73% प्राप्त हुई।
- आहार में 16/16 मिग्रा कॉपर/किग्रा आहार के साथ 100/80 मिग्रा आयरन/ किग्रा आहार का संयोजन भारतीय परिस्थितियों में 0-4/5-8 सप्ताह के दौरान टर्की पोल्स में सर्वोत्तम वृद्धि, प्रतिरक्षा प्रतिक्रिया, हेमेटोलॉजी, सीरम बायोकेमिकल पैरामीटर और कंकाल स्वास्थ्य प्राप्त करने के लिए पर्याप्त पाया गया।
- आहार में 16/16 मिग्रा कॉपर/ किग्रा आहार, 100/80 मिग्रा आयरन/ किग्रा आहार और 90/85 मिग्रा जिंक/किग्रा आहार का संयोजन भारतीय परिस्थितियों में 0-4/5-8 सप्ताह के दौरान टर्की पोल्स की सर्वोत्तम वृद्धि, प्रतिरक्षा प्रतिक्रिया, हेमेटोलॉजी, सीरम बायोकेमिकल पैरामीटर और कंकाल स्वास्थ्य प्राप्त करने के लिए पर्याप्त पाया गया।
- 50 मिग्रा विटामिन-ई के साथ 100 मिग्रा एस्कोर्बिक एसिड / किग्रा की आहारिक सांद्रता 0-8 सप्ताह के दौरान कैरी विराट टर्की पोल्स की सर्वोत्तम वृद्धि, प्रतिरक्षा प्रतिक्रिया, हेमेटोलॉजी, सीरम बायोकेमिकल पैरामीटर और कंकाल स्वास्थ्य प्राप्त करने के लिए पर्याप्त पाया गया।
- गर्म और नम परिस्थितियों में कृषि अपशिष्ट (अनार के छिलके) से बने क्रम्बलस को खिलाने से मुर्गियों में विकास प्रदर्शन, प्रतिरक्षा प्रतिक्रिया, आंत स्वास्थ्य में सुधार हुआ और तनाव कम हुआ।
- गेहूं की चोकर के 50% प्रति स्थापन तक शहलूत के पत्ते के पाउडर का आहार अनुपूरण, रंगीन ब्रॉयलर पक्षियों में उत्पादन प्रदर्शन, हेमेटोलॉजी, सीरम बायोकेमिकल पैरामीटर और कारकास गुणों के लिया लाभकारी पाया गया।
- एल. एसिडोफिलस से प्राप्त 0.2% पोस्टबायोटिक्स के साथ ब्रॉयलर फीड को अनुपूरक करने से प्रदर्शन, प्रतिरक्षा प्रतिक्रिया, आंत स्वास्थ्य, और जेजुनम ऊतक में एंटीऑक्सीडेंट गतिविधि में उल्लेखनीय वृद्धि हुई, जो एंटीबायोटिक-उपचारित और नियंत्रण समूहों दोनों से बेहतर थी ($p < 0.001$)
- 0.75% बरसीम पत्ती को एक पुनर्स्थापना फाइटोजेनिक फीड एडिटिव (PFA) के रूप में उपयोग करने से वाणिज्यिक लेयर नस्लों में 85 और उससे अधिक के तापमान-आर्द्रता सूचकांक, टीएचआई के संपर्क में आने पर उत्पादन हानि (12% तक) और मृत्यु दर (6%) कम हो गई।
- उच्च और निम्न खुराक के कार्बनिक अम्ल और आवश्यक तेल के साथ टर्की को खिलाने से विलाई की लंबाई, फ्रिप्ट की गहराई, और उनके संबंधित अनुपात में वृद्धि हुई। बेहतर सकल वजन और बेहतर फीड दक्षता देखी गई, साथ ही एजीपी-उपचारित समूह में तुलनीय उन्नत प्रतिरक्षात्मक प्रतिक्रियाएं भी देखी गईं। इसके अलावा, इस पहल ने ई. कोलाई के प्रति एंटीमाइक्रोबियल प्रतिरोध के बोझ को भी कम कर दिया।
- विविध कुक्कुट प्रजातियों के लिए कुल 9767.39 क्विंटल मिश्रित आहार का निर्माण किया गया। इसकी गुणवत्ता और मायकोटॉक्सिन संदूषण के लिए कुल 305 फीड नमूनों का विश्लेषण किया गया।
- सीएआरआई फार्मों की विभिन्न कुक्कुट प्रजातियों में हैचबिलिटी (उपजाऊ अंडे सेट) 50.00 से 98.08 प्रतिशत तक थी, और इस अवधि के दौरान विविध पोल्ट्री जर्मप्लाज्म (चिकन, बटेर, टर्की, गिनी फाउल) के 1,44,981 स्वस्थ चूजे प्राप्त हुए।
- विविध पोल्ट्री प्रजातियों में कुल 2,92,000 वैक्सीन खुराक नियोजित की गई। बूडिंग अवधि के दौरान गिनी फाउल और बटेर प्रजातियों में उच्च मृत्यु दर देखी गयी। सीएआरआई पक्षियों में औसत एंटीबायोटिक 19.02 मिलीग्राम / पक्षी / वर्ष दी गई।

जलवायु सहनशील मुर्गी उत्पादन प्रणाली एवं अपशिष्ट प्रबंधन

मूल्य संवर्धन, खाद्य सुरक्षा, गुणवत्ता आश्वासन और उत्पाद विकास

- कैरी पेड़ा (एक अंडा उत्पाद) में 28% प्रोटीन है और इसे 8-10 दिनों के लिए 4 डिग्री सेल्सियस पर और वातावरणीय तापमान पर 3-4 दिनों के लिए संग्रहीत किया जा सकता है।



- 38 डिग्री सेल्सियस और 28 डिग्री सेल्सियस पर संग्रहीत अंडों में क्रमशः 14 और 22 दिनों के बाद गुणवत्ता में गिरावट देखी गयी। इसके विपरीत, 4 डिग्री सेल्सियस और 18 डिग्री सेल्सियस पर रखे गए अंडे 30 दिनों तक बेहतर आंतरिक गुणवत्ता बनाए रखते हैं।
- कैरी-कम्फर्ट का उपयोग परिवहन से 72 घंटे पहले 4.2 ग्राम प्रति लीटर की खुराक में करने से शरीर के वजन घटाव को 6-7% तक कम किया गया, साथ ही परिवहनित पक्षियों की मांस गुणवत्ता और कल्याण में भी सुधार हुआ।

मानव संसाधन विकास, मार्केट इंटेलिजेंस और प्रौद्योगिकी प्रसार

- ऑनलाइन प्रशिक्षण कार्यक्रमों में प्रशिक्षुओं को कुक्कुट पालन के बारे में वैज्ञानिक ज्ञान को संप्रेषित करके ज्ञान के अंतर को प्रभावी ढंग से कम किया।
- डीएपीएसटी परियोजना के तहत कुक्कुट उत्पादन पर कुल 12 प्रशिक्षण आयोजित किए गए और कुल 238 लाभार्थियों को बेहतर चिकन किस्मों और कुक्कुट आहार प्रदान किया गया।
- 373 लाभार्थियों के साथ कुक्कुट उत्पादन पर कुल 12 प्रशिक्षण आयोजित किए गए और कुल 238 लाभार्थियों को डीएपीएसटी परियोजना के तहत उन्नत चिकन किस्मों और पोल्ट्री फीड प्रदान किया गया।
- कुल 27 प्रशिक्षण और जागरूकता कार्यक्रम (पोल्ट्री% 18 (सुअर% 2 (बकरी% 2 (सिलाई मशीन% 5) और दो किसान मेलों का आयोजन किया गया। कुल 1042 लाभार्थियों को मुर्गियां (9695), बकरियां (116), सूअर (24), संतुलित चारा (12923 किलोग्राम), सिलाई मशीन (48), सिलाई सामग्री किट (96), और सौर पैनल (38) प्राप्त हुए। डीएपीएसटी परियोजना के तहत दो चिकन मदर इकाइयाँ और 42 स्व-सहायता समूह स्थापित किए गए, जिसमें 460 महिलाएँ शामिल थीं।
- कुल 4 उद्यमिता विकास कार्यक्रम, 6 अल्पकालिक प्रशिक्षण, 2 विशेष प्रशिक्षण और 4 प्रायोजित प्रशिक्षण आयोजित किए गए, जिसमें 744 प्रतिभागियों को कुक्कुट उत्पादन और प्रबंधन के विभिन्न पहलुओं पर प्रशिक्षित किया गया।

बाह्य निधि से वित्तपोषित परियोजनाएँ

- रेड जंगल फाउल जीनोम की प्रारंभिक संकलन 11 कॉन्टिन्स में 50% कवर करता है, जिसमें N50 25MB और N90 3-3MB है, और यह वीजीपी संघ के स्वर्ण मानक के अनुसार प्राथमिक और परिशुद्ध संकलन दोनों में अधिकतम 96% पूर्णता दिखाता है, जिसकी आधारिक सटीकता 60 है।
- कैरी पॉल्ट्री सीमेन डाइलुएंट को कमरे के तापमान पर 3 वर्ष तक रखने से इसका रंग भूरा-काला हो गया लेकिन अंडों की निषेचनता पर कोई प्रभाव नहीं पड़ा। जबकि निम्न तापमान (3-7 °सेंटीग्रेड) भण्डारण पर इसके, डाइलुएंट रंग में स्थिरता, आंकी गई। हबर्ड ब्रीडर के स्टॉक में फील्ड सत्यापन अध्ययनों ने 95.37% की समग्र प्रजनन क्षमता का संकेत दिया। टीईएस (कुल अंडा सेट) और एफईएस के आधार पर चूजों की अंडे सेने की दर क्रमशः 91.04% और 95.46% देखी गई।
- विभिन्न आनुवांशिक पृष्ठभूमि (व्हाइट लेगॉर्न, असील, कड़कनाथ और निकोबारी) की मुर्गियां प्रयोगात्मक रूप से 7 सप्ताह की उम्र में वेलोजेनिक

एनडीवी द्विजी-टप्पू से संक्रमित की गई। इंट्रामस्क्युलर और अश्वरल/इंट्रा-ओकुलर मार्गों के माध्यम से क्रमशः 108.83 और 107.83 EID50 पर वायरस एडमिनिस्ट्रेशन ने संक्रमण के 4 दिनों के बाद सभी चिकन नस्लों में 100% मृत्यु कर दी। 103.83 EID50 पर टछक्ट एडमिनिस्ट्रेशन के परिणामस्वरूप सभी नस्लों में कम से कम 50% मृत्यु हुई। असील मुर्गियों में स्प्लीन, सीकल टॉन्सिल तथा वर्सा में हिस्टोपैथोलॉजिकल लीजन का स्कोर कम पाया गया। स्प्लीन नमूनों की RNA seq विश्लेषण ने दर्शाया कि असील मुर्गियों में संक्रामक रोग सहनशीलता में महत्वपूर्ण भूमिका निभाने वाले अधिक संख्या में प्रतिरक्षा जीन और cis&IncRNAs (सिस-दीर्घ-गैर-कोडिंग रिबोन्यूक्लिक एसिड) का समन्वय पाया गया, जो व्हाइट लेग हॉर्न से अधिक हैं।

- भाकृअनुप-सीएआरआई, इज्जतनगर ने बैकयार्ड जर्मप्लाज्म और अन्य मौसमी स्थानीय पौधों (जैसे बरसीम, रेजिका, लोबिया और सब्जियों) के लिए 6464 मीटर क्षेत्र का उपयोग करते हुए एक आत्मनिर्भर एकीकृत बैकयार्ड पोल्ट्री उत्पादन मॉडल विकसित किया। यह प्रदर्शन इकाई गिरिग्राम तकनीकी पार्क तकनीक का हिस्सा थी, जिसे वाराणसी, नागपुर, हरदोई, पूरनपुर और कन्याकुमारी में दोहराया गया है।
- लेह और आस-पास के क्षेत्र (नुब्रा वेल्ली) के किसानों से संपर्क किया गया और उन्हें रोजगार के स्रोत के रूप में मुर्गी पालन और संतुलित पोषण के लिए अवगत कराया गया। सीएआरआई जर्मप्लाज्म के प्रदर्शन में प्रगतिशील स्थानीय किसानों की पहचान भी की गई।
- फार्मर फर्स्ट कार्यक्रम के तहत बरेली जिले के आलमपुर जाफराबाद ब्लॉक के चयनित गांवों के क्लस्टर में किसानों को मुर्गी पालन आधारित समेकित खेती अपनाने के लिए राजी किया गया।
- अण्डा देने वाली मुर्गियों के पीने के पानी में एकवैरिटिन 7 मिली/300 लीटर देने से यौन परिपक्वता, उत्पादन क्षमता, अंडे के वजन और अंडे की बाहरी व आंतरिक दोनों गुणवत्ता के लक्षणों पर सकारात्मक प्रभाव पड़ा।
- ब्रॉयलर मुर्गियों के मेश फीड में बिना उत्पादन प्रदर्शन में कोई कमी आये बायोमास (एक पेट्रोलियम उप-उत्पाद) को एक नए प्रोटीन स्रोत के रूप में, सामान्य सोयाबीन मील के स्थान पर 7.5% तक सुरक्षित रूप से उपयोग किया जा सकता है।
- मानव संसाधन विकास कार्यक्रमों, भ्रूण अंडे और फीड सहित जर्मप्लाज्म की आपूर्ति, प्रौद्योगिकी लाइसेंसिंग, उत्पाद बिक्री, परामर्श और अनुबंध अनुसंधान परियोजनाओं से संस्थान द्वारा कुल रु. 1,65,62,002 प्राप्त किए गए।
- एबीआई परियोजना के तहत, विचार चरण में जोड़े गए चार इनक्यूबेटर्स को तकनीकी और विपणन सहायता प्रदान की गई।

अन्य गतिविधियाँ

- विशेष अभियान 3.0 के तहत बाजरा पर जागरूकता कार्यक्रम (स्वच्छता पखवाड़ा, एंटीबायोटिक जागरूकता सप्ताह, सतर्कता जागरूकता सप्ताह, विश्व अंडा दिवस, विश्व मृदा दिवस और किसान दिवस आयोजित किए गए।





1. EXECUTIVE SUMMARY

Productivity Enhancement of Selected Poultry Species

- The body weights of three varieties of guinea fowls were measured at 0-day, 4-week, 8-week, and 12-week of age. The weights for Pearl were 25.97 ± 0.02 g at 0 day, 321.53 ± 1.54 g at 4 weeks, 846.86 ± 2.31 g at 8 weeks, and 1156.05 ± 2.86 g at 12 weeks. Lavender showed weights of 25.93 ± 0.04 g, 311.81 ± 12.34 g, 822.00 ± 4.67 g, and 1129.97 ± 6.72 g at the various age intervals. White exhibited weights of 25.86 ± 0.05 g, 204.06 ± 2.79 g, 793.41 ± 3.76 g, and 1035.19 ± 5.94 g, at the respective time points.
- The quail selection and improvement program completed its third generation, achieving hatchability rates of 62.35% for CARIUTTAM and 59.72% for CARIBROWN. The body weights of male CARIUTTAM, CARIBROWN and CARISUNEHERI were 200.61, 171.06 and 187.26 g respectively.
- The observed age at sexual maturity (ASM) for CARIBROWN and CARISUNEHERI was 43.41 and 50.37 days, with egg production of 39.24 and 37.21 eggs at 18 weeks, respectively. The 5-week feed conversion ratio (FCR) for CARIUTTAM, CARIBROWN, and CARISUNEHERI was 2.44, 3.02, and 3.16, respectively. Hatchability (total egg set) was not affected by high temperatures (39.5°C & 40.5°C) during early (6-8 days) and late (12-14 days) embryonic development in Japanese Quail
- A selection program was conducted on four broiler pure lines and one native chicken germplasm to maintain and enhance economically important traits. Unique characteristics of the native chickens were characterized, and a cross between the Coloured Synthetic Female Line (CSFL) and Desi chickens was produced and evaluated.
- The Desi Broiler cross named CARIBROSAMRIDHI has been developed for village poultry production, with characteristics of 12-week BW of 1850.63 ± 44.45 g, feed conversion ratio (FCR) of 2.93 ± 0.07 for the first 6 weeks, a dressing percentage of 68.63 ± 0.23 , and a meat-to-bone ratio ranging from 1.09 to 1.33.
- The fertility and hatchability of two-coloured parent lines, the Coloured Synthetic Male Line (CSML) and the Coloured Synthetic Female Line (CSFL), were compared. The CSFL exhibited a fertility rate of 88.42% from a total of 4043 eggs set, resulting in 3097 good chicks. Its hatchability rates were 77.71% for TES and 87.89% for FES. In contrast, the CSML showed a slightly lower fertility rate of 82.78% from 5698 eggs set, with 4028 good chicks hatched.
- Fertility and hatchability of two lines, namely SML and SDL, significant differences were observed. The SML strain exhibited a fertility rate of 92.92% from a set of 1666 eggs, resulting in 1246 good chicks, with a hatchability of 75.09% in total egg set (TES) and 80.81% in fertile egg set (FES). Conversely, the SDL strain demonstrated a higher fertility rate of 95.15% from 1772 eggs, yielding 1402 good chicks. Its hatchability rates were correspondingly higher, with 81.94% in TES and 86.12% in FES.
- In a turkey fertility and hatchability analysis conducted over 18 hatches, a total of 19,544 eggs were set, with 5,738 classified as infertile. The fertility percentage was observed as 70.64%. From the fertile eggs, 9,489 chicks were hatched, resulting in a hatchability percentage of 48.55% for TES and 68.73% for FES.
- Dietary combination of 16/16 mg copper/kg diet with 100/80 mg iron/kg diet was found adequate to obtain optimum growth performance, immune response, haematology, serum biochemical parameters and skeletal health of growing turkey poult during 0-4/5-8 weeks under Indian conditions.
- Dietary combination of 16/16 mg copper/kg diet, 100/80 mg iron/kg diet and 90/85 mg zinc/kg diet improved optimum growth performance, immune response, haematology, serum biochemical parameters and skeletal health of growing turkey poult during 0-4/5-8 weeks under Indian conditions.
- Dietary concentration of 50 mg Vit-E with 100mg/kg ascorbic acid was found adequate for optimum growth, immune response, serum biochemical parameters, skeletal health, and cost economics of growing CARIVIRAT turkey poult during 0-8 weeks.
- Feeding of Crumbles made from agro -waste (pomegranate peel) under hot humid conditions enhanced growth performance, immune response, gut health, and reduced stress in poultry.
- Dietary supplementation of mulberry leaf powder (MLP) up to 50% replacement of wheat bran was beneficial for production performance, hemato-biochemical parameters, and carcass traits in coloured broiler birds.
- Supplementing broiler feed with 0.2% postbiotics derived from *L. acidophilus* significantly enhanced performance, immune response, gut health, and antioxidant activity in jejunum tissue, surpassing both antibiotic-treated and control groups ($P < 0.001$).
- Berseem leaf @ 0.75 % aided as a restorative phytogenic feed additive (PFA) to curtail production losses (up to 12%) and mortality (6%) in commercial layer strains when exposed to THI of 85 and above.
- Feeding turkeys with higher and lower doses of organic



acid (FA) and essential oil (T) resulted in increased villi lengths, crypt depths, and their corresponding ratios. Improved gross weights and better feed efficiency were observed, alongside enhanced immunological responses comparable to those in the AGP-treated group. Additionally, this approach reduced the antimicrobial resistance burden to *E. coli*.

- A total of 9767.39 quintals of compound feed has been manufactured for diversified poultry species. A total of 305 feed samples have been analyzed for its quality and mycotoxin contamination.
- Hatchability (fertile egg set) in various poultry species of CARI farms ranged from 50.00 to 98.08 percent, and 144,981 healthy chicks of diversified poultry germplasm (chicken, quails, turkey guinea fowls) were hatched out during the period.
- A total of 2,92,000 vaccine doses have been employed in diversified poultry species. Higher mortality patterns were observed in guinea fowl and quail species during the brooding period. Average antibiotic footprints in CARI birds were calculated to be 19.02 mg/bird/year.

Climate Resilient Poultry Production System and Waste Management

Value Addition, Food Safety, Quality Assurance and Product Development

- CARI Peda (an egg product) contains 28% protein and can be stored for 8-10 days at 4°C and for 3-4 days at ambient temperature.
- Eggs stored at 38°C and 28°C showed a decline in quality after 14 and 22 days, respectively. In contrast, eggs kept at 4°C and 18°C maintained better interior quality for up to 30 days.
- Supplementation of CARI-COMFORT 72 hours before transport at a dose of 4.2 g/L reduced body weight loss to 6-7%, while also improving meat quality and welfare of transported birds.

HRD, Market Intelligence and Technology Dissemination

- Online training programs effectively reduced the knowledge gap by communicating scientific knowledge about poultry farming to trainees.
- A total of 12 trainings on poultry production were organized with 373 beneficiaries and a total of 238 beneficiaries were provided with improved chicken varieties and poultry feed under DAPST project.
- A total of 27 training and awareness programs (Poultry: 18; Pig: 2; Goat: 2; Sewing Machine: 5) and two kisan melas were organized. A total of 1042 beneficiaries received poultry (9695), goats (116), pigs (24), balanced feed (12923 kg), sewing machines (48), sewing material kits (96), and solar panels (38). Two chick mother units and 42 self-help groups (SHGs) involving 460 women were established under the DAPSC project.

- A total of 4 Entrepreneurship development programmes, 6 short-term trainings, 2 specialized trainings and 4 sponsored trainings were organized wherein 744 participants were trained on different aspects of poultry production and management.

Externally funded projects

- Survey of Red Jungle Fowl populations and sample collection was employed from Punjab, Mizoram, Meghalaya, Delhi, Tripura, and Madhya Pradesh. The initial assembly of the Red Jungle Fowl genome covers 50% in 11 contigs with an N50 of 25 MB and N90 of 3.3 MB, exhibiting over 96% completeness in both primary and purged assemblies, with a base accuracy of 60 according to the VGP consortium's gold standard.
- Storage of CARI Poultry semen diluent at room temperature up to 3 years resulted in a brownish black colour with no effect on fertility while at low temperature (3-7 °C) yielded a stable form of diluent. Field validation studies in Hubbard breeder's stocks indicated an overall fertility of 95.37%. Hatchability of chicks based on TES (total egg set) and FES were noticed 91.04% and 95.46% respectively.
- Chickens of different genetic background (White leghorn, Aseel, Kadaknath & Nicobari) were experimentally infected with velogenic NDV (G-VII) at 7 weeks of age. Administration of virus at 108.83 and 107.83 EID₅₀ through intramuscular and oral/intra-ocular routes respectively caused 100% mortality in all chicken breeds at 4 days post infection (dpi). Administration of vNDV at 103.83 EID₅₀ resulted in at least 50% mortality in all breeds. Histopathological scoring of lesions in spleen, caecal tonsil and bursa were less in Aseel. RNA seq analysis of spleen samples revealed the higher number of immune genes and cis-lncRNAs co-expressing with these genes than WLH (susceptible) suggesting playing a significant role in Aseel for disease resilience.
- ICAR-CARI, Izatnagar, developed a self-sustaining integrated backyard poultry production model, utilizing a 64x64 m area for backyard germplasm and other seasonal local plants (such as Barseem, Regica, Lobia, and vegetables). This demonstration unit was part of the Girigram Takniki Park technology, which has been replicated in Varanasi, Nagpur, Hardoi, Puranpur, and Kanyakumari.
- Farmers in Leh and nearby region (Nubra Velly) were contacted and apprised to adopt poultry as source of employment and balance nutrition. Identification of progressive local farmer in demonstrating CARI germplasm was also made.
- Under Farmers First Programme, farmers in the cluster of selected villages in Alampur Zafrabad block of Bareilly district were persuaded to adopt poultry based integrated farming.
- Including Aquaritin at 7 mL/300 L in the drinking water of layer chickens positively affected the age at sexual maturity, production efficiency, egg weight, and both external and internal egg quality traits.



- Supplementing the diet of broiler chickens with biomass (a petroleum byproduct) as a new protein source can safely replace up to 7.5% of the conventional soybean meal in mash feed without compromising production performance.
- A total of INR 1,65,62,002 was generated from human resource development programs, the supply of germplasm including embryonated eggs and feed, technology licensing, product sales, consultancy, and contract research projects.
- Under the ABI project, technical and marketing support was provided to four incubates who were added at ideation stage.

Other activities

- Special campaign 3.0, Awareness programmes on millets, Swachhata Pakhwara, Antimicrobial awareness week, Vigilance awareness week, World Egg Day, World Soil Day, 9th International Yoga day and Kisan Diwas were organized.



cari



Estd. 1979



2. INTRODUCTION

- Having established on November 2, 1979, the ICAR-Central Avian Research Institute under the aegis of Indian Council of Agriculture Research, New Delhi has been the major driving force steering the Indian poultry sector through various phases of development during the past four decades. It has been providing much needed support in terms of elite germplasm, production and processing technologies, trained manpower through post graduate education, training and extension in all sub-disciplines of Poultry Science for promoting sustainable diversified poultry production at commercial, small scale rural and backyard poultry production in the Country. The premier Institute with its campus at Izatnagar, Bareilly, Uttar Pradesh is the only one of its kind wholly dedicated to poultry science research, education and extension in the Country.
- Basic and applied research through multi-disciplinary approach on diversified poultry species is conducted at the Institute. The remarkable growth achieved in the Indian poultry sector has been due to several factors like initiation of pure line breeding in the country especially at Central Avian Research Institute, leading to availability of elite germplasm of ducks, Japanese quails, turkey, native fowls and commercial layer and broiler chicken and parallel development of other input sub-sectors like feed, hatchery and farm appliances, poultry biologicals, feed analysis and disease diagnostics, modern mechanized poultry and egg processing plants, vertical and horizontal integration in poultry farming, availability of soft credit, and above all, ever-increasing demand of poultry products, etc.
- The Institute has been serving as the nerve centre for popularizing ducks, Japanese quails, native fowls, Guinea fowls and turkey and disseminating their germplasm in the nook and corner of the entire Country. The high performing improved germplasm has been in very high demand due to their high suitability for the concept of 'production by masses'. The pure lines of important breeds of diversified poultry species are being maintained at the Institute.

The Institute has also been providing focused support to the industry by providing entrepreneurship development and business incubation facilities.

Mandate

- Basic and applied research on productivity enhancement for sustainable production in diverse avian species.
- Human resource development and capacity building.

Major R & D Activities

- The Institute is committed to the requirements of the small poultry entrepreneurs on one hand and is also responsive to the problems and challenges faced by the commercial poultry industry on the other hand. A wide range of challenges faced by the poultry industry are being addressed by the institute, some of which are outlined below:
- Genetic improvement, characterization and propagation of diversified poultry species through selective breeding and molecular techniques, research in frontier areas and conservation of native poultry species.
- Basic and applied aspects of poultry nutrition including alternate feed resources for reduction in cost of poultry production, diagnostics and consultancy services in feed analysis and quality assurance etc.
- Physiological interventions for improved reproduction, digestion and stress management.
- Development of value added and functional poultry products, innovative techniques for preservation, packaging and shelf life enhancement, processing and utilization of poultry by-products.
- Poultry waste utilization as source of green energy.
- Providing training, advisory and consultancy services including agribusiness incubation facilities and technology licensing.
- Development and dissemination of poultry production technologies through various extension methods, germplasm supply and publication of books/bulletins.





ORGANOGRAM

DIRECTOR

INSTITUTE MANAGEMENT COMMITTEE

RESEARCH ADVISORY COMMITTEE (RAC)

INSTITUTE RESEARCH COUNCIL (IRC)

ADMINISTRATION

SCIENTIFIC

AUXILIARY

DIVISIONS

- * Avian Genetics & Breeding
- * Avian Nutrition & Feed Technology
- * Avian Physiology & Reproduction
- * Post-Harvest Technology

SECTIONS

- * Post-Graduate Education & Training
- * Avian Medicine
- * Poultry Housing & Management
- * Poultry Economics & Agribusiness Research
- * Prioritization, Monitoring & Evaluation
- * Technology Transfer

EXPERIMENTAL FARMS

- * Quail
- * Turkey
- * Guinea Fowl
- * Desi Fowl
- * Layer
- * Broiler
- * Emu
- * Demonstration Shed

SERVICE UNITS

- * Hatchery
- * Feed Storage & Processing Unit
- * Agriculture Knowledge Management Unit
- * Institute Technology Management Unit
- * Agribusiness Incubation Center
- * Library
- * Poultry Processing Unit

- * Bill and Cash
- * Establishment
- * General and Contract Audit and Accounts
- * Central Store
- * Telecommunication
- * Transport
- * Record
- * Hindi Cell

- * Vigilance Cell
- * Publication Cell
- * Engineering and Maintenance Unit
- * Security Section
- * Estate Section
- * Games and Sports Unit
- * Staff Welfare Club
- * Medical Unit
- * Marketing Centre
- * Germplasm Cell



3. RESEARCH ACHIEVEMENTS

Programme 1: Productivity Enhancement of selected avian species

Sub Programme- (i) Enhancement of productivity, reproductive efficiency and immune-competence of selected diversified poultry species along with development of improved package of practices.

Genetic improvement in broiler and layer type domesticated Japanese quails

Different CARI quail lines completed 3rd generation. The hatchability and mortality in different varieties of Japanese

quails were studied under the ideal incubation and brooding conditions. CARIUTTAM quails recorded the highest hatchability (on total egg set basis) of 62.35% and the lowest mortality of 5.02% (Table).

Table: The hatchability and mortality percentage of domesticated Japanese quail lines

Variety	Total eggs collected	Good chicks	Hatchability % (TES)	Mortality (no.)	Mortality % (0-5 wks)
CARIUTTAM	5974	3725	62.35	187	5.02
CONTROL LINE	1265	637	50.35	67	10.52
CARIBROWN	2994	1788	59.72	113	6.32
CARISUNEHERI	2263	1147	50.68	97	8.45
CONTROL LINE	3100	1333	43.00	147	11.03
CARIUJJAWAL	1845	857	46.44	81	09.45
CARISWETA	2801	1190	42.48	96	08.07
CARIPEARL	1172	632	53.92	52	08.22
CONTROL LINE	2365	947	40.04	103	11.37

Performance of CARIUTTAM, CARIBROWN and CARISUNEHERI Japanese quails:

At 5 weeks, CARIUTTAM, CARISUNEHERI and CARIBROWN had considerably higher body weights ($p < 0.01$) as against controls. Body weights of males and females in the control population at 5 week of age was reported to be 147.61g and 157.62g, respectively (Table). Highest FCR was found in CARIUTTAM 2.44 ± 0.43 followed by CARIBROWN, CARISUNEHERI and CONTROL lines.

Table: Mean $\pm$ SE of 5 wk BW (g) and FCR of domesticated Japanese quails among different genetic groups

VARIETY	BW		FCR
	Male	Female	
CARIUTTAM	200.61 $\pm$ 0.92	216.67 $\pm$ 0.98	2.44 $\pm$ 0.43
CONTROL LINE	165.68 $\pm$ 0.68	178.62 $\pm$ 0.63	3.56 $\pm$ 0.22
CARIBROWN	171.06 $\pm$ 0.47	187.26 $\pm$ 0.68	3.02 $\pm$ 0.03
CARISUNEHERI	171.67 $\pm$ 0.69	183.29 $\pm$ 0.67	3.16 $\pm$ 0.04
CONTROL LINE	147.61 $\pm$ 0.51	157.62 $\pm$ 0.53	3.76 $\pm$ 0.04

The Age of Sexual Maturity (ASM), egg weight at 18 weeks (EW18) and egg production at 18 weeks (EP18) for CARIBROWN and CARISUNEHERI are presented in table

Table: Mean $\pm$ SE of Egg production (numbers) & Egg weight of the age 18 wks of age in domesticated Japanese quails among different genetic groups (n-300).

VARIETY	ASM (days)	EW18	EP18 (n)
CARIBROWN	43.41 ^b $\pm$ 0.07	12.67 $\pm$ 0.07	39.24
CARISUNEHERI	50.37 ^c $\pm$ 0.11	12.66 $\pm$ 0.08	37.21
CONTROL LINE	57.67 ^c $\pm$ 0.12	10.12 ^c $\pm$ 0.06	31.26

The highest dressed weight was in CARIUTTAM males and females @175.47 $\pm$ 1.56g & 184.56 $\pm$ 1.79g followed by CARISUNEHERI @159.98 $\pm$ 1.97g & 166.34 $\pm$ 1.74g and CARIBROWN @152.72 $\pm$ 1.87g & 165.98 $\pm$ 1.92g, respectively (Table).

Table: Slaughter traits of domesticated Japanese quails in different genetic groups

Variety	Sex	PSLWT (g)	CAR WT (g)	BR (g)	TH (g)	BA (g)	WI (g)	NK (g)	DP (%)
CARIUTTAM	Male	175.47 $\pm$ 1.56	128.92 $\pm$ 1.14	45.82 $\pm$ 0.46	29.41 $\pm$ 0.36	34.22 $\pm$ 0.49	18.73 $\pm$ 0.27	2.75 $\pm$ 0.08	73.88 $\pm$ 0.14
	Female	184.56 $\pm$ 1.79	138.51 $\pm$ 1.30	49.91 $\pm$ 0.57	32.47 $\pm$ 0.48	36.95 $\pm$ 0.55	20.06 $\pm$ 0.32	7.42 $\pm$ 0.12	75.60 $\pm$ 0.21
CARISUNEHERI	Male	159.98 $\pm$ 1.97	113.02 $\pm$ 1.28	40.20 $\pm$ 0.49	26.20 $\pm$ 0.33	29.21 $\pm$ 0.80	13.95 $\pm$ 0.30	3.46 $\pm$ 0.09	71.77 $\pm$ 0.34
	Female	166.34 $\pm$ 1.74	119.48 $\pm$ 1.28	44.88 $\pm$ 0.69	30.59 $\pm$ 0.49	34.86 $\pm$ 0.69	18.19 $\pm$ 0.43	7.55 $\pm$ 0.15	71.96 $\pm$ 0.18
CARIBROWN	Male	152.72 $\pm$ 1.87	108.41 $\pm$ 1.28	38.76 $\pm$ 0.58	24.62 $\pm$ 0.45	28.80 $\pm$ 0.50	13.11 $\pm$ 0.24	3.13 $\pm$ 0.09	71.02 $\pm$ 0.16
	Female	165.98 $\pm$ 1.92	119.11 $\pm$ 1.36	45.15 $\pm$ 0.55	31.08 $\pm$ 0.49	33.77 $\pm$ 0.72	18.16 $\pm$ 0.41	7.50 $\pm$ 0.16	71.25 $\pm$ 0.21

PSLWT: Pre-Slaughter Weight, CAR WT: Carcass weight, BR- Breast, TH- Thigh, BA- Back, WI- Wing, NK- Neck, DP- Dressing Percentage, Means bearing different superscripts within column differ significantly ($p < 0.01$)



The heritability estimates of CARIBROWN and CARISUNEHERI at 5 weeks of age were 0.256 ± 0.056 and 0.581 ± 0.096 , respectively (Table). The heritability estimates of ASM, EP18 and EW18 in CARIBROWN were estimated 0.221 ± 0.153 , 0.068 ± 0.167 , 0.358 ± 0.152 and the corresponding values were for CARISUNEHERI were 0.155 ± 0.151 , 0.065 ± 0.123 and 0.456 ± 0.145 , respectively. The best heritability estimates for the production traits were reported in CARISUNEHERI (Table).

Table: Heritability of growth traits in Japanese quails from 1-5 week of age

Traits	$h^2 \pm SE$	CARIBROWN	CARISUNEHERI
Hatch		0.284 ± 0.058	0.656 ± 0.087
WK1		0.152 ± 0.066	0.266 ± 0.079
WK2		0.341 ± 0.083	0.448 ± 0.076
WK3		0.210 ± 0.057	0.197 ± 0.080
WK4		0.165 ± 0.053	0.293 ± 0.075
WK5		0.256 ± 0.056	0.581 ± 0.096

*Heritability: $h^2 \pm SE$

Table: Genetic and phenotypic correlations for body weight during 0- 5 weeks for Japanese quails (CARIUTTAM™)

CARIUTTAM	Hatch	WK1	WK2	WK3	WK4	WK5
Hatch	-	0.052 ± 0.021	0.016 ± 0.021	0.043 ± 0.021	0.042 ± 0.021	0.027 ± 0.021
WK1	0.312 ± 0.001	-	0.450 ± 0.016	0.026 ± 0.020	0.018 ± 0.020	0.004 ± 0.020
WK2	0.148 ± 0.248	0.515 ± 0.001	-	0.070 ± 0.020	0.070 ± 0.020	0.031 ± 0.020
WK3	0.434 ± 0.175	0.328 ± 0.001	0.226 ± 0.347	-	0.596 ± 0.013	0.316 ± 0.018
WK4	0.009 ± 0.150	0.145 ± 0.001	0.256 ± 0.291	0.763 ± 0.119	-	0.348 ± 0.018
WK5	0.142 ± 0.189	0.300 ± 0.001	0.146 ± 0.363	0.892 ± 0.194	0.642 ± 0.180	-

Lower diagonal metrics indicates genetic correlations while the upper one shows phenotypic correlations

Genetic improvement of turkey for higher body weight
Establishing feed efficient turkey (Meleagaris gallopavo) line using metabolism related candidate gene polymorphism and gut microbiome information
Genetic improvement and genomics in pearl variety of Guinea fowl

Studies on certain dietary antioxidants and their interaction in poultry

Experiment 1: The impact of varying dietary levels of copper (Cu) and iron (Fe) on the growth performance and immune response of growing turkey poults in experimental cages was examined. An 8-week feeding trial utilized a 3x3 factorial design with three levels of copper (8, 12, and 16 mg/kg) combined with three levels of iron (73/67, 80/67, and 100/80 mg/kg). Turkey poults fed a diet containing 16/16 mg Cu/kg with 100/80 mg Fe/kg exhibited significantly higher body weight (BW), body weight gain (BWG), feed efficiency (FE), livability, humoral immune response, and immune organ weight during both 0-4- and 5-

Table: Heritability of production traits in Japanese quails

Traits	CARIBROWN	CARISUNEHERI
ASM	0.221 ± 0.153	0.155 ± 0.151
EP8	0.068 ± 0.167	0.065 ± 0.123
EP 18wk	0.358 ± 0.152	0.456 ± 0.145

Genotypic and Phenotypic Correlation for body weight in CARIUTTAM™

The estimates of genetic and phenotypic correlations among body weights at different ages for CARIUTTAM™ Japanese quails were similar in magnitude and direction (table). The genetic correlation for CARIUTTAM™ ranges from 0.009 ± 0.150 to 0.892 ± 0.194 . The highest genetic correlation values were observed at WK 5 and WK 3. The phenotypic correlation values ranged from 0.004 ± 0.020 to 0.596 ± 0.013 .

8-weeks of age. However, cell-mediated immune response was not influenced by the dietary treatments. Additionally, hemoglobin concentration, packed cell volume, and serum calcium levels were enhanced, and the heterophil to lymphocyte ratio was reduced ($p < 0.05$). Serum uric acid concentration was also lowered ($p < 0.05$). In terms of tibial bone morphometrics, there was an increase in bone length, proximal width, and weight, along with a greater degree of mineralization (bone ash, calcium, and phosphorus). Higher concentrations of copper and lower concentrations of zinc were observed in tibial portions. Significantly greater tibia bone Cu and Fe content was noted in the diet containing 16/16 mg Cu/kg with 100/80 mg Fe/kg.

Based on the findings, it was concluded that a dietary combination of 16/16 mg copper/kg with 100/80 mg iron/kg provides an optimal balance to support production, immunity, and skeletal health in growing turkey poults during 0-4 and 5-8-weeks of age.

Table: Effect of Cu and Fe on growth and immune response of poults

Treatments		BWG (gm)	FI (gm)	FCR	Foot web	HA titre
Cu (mg/kg)	Fe(mg/kg)	0-8wks	0-8wks	0-8wks	Index mm)	(log2)
Interaction effect (Cu × Fe)						
8/8	73/67	951	2537	2.67 ^c	1.14	3.22 ^{ab}
	80/67	1006	2408	2.40 ^{ab}	1.28	3.30 ^{abc}
	100/80	1021	2397	2.35 ^{ab}	1.32	3.38 ^{bcd}



12/12	73/67	989	2536	2.57 ^c	1.22	3.18 ^a
	80/67	1009	2454	2.4 ^{4b}	1.29	3.49 ^{de}
	100/80	1067	2497	2.34 ^{ab}	1.45	3.62 ^{ef}
16/16	73/67	1022	2375	2.32 ^{ab}	1.37	3.39 ^{bcd}
	80/67	1068	2465	2.31 ^{ab}	1.35	3.47 ^{cde}
	100/80	1128	2547	2.26 ^a	1.68	3.74 ^f
Pooled SEM		10.33	18.88	0.02	0.05	0.05
Main effect between Cu levels						
8/8		993 ^a	2448	2.47 ^b	1.25	3.31 ^m
12/12		1022 ^a	2496	2.45 ^b	1.32	3.43 ⁿ
16/16		1073 ^b	2463	2.30 ^a	1.47	3.53 ^o
Main effect between Fe levels						
73/67		987 ^a	2483	2.52 ^b	1.24	3.26 ^x
80/67		1028 ^b	2443	2.38 ^a	1.30	3.42 ^y
100/80		1072 ^c	2480	2.32 ^a	1.49	3.58 ^z
Probabilities						
Interaction		NS	NS	P<0.05	NS	P<0.05
Between Cu levels		P<0.01	NS	P<0.01	NS	P<0.01
Between Fe levels		P<0.01	NS	P<0.01	NS	P<0.01

Means bearing superscripts in the same column differ significantly (P<0.05)

Experiment 2: The effect of different dietary levels of copper (Cu), iron (Fe), and zinc (Zn) on the growth performance and immune response of CARIVIRAT growing poults in experimental cages was investigated. The 8-week study utilized two levels of Cu (16/16 and 20/20 mg/kg), each paired with two levels of Fe (80/67 and 100/80 mg/kg), and each combined with two levels of Zn (70/65 and 90/85 mg/kg). Poults fed with a dietary combination of 16/16 mg Cu/kg, 100/80 mg Fe/kg, and 70/65 mg Zn/kg demonstrated significantly enhanced BW, BWG, and FE during 0-4 and 5-8 weeks of age. Serum calcium, phosphorus, and total protein levels also showed significant

increments (p<0.05). These dietary groups exhibited significantly higher tibial bone weight, bone ash, zinc, and calcium content. Notably, higher tibial bone copper content was observed with a diet of 16/16 mg Cu/kg and 80/60 mg Fe/kg. Additionally, significant increases in iron (Fe) and manganese (Mn) content were found in the 16/16 mg Cu/kg diet and 100/80 mg Fe/kg diet.

The study concluded that a dietary combination of 16/16 mg copper/kg, 100/80 mg iron/kg, and 90/85 mg zinc/kg is sufficient to ensure optimal growth performance, immune response, serum biochemical parameters, and skeletal health in growing turkey poults during 0-4/5-8 weeks of age.

Table: Growth and immune response of turkey poults as influence by variable levels of Cu, Fe and Zn in the diet:

Treatments			Growth			Immunity	
Cu (mg/kg)	Fe (mg/kg)	Zn (mg/kg)	Body wt. gain(g/b)	Feed intake(g/b)	FCR	Foot web index (mm)	HA Titre (log2)
Interaction effect (Cu × Fe × Zn)							
16/16	80/67	70/65	1131	2592	2.30	1.123 ^{ab}	4.125
16/16	80/67	90/85	1150	2626	2.29	1.455 ^b	3.944
16/16	100/80	70/65	1151	2550	2.22	1.076 ^{ab}	4.124
16/16	100/80	90/85	1120	2570	2.30	1.100 ^{ab}	4.216
20/20	80/67	70/65	1095	2492	2.28	1.265 ^{ab}	3.913
20/20	80/67	90/85	1034	2436	2.36	0.891 ^a	4.178
20/20	100/80	70/65	1151	2620	2.28	0.868 ^a	3.750
20/20	100/80	90/85	1085	2512	2.32	1.159 ^{ab}	4.318
Pooled SEM			9.14	18.82	0.01	0.06	0.04
Between Cu levels							
16/16			1138 ⁿ	2584	2.27	1.188	4.102
20/20			1091 ^m	2515	2.31	1.046	4.039
Between Fe levels							
80/67			1102	2536	2.30	1.183	4.040
100/80			1127	2563	2.28	1.051	4.102
Between Zn levels							
70/65			1132	2564	2.27	1.083	3.978 ^p
90/85			1097	2536	2.31	1.151	4.164 ^q

Means bearing superscripts in the same column differ significantly (P<0.05)



Experiment 3: An eight-week study on CARIVIRAT turkey poults tested five diets (D1-D5) with varying levels of vitamin E and ascorbic acid was carried out employing a completely randomized design (CRD), with each treatment replicated four times, totaling 32 poults per treatment. The findings revealed that the diet with 50 mg of vit-E and 100mg/kg of ascorbic acid (D2) led to the highest BWG, FE, and survivability among poults aged 0-8 weeks. The control group (D1), with only 11mg of vitamin E and no ascorbic acid, showed a significantly lower immune response and

higher alanine amino transferase (ALT) levels. Higher dietary levels of vitamin E and ascorbic acid resulted in increased serum cholesterol and tibia bone length, particularly in D2 and D3 groups. Conversely, the control group had lower bone quality indicators. Economically, the D2 diet proved most cost-effective, suggesting that 50mg of vitamin E with 100mg/kg of ascorbic acid is optimal for growth, immunity, serum biochemistry, bone health, and cost-efficiency in growing turkeys during their first 8 wk.

Table: Effect of feeding different levels of supplemental vitamin E and ascorbic acid on growth and immune response of turkey poults

Treatments	Vitamin E (mg/kg)+ Vitamin C (mg/kg)	Body weight gain 0-8wks (g)	Feed intake 0-8wks (g)	FCR 0-8wks	Foot web index	HA titre (log2)
D1(Control)	11+0	995.41 ^{abc}	2372.87	2.47	0.43 ^a	2.96
D2	50+100	1068.64 ^c	2260.49	2.16	0.77 ^b	3.28
D3	50+200	1058.19 ^{bc}	2552.52	2.49	0.69 ^b	2.75
D4	100+100	973.94 ^{ab}	2262.08	2.35	0.91 ^b	2.70
D5	100+200	950.71 ^a	2396.17	2.59	0.71 ^b	3.06
Pooled SEM		13.60	40.21	0.05	0.04	0.13
P		(p≤0.05)	NS	NS	(p≤0.01)	NS

Means bearing superscripts in the same column differ significantly (P<0.05)

Exploring herb, essential oils, plant and plants natural compounds for development of natural growth promoter

Experiment 1: Pomegranate peel based agro-waste has been used in crumble form for feeding of broilers (N=288). Crumbles were prepared in different composition and materials and were name as Crumble PBE and Crumble PBL. Dietary treatment group were fed with T₁ or control (basal diet), T₂ (T₁ + 6.25 g/kg Crumble PBL), T₃ (T₁ + 8.75 g/kg Crumble PBL), T₄ (T₁ + 6.25 g/kg Crumble PBL), T₅ (T₁ + 8.75 g/kg Crumble PBE) and T₆ or antibiotic control (T₁ + 335 mg/kg CTC). Dietary supplemented groups (T₂, T₃, T₄ and T₅) performed better than T₁ and T₆ groups, with T₅ acclaimed to have superior FI, FCR and BWG (P<0.05). Overall, better immune responses have been recorded in treatment groups

with T₃ and T₅ groups having better (P<0.05) humoral and cell-mediated immunity. With respect to serum biochemistry, intestinal dimensions no significant difference could be observed among treated and control birds. Coliform counts were decreased with concomitant increase in lactobacillus in crumble fed groups with better counts in T₅ group. For jejunal histo-morphometry, significant difference was observed for VW (P<0.05), VH (P<0.01), CD (P<0.01) & VH:CD (P<0.05) with highest value observed in T₄ group, however VH:VW ratio and CW remain unaffected. Significant (P<0.05) reduction for HL ratio and corticosterone in T₂ & T₅ group respectively. In conclusion, prepared crumbles from agro waste under hot humid conditions enhance the growth performance, immune response, gut health and reduced stress.

Table: Effect of Antioxidant Crumble PBL & Crumble PBE supplementation on nutrient utilization in broiler chicken

Treatment	Dietary Supplement	Moisture (%)	DM (%)	N-retained (%)	Ca-retained (%)	P-retained (%)
T1	0	28.83±1.40	71.16±1.40	57.26±1.24	41.14±1.08	48.85±1.21
T2	6.25 g/kg Crumble PBL	26.50±1.38	73.50±1.38	57.51±1.16	39.54±0.87	47.74±1.52
T3	8.75 g/kg Crumble PBL	27.83±1.16	72.16±1.16	58.36±0.79	41.62±1.70	49.82±1.02
T4	6.25 g/kg Crumble PBE	27.33±1.20	72.66±1.20	56.38±1.14	40.52±1.47	48.92±1.07
T5	8.75 g/kg Crumble PBE	31.84±2.28	68.16±2.28	56.75±1.47	43.87±0.35	51.13±1.48
T6	335 mg/kg CTC (Antibiotic Control)	30.79±0.60	69.16±0.60	56.07±1.82	41.14±0.96	51.10±1.23
	P	0.090	0.091	0.843	0.205	0.369



Fig. 1: Humoral immune response

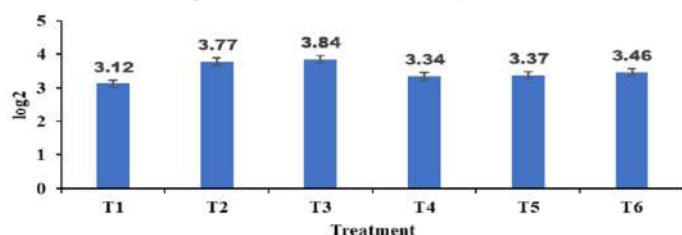
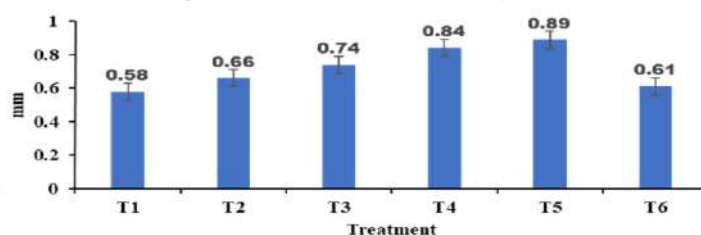


Fig. 2: Cell-mediated immune response



Experiment- 2: Two protein sources were used for preparation of two types of crumbles named as Crumble PBE and Crumble PDE. Rest all the ingredients were the same. A total of 120 days old (8×5×3) broiler chicks with uniform body weights were raised in 3 treatment groups. Three diets based on maize-soyabean were formulated: T1 (control diet), T2 (T1 + 8.75 g/kg Crumble PBE), T3 (T2 + 8.75 g/kg Crumble PDE). The experiment showed significant improvement in body weight during 0-3 and 0-6 weeks of age. Amongst all dietary treatments, no significant difference in carcass characteristics or organs weight were recorded. The dietary addition of both antioxidant crumbles had a significant impact on the immune response of birds. Treatment PBE had the

highest ($P \leq 0.05$) index of humoral immunity and cell-mediated immunity, followed by PDE. Both antioxidant crumbles supplemented groups revealed significant ($P < 0.05$) reduction for Heterophil: Lymphocyte (H/L) ratio and corticosterone level as compared to control group. Highest increase in RBC, HB, MCHC and PCV were observed in PDE supplemented group followed by PBE. A significant increase ($P > 0.05$) total protein and decrease in uric acid. Organoleptic/sensory evaluation and characteristics of meat of broiler supplemented with PBE group was significantly better ($P > 0.05$) as compared with other treatment groups. In conclusion, PBE crumble enhanced the growth performance, immune response and gut health of broiler.

Table: Effect of feeding antioxidant crumbles on carcass and organ weight (% of live weight)

Treatment	Carcass yield					Organ weight						
	Breast	Thigh	Leg	Back	Neck	Heart	Liver	Gizzard	Spleen	Bursa	Thymus	Fat
T1	206.50	139.17	151.00	220.33	28.67	7.26 ^b	38.17	37.21	3.30	2.35 ^a	4.85 ^c	21.26 ^a
T2	229.83	135.33	141.00	196.17	29.83	8.20 ^{ab}	31.16	36.31	3.28	1.57 ^c	6.58 ^b	13.53 ^b
T3	264.33	161.83	136.67	227.00	38.33	10.45 ^a	38.39	38.92	3.71	1.27 ^{bc}	7.20 ^a	13.67 ^b
T4	236.17	149.50	150.33	235.00	30.17	8.56 ^{ab}	35.16	35.34	3.10	1.77 ^b	4.73 ^c	15.85 ^b
T5	244.50	148.67	138.00	216.67	31.33	9.82 ^a	36.65	36.67	3.92	1.16 ^d	7.51 ^a	13.51 ^b
SEM	4.26	2.53	3.19	5.46	0.91	0.22	0.78	0.80	0.13	0.08	0.28	0.82
p	0.30	0.25	0.84	0.58	0.70	0.01	0.04	0.76	0.17	0.02	0.01	0.08

Table: Effect of feeding antioxidant crumble on serum biochemical parameter of broiler chicken

Treatment	Protein (g/dl)	Cholesterol (mg/dl)	Triglyceride (mg/dl)	Alkaline Phosphate	Albumin (g/dl)	Globulin (g/dl)	A/G Ratio
T1	3.93 ^a	122.02	93.41	113.25	1.82	2.81	0.64
T2	4.74 ^b	131.42	98.70	112.22	1.75	2.92	0.59
T3	4.63 ^b	142.85	102.69	112.05	1.71	2.9	0.60
T4	4.73 ^b	130.29	98.27	112.74	1.79	2.94	0.62
T5	4.80 ^b	134.36	99.67	113.94	1.88	2.92	0.64
SEM	2.14	2.54	1.42	1.26	0.03	0.14	0.02
p	0.03	0.12	0.52	0.98	0.76	0.42	0.98

Identification and evaluation of locally available unconventional feed resources for poultry production and nutrigenomic studies in NEH region

The impact of Mulberry leaf powder (MLP) on the performance of local coloured broiler chickens was investigated wherein four dietary treatments were formulated in accordance with the Bureau of Indian Standards (BIS). These treatments included a control diet (T1) and three diets in which MLP replaced wheat bran at 50% (T2), 75% (T3), and 100% (T4), respectively. The results indicated a significant increase ($P \leq 0.05$) in average feed intake across all levels of MLP replacement. Notably, body weight was significantly higher ($P < 0.05$) in the 75% and 100% MLP replacement groups, while the 50% replacement group

exhibited body weights comparable to the control. Furthermore, the 50% MLP replacement group showed improved body weight gain and feed conversion ratio (FCR) compared to other treatment groups. The inclusion of MLP did not significantly affect the proportions of breast, neck, back, wings, liver, gizzard, heart, pancreas, and spleen. However, the 50% MLP replacement group demonstrated a notable increase in carcass weight and drumstick yield. Serum biochemical parameters remained unchanged across all groups. Histopathological examination revealed a significant increase in villi width and surface area in the 50% MLP group compared to others. In conclusion, this study suggests that MLP can safely replace wheat bran up to a 50% level in the diets of local coloured broiler chickens without adverse effecting growth performance or carcass traits.



Table: Effect of dietary supplementation of mulberry leaves powder on production performance in locally available coloured birds

Diet	Body weight (g)			Feed Intake (g)			FCR		
	0-3 wks	3-6 wks	0-6 wks	0-3 wks	3-6 wks	0-6 wks	0-3 wks	3-6 wks	0-6 wks
T1	391.19	749.93	1041.12 ^b	717.91	1720.32 ^b	2337.23 ^a	1.84 ^a	2.29	2.24
T2	386.19	752.52	1038.71 ^b	786.88	1922.33 ^b	2709.21 ^b	2.04 ^b	2.55	2.61
T3	373.84	698.87	975.71 ^a	837.75	2060.31 ^b	2769.06 ^b	2.24 ^b	2.95	2.84
T4	362.58	681.71	940.29 ^a	838.94	2040.44 ^b	2799.38 ^b	2.31 ^b	2.99	2.98
SEM	13.33	17.23	28.23	32.45	43.62	65.24	0.23	0.42	0.34
P	NS	NS	≤0.05	NS	≤0.05	≤0.05	≤0.05	NS	NS

Values bearing different superscripts in a column differed significantly (P)

Multi-strain postbiotics as an alternative to antibiotic growth promoter

Supplementation of postbiotics derived from *Lactobacillus acidophilus* (*L. acidophilus*) at a concentration of 0.2% in broiler chicken feed resulted in significant enhancements (P<0.001) in performance metrics, immune response, gut health, and antioxidant activity in the jejunum tissue, surpassing both antibiotic-treated and control groups. Notably, postbiotics contributed to the proliferation of *Lactobacillus* populations while reducing the abundance of gram-negative bacteria.

Further investigations into the combined supplementation of postbiotics derived from *L. acidophilus* (LP) and *L. plantarum*

(LA) at concentrations of 0.2% and 0.6%, respectively, demonstrated marked improvements in body weight, weight gain, feed intake, and feed conversion ratio (FCR) in broilers, suggesting a synergistic effect of the postbiotics. LA based postbiotic at 0.2% significantly improved body weights, FCR, immunity anti-oxidant activity (Table 8), villus height, width and crypt depths suggesting better absorptive functionality (Table 9). Postbiotics of LA 0.2%+ LP 0.6% significantly improved body weights, FCR, immunity, anti-oxidant activity (Table). villus height, width and crypt depths suggest better absorptive functionality

Table: Effects of dietary supplementation of postbiotics on production, immunity and antioxidant activity in broiler chicken (21d)

Treatment No	BW (g)	FCR	HI {SRBC} (log2)	CMI {pHAP} (mm)	Jejunal anti-oxidant (Trolox) mM
T1 (BD+MRS)	1394.78 ^e ±10.71	1.90 ^a ±0.01	2.71 ^b ±0.11	0.63 ^c ±0.05	0.89 ^c ±0.02
T2 (CTC)	1631.03 ^b ±10.34	1.77 ^b ±0.03	3.01 ^b ±0.13	0.78 ^{ab} ±0.04	1.02 ^b ±0.01
T3 Probiotic	1478.65 ^{cd} ±11.43	1.80 ^{ab} ±0.05	2.76 ^b ±0.20	0.72 ^b ±0.08	1.04 ^a ±0.00
T4 (0.2% Postbiotic)	1677.52 ^a ±10.60	1.75 ^b ±0.04	3.36 ^b ±0.21	0.80 ^a ±0.03	1.05 ^a ±0.00
T5 (0.4% Postbiotic)	1512.78 ^c ±8.41	1.79 ^{ab} ±0.02	3.11 ^b ±0.15	0.73 ^b ±0.12	1.05 ^a ±0.00
T6 (0.6% Postbiotic)	1474.48 ^{cd} ±10.35	1.81 ^a ±0.04	4.01 ^a ±0.23	0.66 ^c ±0.04	1.03 ^{ab} ±0.00
P Value	0.000	0.000	0.001	0.001	0.000

Table: Effects of dietary supplementation of postbiotics on intestinal (jejunum) histomorphometry of broiler chicken (21d)

Treatments	Villus height (µm)	Villus width (µm)	Crypt depth (µm)	Crypt width (µm)
T1 (BD+MRS)	915.03 ^b ±14.59	102.36 ^c ±4.70	86.47 ^{bc} ±7.14	29.07 ^b ±1.85
T2 (CTC)	1060.51 ^a ±14.65	150.65 ^{ab} ±15.25	116.50 ^{ab} ±5.06	47.41^a±5.67
T3 Probiotic	867.72 ^b ±31.19	117.39 ^{bc} ±16.59	73.01 ^c ±14.83	30.49 ^c ±1.68
T4 (0.2% Postbiotic)	1149.38^a±10.08	180.05^a±9.32	149.37^a±7.65	37.82 ^{ab} ±2.24
T5 (0.4% Postbiotic)	1076.90^a±42.28	152.29 ^{ab} ±9.29	100.37 ^{bc} ±4.59	42.70 ^{ab} ±6.77
T6 (0.6% Postbiotic)	921.51 ^b ±10.56	115.72 ^{bc} ±4.55	77.67 ^c ±1.72	33.54 ^{ab} ±2.33
p	0.000	0.000	0.000	0.015



Fig. (L-R): Histological architecture of broilers fed with basal diet with MRS broth, basal diet with chlortetracycline and basal diet with postbiotics

Table: Effects of dietary supplementation of postbiotics combination on production, immunity and antioxidant activity in broiler chicken (21d)

Treatment No	BW (g)	FCR	HI {SRBC} (log2)	CMI {pHAP} (mm)	Jejunal anti-oxidant (Trolox) mM
T1 (BD+MRS)	1394.78 ^e ±10.71	1.90 ^a ±0.01	2.71 ^b ±0.11	0.63 ^c ±0.05	0.89 ^e ±0.02
T2 (CTC)	1631.03 ^b ±10.34	1.77 ^b ±0.03	3.01 ^b ±0.13	0.78 ^{ab} ±0.04	1.02 ^b ±0.01
T3 Probiotic	1478.65 ^{cd} ±11.43	1.80 ^{ab} ±0.05	2.76 ^b ±0.20	0.72 ^b ±0.08	1.04 ^a ±0.00
T4 (0.2% Postbiotic)	1677.52 ^a ±10.60	1.75 ^b ±0.04	3.36 ^b ±0.21	0.80 ^a ±0.03	1.05 ^a ±0.00
T5 (0.4% Postbiotic)	1512.78 ^c ±8.41	1.79 ^{ab} ±0.02	3.11 ^b ±0.15	0.73 ^b ±0.12	1.05 ^a ±0.00
T6 (0.6% Postbiotic)	1474.48 ^{cd} ±10.35	1.81 ^a ±0.04	4.01 ^a ±0.23	0.66 ^c ±0.04	1.03 ^{ab} ±0.00
P Value	0.000	0.000	0.001	0.001	0.000

Table: Effects of dietary supplementation of postbiotics on intestinal (jejunum) histo-morphometry of broiler chicken (21d)

	Villus height (μm)	Villus width (μm)	Crypt depth (μm)	Crypt width (μm)
T1 (BD+MRS)	820.42 ^c ±8.24	70.83 ^c ±2.84	83.69 ^c ±6.11	21.72 ^a ±3.39
T2 (CTC)	894.32 ^{bc} ±5.23	140.14 ^a ±4.94	117.64 ^{abc} ±7.10	36.24 ^a ±5.07
T3 Probiotic 1	873.18 ^{bc} ±8.62	97.69 ^{bc} ±3.19	90.11 ^{bc} ±8.07	24.53 ^{bc} ±2.82
T4 Probiotic 2	872.85 ^{bc} ±9.05	84.52 ^{bc} ±3.75	91.57 ^{bc} ±8.05	35.81 ^a ±3.08
T5 (0.2% Postbiotic – L.A)	931.02 ^{abc} ±7.30	95.98 ^{bc} ±8.51	96.26 ^{abc} ±9.46	34.49 ^{ab} ±4.41
T6 (0.6% Postbiotic – L.P)	995.98 ^{ab} ±6.73	91.33 ^{bc} ±2.44	124.22 ^{ab} ±6.09	24.85 ^{bc} ±3.51
T7 (0.2% L.A. + 0.6% L.P.)	1068.59 ^a ±8.64	103.65 ^b ±5.51	132.79 ^a ±8.92	23.86 ^{bc} ±1.27

Reproductive rejuvenation in commercial and desi spenthens

Berseem, leguminous forage and a rich source of natural phytoestrogens (isoflavones) were collected and dried in shade and subsequently ground to a fine powder and later incorporated @ 0.75% in laying feed of 60 weeks old adult CARISONALI hens (n=72 birds). The formulation induced an overall increase of 8% hen day egg production with a higher incidence of brightly colored yolks and lower bird mortality under summer stress. Further, berseem leaf powder @ 0.75 % aided as a restorative phytogenic feed additive (PFA) to curtail production losses (up to 12%) and mortality (6%) in

commercial layer strains when exposed to THI of 85 and above.

Effect of embryonic thermal conditioning on epigenetic modifications and postnatal thermo-tolerance in Japanese quails.

The effect of higher temperatures (39.5 °C & 40.5 °C) for 10 hr/day during the early (6-8 day) and late (12-14 day) embryonic development of Japanese quails was studied. The eggs kept under the standard conditions (at 37.5 °C) served as control group. In treatment groups for the rest of the days, all the groups were kept as control group. The experimental design was as follows:

Incubation temperature/duration	Embryonic Day	
	6-8 (early)	12-14 (late)
39.5°C for 10 hr/day	T2	T3
40.5°C for 10 hr/day	T4	T5

Control (T1): At 37.5°C from D0-D17

The mean hatchability in control, T1, T2, T3, T4 & T5 were 51.08±1.812, 49.17±1.62, 50.01±1.27, 48.33±1.95 and 50.83±1.32 percent, respectively. There was no significant difference among control and treatment groups (Fig. 1).

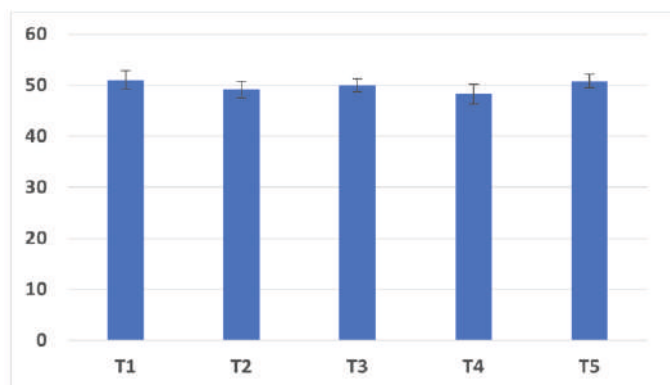


Fig: Graph showing mean percentage hatchability in different groups.

Thus, higher temperatures (39.5 °C & 40.5 °C) during the early (6-8 day) and late (12-14 day) embryonic development for 10 hours/day did not affect the hatchability in Japanese quails.

Quality assessment of feed stuffs and poultry feed

A total of 305 feed samples received from various public and private sector agencies pertaining to various feed ingredients and compounded feed/ concentrates were analyzed for proximate principles, minerals, adulterants and toxicants etc.

Monitoring of poultry diseases and implementation of bio-security measures including vaccination for achieving better survivability and productivity in CARI birds (Service project)

- The Avian Medicine Unit monitored the disease incidence in different poultry species, in different seasons and also during with different production profile in order to ensure early detection of disease/infection. Disease presence was monitored based on sero-surveillance. Regular necropsy of deceased birds and histological approaches were adopted for disease diagnosis. Strategies were devised and implemented for effective health management including proper prophylactic measures.
- For effective deworming, all the birds were given multi-vitamins and anti-stress agents in drinking water one day prior to deworming and the programme of deworming was implemented as per prescribed schedule for specific species.
- To prevent the infectious agents in the farms, biosecurity measures were strengthened. A total of 2,92,200 vaccine doses have been employed in different poultry species of CARI farms. This includes 124000 doses of live attenuated strains of Newcastle disease including booster dose; 7500 doses of Intermediate strain of Infectious bursal disease vaccine including booster dose, 35500 doses of Marek's disease vaccine (HVT-3), 22000 doses of mesogenic strain of NDV (R2B) and 27000 doses of fowl pox vaccine. Vaccination data suggests that diversified poultry species receives least vaccination doses compared to chicken counterparts.

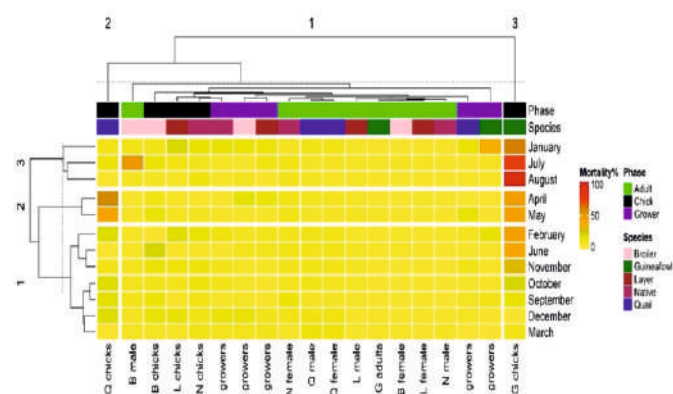
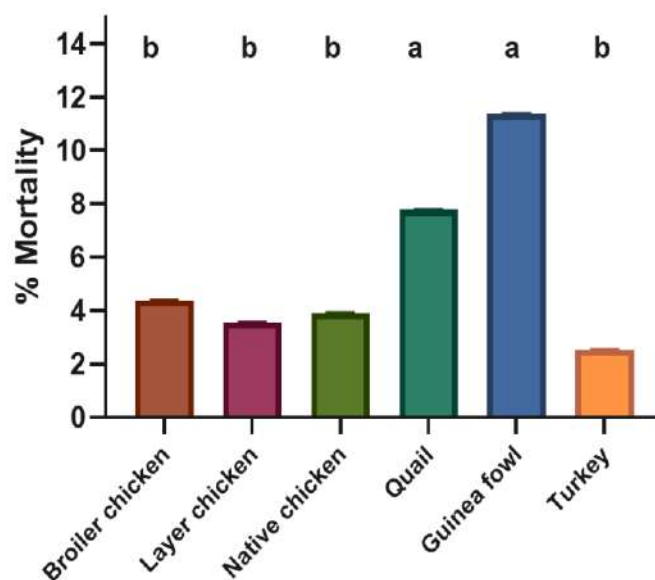
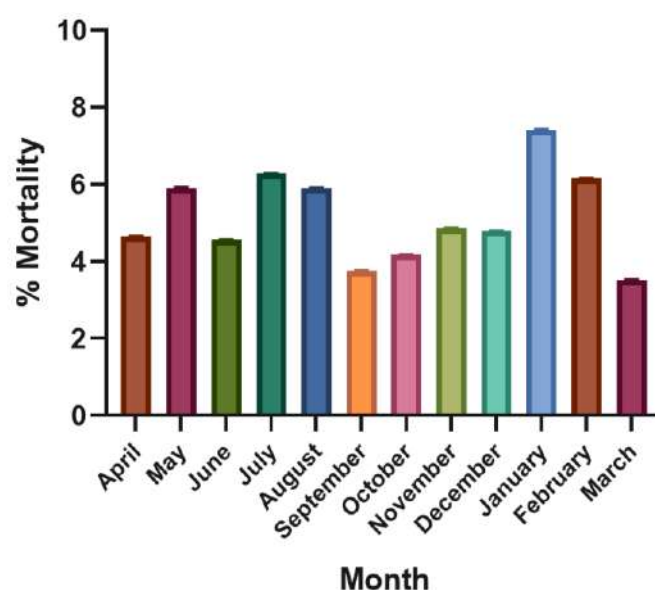


Fig. Heat maps showing the hierarchical cluster of mortality patterns in different diversified poultry species during different production stages and seasons. Each row represents a season, species, production phase and each column represent an experimental unit belonging to a specific category. The tree was constructed using the package "Complex Heatmap" of the R software version 4.0.3 (R Core Team, 2020). Different colours indicate production stage and species. Colouring from Light to dark indicates the zero to higher mortality in all species.





Diseases diagnosed in diversified poultry species (from January to December 2023)

Species	Diseases diagnosed
Broiler	Heat stroke, Histomoniasis, Complicated chronic respiratory disease, Pneumonia, Air sacculitis, Bacterial hepatitis
Layer	Heat stroke, Visceral Gout, Coccidiosis, Pneumonia Egg peritonitis, Salpingitis, Bacterial Hepatitis
Native	Visceral Gout, Egg peritonitis, Septicaemia, Colisepticaemia, Omphalitis, Infectious bursa disease
Quail	Brooder pneumonia, brooding mortality
Guinea fowl	Unabsorbed yolks, spraddled legs, Nephrosis, Pneumonia



Suspected case of salpingitis in white layers chickens



Pericarditis and peri-hepatitis with characteristic golden yellow coloured fibrin deposition in CARILED layer chickens (a suspected case of Complicated chronic respiratory disease)



Concave lesions with saucer shaped necrotic focal ulcers in liver

Production of DOCs of diversified poultry germplasm

With an incubation and hatching capacity of approximately 80,000 eggs at a time, the Experimental Hatchery Section has several major responsibilities: hatching the required number of replacement stock for various pure line/pedigreed flocks, including chickens, quails, turkeys, guinea fowl, and other germplasm maintained at CARI; hatching commercial and parent stock broilers, layers, and Desi breeds for supply to various government and private poultry farms; supplying embryonated eggs and day-old chicks to IVRI and CARI for vaccine preparation and experimental purposes, supporting their academic and research mandates; providing essential support for teaching

and conducting practical sessions in graduate and postgraduate courses on incubation and hatching; conducting specialized training courses on "Incubation and Hatchery Management" in collaboration with the Technology Transfer Section and Post graduate Education & Training section for poultry entrepreneurs and government/private personnel; and offering consultancy services for establishing poultry hatcheries and resolving specific issues for government and private personnel.

On the whole the average hatchability in various germplasm on fertile egg set (FES) basis was recorded 80.37 percent during 2023. At occasion the highest hatchability (FES) 97.44% was obtained in Layer chicken.

Hatching Performance of Various Germ Plasm of The Year – 2023

TYPE OF BIRDS	TOTAL EGGS SET	FERTILE EGGS (%)	HATCHABILITY ON EGG SET (%)	HATCHABILITY ON FERTILE EGG SET (%)	NUMBER OF GOOD CHICKS HATCHED
LAYER	35163	58.80 (44.89-82.60)	51.07 (40.59-74.31)	86.85 (76.14-97.44)	17957
BROILER	33531	79.32 (39.13-90.16)	70.11 (33.33-80.15)	88.38 (55.56-95.24)	23507
QUAIL	33161	61.62 (52.57-71.79)	42.78 (34.79-55.71)	69.43 (64.60-70.60)	14187
GUINEA FOWL	46616	48.64 (35.04-70.82)	29.52 (10.00-64.75)	60.69 (29.30-91.44)	13761
TURKEY	20179	59.84 (27.08-71.80)	47.13 (15.74-61.57)	78.76 (58.12-86.96)	9510
DESI FOWL	92918	54.19 (30.09-77.92)	46.83 (10.73-71.83)	86.42 (27.38-94.16)	43512
Other	4834	64.21 (48.28-89.47)	59.12 (27.27-85.21)	92.07 (64.29-96.84)	2858

Figure in parenthesis denotes minimum and maximum range.

Sub-Programme- (ii) Development of package of practices for rural poultry production system

Improving broiler parent lines and developing the meat type crosses for rural poultry production (AICRP Component)

The programme focused on improvement of coloured pure broiler chicken lines and the local native lines in order to

develop location-specific broiler-type cross for rural poultry farming. So far, 21 generations of selection based on 5 week's BW was completed in coloured broiler parent lines (CSML, CSFL). For local native chickens, mass selection for higher 16-wk body weight and mild culling for 40-week egg production in native chicken parent line was completed for S8 generation.



Table: Fertility and hatchability % of various stocks maintained at broiler farm

Line/ Strain	No. of Egg Set	Fertility (%)	Good Chicks	Hatchability % (TES)	Hatchability % (FES)
SML	1666	92.92	1246	75.09	80.81
SDL	1772	95.15	1402	81.94	86.12
CSFL(S21)	4043	88.42	3097	77.71	87.89
CSML (S21)	5698	82.78	4028	71.81	86.75
Control (S21)	1110	92.79	789	71.98	77.57
IC3	326	84.66	194	61.35	72.46
IR3	370	87.57	287	78.92	90.12
NNC	88	81.82	47	56.82	69.44
NNW	297	83.16	205	70.03	84.21
CARIBROTROPICANA	77	83.12	35	49.35	59.38
Desi pure	1369	84.44	844	68.96	81.66
Desi x CSFL	1585	85.62	1130	71.99	84.08

Table: Body weights at 5-weeks in different broiler lines

Broiler Lines	Body weights (gms) (Mean±SE)
SML	872.71±5.14
SDL	807.42±4.98
CSFL	957.57±5.58
CSML	946.23±7.08
Control	735.05±5.19
Local native	457.87±3.58
IC3	757.23±29.29
IR3	952.95±28.59
NNC	946
NNW	735.60±34.15
CARIBROTROPICANA	686.23±72.64



CARIBROSAMRIDHI chicken

CARIBROSAMRIDHI

A region-specific desi broiler variant, named CARIBROSAMRIDHI, has been created specifically for meat production. This colored desi broiler chicken demonstrated exceptional meat quality when raised and fed under local practices. The key characteristics of this developed variety include:

- Attractive-multi coloured plumage and feather patterns as rural people like coloured birds from aesthetic point of view and better looking.
- Adaptability to the local climatic environment
- Longer shank length which help in self-protection from predators in backyard areas and larger breast angle which shows breast meat yield.
- Grow faster and attain a flavor profile in the meat that closely resembles that of desi chicken.
- Higher immune response,
- Low cost of production
- Higher net profit percentage
- Better dressing percentage to align more closely with that of commercial broiler chickens.
- Higher meat: bone ratio

Performance potential of CARIBROSAMRIDHI chicken

Day old chick weight (g)	35-37g
Body weight at 6 weeks (g)	650-750g
Body weight at 12 weeks (g)	1630-1850
FCR at 12 weeks	2.64-3.22
Shank length at 12 weeks (cm)	9.13- 10.59
Dressing percentage at 12 weeks of age	68.63- 73.70
Meat: Bone	1.09-1.33

Results of the 57th Random Sample Broiler Test (2023-2024)

The 57th random sample broiler test was conducted at the Central Poultry Performance Testing Center (CPPTC) in Gurugram, Haryana, during the 2023-2024 period. The aim of the test was to assess the performance of various broiler commercial stocks in terms of key parameters such as body weight, feed conversion ratio (FCR), dressing percentage, and economic indicators. The following are the test results of broiler strains

Variety/Strain	Rank	BW	FCR	Receipts over feed cost
CARIOBRODHANRAJA	3	1.86	2.1	24.39
CARIBROVISHAL	2	2.0	1.85	43.67



Novel value-added poultry products

A nutritious novel sweet dish, CARI Egg Peda was prepared with blends of ghee, coagulated egg, khoa, sugar, oats and vanilla essence in appropriate proportions to give the shape and appearance of popular traditional Indian sweet dish, Peda. Compositional analysis revealed 28% protein with shelf life of 8-10 days at 4°C and 3-4 days at ambient temperature.



Ambient temperature

Refrigerated temperature



Aerobic packaging

Vacuum packaging

Optimization the welfare of broiler chickens with special emphasis on transport

Administration of CARI-COMFORT to broilers 3 days prior to transportation at 4.2g/L in drinking water induced immunity, reduction of weight loss by 6-7%, improved meat quality and overall welfare of the birds. CARI-COMFORT may be the strategic solution to address post harvesting losses in broiler production systems.

Development of training modules and digital applications for transfer of poultry production technologies

The knowledge level of trainees was assessed before and after the training programme on various aspects of poultry farming by developing customized Google forms. A total of 63.64% trainees had low level of poultry knowledge followed by 29.37% and 6.99% trainees having medium and no knowledge, respectively. None of the trainees possessed high level of knowledge. Assessment of trainees after training revealed that majority (60.84%) had high level of knowledge and 38.46% and 0.70% had medium and low knowledge levels suggesting that training programmes have enhanced the knowledge levels of trainees. The overall mean training scores pre and post-training sessions were 21.31 and 46.59, respectively ($p=0.000$). Trainees possessed highest knowledge on brooding management (43.87%) followed by health (42.81%), feeding (42.01%), housing (38.83%) and basic (32.33%) management of poultry. The pre-training average knowledge was minimum on health management (2.75) while maximum in the basic knowledge in poultry farming (6.28). In case of post-training, average knowledge was found maximum in health care management aspect (6.6). This study indicated that online training

programs had effectively and successfully reduced the knowledge gap by communicating scientific knowledge about poultry farming to the trainees.

Innovative strategies to reduce post-harvest losses as well as to achieve better welfare of chicken

A total of six hundred and forty ($n=640$) freshly laid CARIPRIYA eggs were collected from the institute's poultry farm. These eggs were allocated into four experimental groups, each comprising 160 eggs, with four replicates per group and 40 eggs per replicate. The groups were designated as follows: T1 (Control): Eggs stored at room temperature (2-8 °C); T2: Eggs stored at 18°C; T3: Eggs stored at 28 °C; T4: Eggs stored at 38 °C. The eggs were evaluated at 0, 6th, 12th, 18th, 24th, 30th, and 36th days for parameters related to quality. Both the storage duration and temperature had a significant impact on nearly all internal and some external quality parameters of the eggs. Notably, the air cell diameter increased with the egg's age, with a highly significant difference ($p<0.001$) observed between the treatment groups; T3 and T4 exhibited larger diameters than the others. Additionally, the yolk index and albumen viscosity decreased significantly ($p<0.05$) with prolonged storage and higher temperatures. There were marked deteriorations in Haugh units (HU), as influenced by the storage conditions. The albumen height notably decreased ($p<0.05$) as the eggs aged, especially after the 24th day of storage. The pH levels of the whole egg, albumen, and yolk increased significantly ($p<0.05$), in the eggs stored at 28°C and 38°C. In contrast, eggs kept in the refrigerator showed minimal changes compared to those stored at 18°C. Microbial analysis revealed that the Total Plate Count was significantly higher ($p<0.001$) in the T4 group compared to the others. Organoleptic evaluations rated eggs stored for over 12 days at 38°C and over 20 days at 28°C as poor. However, eggs from the T1 and T2 groups-maintained preference up to the 30th day of the study. The findings clearly indicate that eggs stored at 38°C begin to decline in quality after the 14th day, while those at 28°C start deteriorating after the 22nd day. Conversely, eggs maintained at 4°C and 18°C exhibited superior internal quality up to the 30th day.

Socio-economic empowerment of tribal population in selected districts of Uttar Pradesh and Uttarakhand through intervention of poultry technologies (DAPST)

- a) The programme to distribute growers (CARISHYAMA, CARINIRBHEEK and KADAKNATH) and feed to the selected tribal beneficiaries along with Awareness cum Training Camps was organized on July 11, 2023 in village Kumrah and August 18, 2023 in the village, Naugma thaggu, and Umrukalan Block- Khatima, District Udham Singh Nagar, U.K. which was attended by about 120 participants. In all, about 2016 Chicks and 21 quintal feed, mineral mixture, poultry rearing kit, drum, tub, poultry feeder & poultry drinker etc. were distributed to about 120 selected tribal beneficiaries under the programme.



b) Three day on campus training programme was organize on backyard poultry production for the beneficiaries of DAPST project on dated 19-21 Dec, 2023 . 31 tribal people were participated from Umru Khurd and Diyan village Khatima block, US

Nagar, U.K. One day on campus training Program was also organized. 86 beneficiaries were participated from Sainjini, Sisona, Sitarganj Block Uldhan, Khatima Block, Distt. U S Nagar.

Training and other activities during 2023 to 2024 Under DAPST project

Sl.	Date & Place	Activities	Villages covered	Distribution-beneficiaries	Awareness beneficiaries
01	21-02-2023 Village- Sainjini, Sitarganj Block, Distt. U S Nagar	To organize an awareness camp and collect feed- back from the beneficiaries on the distributed birds.	01, Sainjini	28	Mask and leaflets were distributed 28 beneficiaries.
02	21-02-2023 Village- Sisona, Sitarganj Block, Distt. U S Nagar	To organize an awareness camp and collect feed- back from the beneficiaries on the distributed birds.	01, Sisona	20	Mask and leaflets were distributed 20 beneficiaries
03	24-02-2023 Village- Uldhan, Khatima Block, Distt. U S Nagar	To organize an awareness camp and collect feed- back from the beneficiaries on the distributed birds.	01, Uldhan	30	Mask and leaflets were distributed 30 beneficiaries
04	01-03-2023 ICAR-CARI, Izatnagar, Bareilly, UP-243122	To organize a one-day hand on training programme to the beneficiaries of DAPST project	01, Village- ainjini, Sitarganj Block, Distt. U S Nagar	43	Participation Certificate was distributed to 43 beneficiaries.
05	02-03-2023 ICAR-CARI, Izatnagar, Bareilly, UP-243122	To organize a one day hand on training programme to the beneficiaries of DAPST project	01, Village- Uldhan, Khatima Block, Distt. U S Nagar	22	Participation Certificate was distributed to 22 beneficiaries.



06	03-03-2023 ICAR-CARI, Izatnagar, Bareilly, UP-243122	To organize an one day hand on training programme to the beneficiaries of DAPST project.	01, Village- Sisona, Sitarganj Block, Distt. U S Nagar	21	Participation Certificate was distributed to 21 beneficiaries.
07	11.07.2023 Khatima Block, dham singh Nagar (UK	To organize a camp and to distribute chicks & feed to the beneficiaries	Kumrha	55	55, beneficiaries
08	18.08.2023 Khatima Block, dham singh Nagar (UK	To organize a camp and to distribute chicks & feed to the beneficiaries	Naugma Thaggu	40	40, beneficiaries
09	11.09.23 Khatima Block, Udham singh Nagar (UK)	To organize Poultry Entrepreneurship Awareness camp.	Umru Khurd	50	50, beneficiaries
10	25.10.23 Khatima Block, dham singh Nagar (UK)	To organize Poultry Entrepreneurship Awareness camp.	Diyan	51	51, beneficiaries
11	22.11.2023 Khatima Block, dham singh Nagar (UK	To organize a camp and to distribute chicks, feed, mineral mixture,kit, drum & hut to the beneficiaries	Umru Khurd	63	63, beneficiaries
12	19-21 Dec 2023 Khatima Block, dham singh Nagar (UK)	To organize a three days poultry awareness training programme in cari to the beneficiaries of DAPST project.	Umru Khurd	30	Participation Certificate was distributed to 30 beneficiaries.

Entrepreneurship Opportunities and Skill Development for Self-sustainable Livelihood and Nutritional Security for Socially Privileged Groups (Scheduled caste)

A total of 27 training cum awareness programs were organized on poultry production (18), Goat farming (2), pig farming (3) and sewing machine training (5) in addition two kisan melas were organized wherein 1945 person from 91 different villages have participated. 9695 CARI germplasm CARINIRBHEEK/CARISHYAMA) with 11743 Kg feed, 116 goats with 280Kg feed, 24 pigs with 900 Kg Feed, 48 sewing

machines with 96 sewing machine kits, 38 solar panel alongside with other benefits were provided to the beneficiaries. Forty-two Self Help Groups (poultry farming, goat farming, pig farming, sewing and apparel training) with total 460 members, predominantly women were established to foster collaborative activities. In addition, one MOU under the chick mother unit was signed for rearing of CARI germplasm up to 4 weeks by the SC beneficiaries. Procured a cumulative total of 12,170 chicks, signifying a step towards sustainable economic empowerment.







Training and Other Activity during 2023 under DAPSC project

S.No.	Activity	Date	No of Trainees-Beneficiaries	No of Beneficiaries	Name of villages	No of birds/livestock/ Solar panel/sewing machines,etc
1.	On Campus Awareness Training Program Training on Solar Panel uses	08.05.2023	45	38	Gopalpur, Javeda, Bhagwanpur, Benipur, CB Ganj, Tulasherpur, Mithlapuri, Attakayasthan, Rithora etc.	38 (Solar panels)
2.	On Campus Awareness and Training Program on Pig Farming	31.05.2023	10	10	Simra Ajuba Begum	10 (Pigs) 300 Kgs (Feed)
3.	Off Campus Awareness and Training Program on Poultry	14.06.2023	65	100	Genda khali, Champawat (UK)	954 (Birds) 900 Kgs (Feed) 60 (Feeder, Drinker)
4.	On Campus CARI chitranshi, CARI SR SHG	15.06.2023	20	60	Jatav pura Rithora	14 (Pigs) 600 Kgs (Feed)
5.	On Campus Awareness and Training Program on Poultry	05.07.2023	35	20	Mastipur, Nagriya Kalan, Sagalpur	3 (Bukhari) 1008 (Birds) 900 Kgs (Feed) 24 (Feeder, Drinker)
6.	Off Campus Awareness and Training Program on Poultry	21.07.2023	65	30	Mathurapur, Javeda-Javedi	15 (Huts) 1510 (Birds) 1125 Kgs (Feed) 15 (Feeder, Drinker)
7.	On Campus Training Program on Poultry	31.07.2023	70	60	Tulasherpur, Benipur, Naryawal Chhoti Bihar, VDA Colony	04 (Huts) 1433 (Birds) 1500 Kgs (Feed) 40 (Feeder, Drinker)
8.	Off Campus Awareness and Training Program on Poultry	14.08.2023	92	58	Yakoobpur	15 (Huts) 950 (Birds) 1000 Kgs (Feed) 40 (Feeder, Drinker)
9.	On campus CARI Radhika, CARI Surbhi SHG on poultry	21.08.23	22	41	Darurapur, C.b Ganj	200 (Birds) 300 Kgs (Feed)
10.	Only Distribution for 6-SHG	05.09.2023			Daruapur, Mastipur, Nagariya Ritora, Pardauli, Sagalpur	12 (Bukhari)
11.	Off campus Awareness and Sewing Machine Training for 3-SHG	26.09.2023	45	20	Yakoobpur	
12.	Off campus Awareness and Sewing Machine Training for 2-SHG	12.10.2023	45	42	Chenamorarpur, Khajuriya-Zulfikar	



13.	On Campus Awareness and Training Program on Goat Farming & Distribution for 10-SHG	18.10.2023 to 21.10.23	100	28	Dandiya Nagla, Gunahattu, Javeda, Benipur, Saripur, Pardauli, Bohit, Ritora, Dhakiya, Laadpur,	50 (Goats) 980 Kgs (Feed)
14.	Off Campus Awareness and Sewing Machine Training for 4-SHG	28.10.2023	51	40	KVK, Pilibhit	-
15.	On campus Virat Kukkut Mela and exhibition	02.11.2023	370	2	CARI, Izatnagar	02 (Huts) 02 (Bukhari) 40 (Birds) 40 Kgs (Feed)
16.	Off campus awareness and birds distribution	07.11.2023 to 09.11.2023	59	40	Fazilpur	04 (Bukhari) 840 (Birds) 1000 Kgs (Feed) 40 (Feeder, Drinker)
17.	Off Campus Awareness and Sewing Machine Distributin for 4-SHG	11.11.2023	45	40	Bithorakhurd, Nuriya, Rampura, Auraiya, KVK	-
18.	Off Campus Awareness and Sewing Machine Training for 3-SHG	17.11.2023 to 01.12.2023	42	42	Chhoti Bihar, Dharampur, Dohra-Gautiya	-
19.	Off Campus Awareness and Sewing Machine Training for 2-SHG	19.11.2023 to 03.12.2023	35	28	Mandvabansipur, Deodas	-
20.	On Campus Training Program on Poultry and Distribution	24.11.2023 to 25.11.2023	35	26	Khoh	650 Kgs (Feed)
21.	Off campus Awareness prg. Training on poultry and Distribution	11.12.2023	42	26	Pipariya	650 Kgs (Feed) 26 (Feeder, Drinker)
22.	Off campus Awareness prg. Training and Distribution	19.12.2023	54	46	Dandiya Nagla	920 Kgs (Feed)
23.	On campus Kisaan Divas and sewing machine Distribution for 2-SHG	23.12.2023	40	28	Mandvabansipur, Deodas	14 (Sewing machines) 28 (Sewing Kits)
24.	On campus sewing machine Distribution for 2-SHG	27.12.2023	35	28	Chenamorarpur, Khajuriya-Zulfikar	14 (Sewing machines) 28 (Sewing Kits)



25.	Off campus Awareness prg. Training on poultry and Distribution	11.01.2024	40	32	Dhorera	501 (Birds) 800 Kgs (Feed)
26.	Off campus Awareness prog. Kukkut Mela and Exhibition, Fatehganj-West	12.03.2024	248	4	Fateh Ganj Paschimi Bareilly	04 (Huts) 60 (Birds) 80 Kgs (Feed) 4 (Feeder, Drinker)
27.	Off Campus Awareness and Training Program on Goat Farming & Distribution for 12-SHG	18.03.2024 to 21.03.2024	130	120	Sunoramorarpur, Bilpur, Amrita, Mastipur, Sundiyaba, Dhora, Bithri-Chenpur, Bhartol, Bhgbanpur Dhimri, HarHarpur Matkali, Bhgbantapur Aoundh,	66 (Goats) 1200 Kgs (Feed)

Chicks supplied through Mother Units (MOU) January to December, 2023

S.No.	Name	Fathers Name	Address	No. of chicks	No of chicks distributed	Village	Date
1	Gaurav Singh	Naredra Pal	C.B.Ganj, Bareilly	970	950	Genda kahli, UK	15.05.23
2	Sanjeev kumar	Suresh	56, New Type -I, IVRI Campus, Izzatnagar	1050	1008	Sagalpur, Nagariya Parikshit, astipur	26.05.23
3	Gaurav Singh	Narendra Pal	C.B.Ganj, Bareilly	1593	1235	Mathurapur-khamriya, Jabeda-Jabedi	06.06.23
4	Sanjeev	Suresh	56, New Type -I, IVRI Campus, Izzatnagar	1500	1433	Tula Sherpur, Nariyawal, Choti Vihar, Benipur	27.06.23
5	Sanjeev	Suresh	56, New Type -I, IVRI Campus, Izzatnagar	1120	950	Yakoobpur	11.07.23
6	Parmanand	Murari Lal	Jatavpura, Rithora	860	840	Fazilpur	06.10.23
7	Gaurav Singh	Naredra Pal	C.B.Ganj, Bareilly	1050	580	Khoh , Nawabganj	18.10.23
8	Gyan Dev Gautam	Ram Singh	Khalilpur road gali no.03 c.b ganj	1285	567	Pipariya- Bhojipura	31.10.23
9	Sanjeev Kumar	Suresh	56, New Type -I, IVRI Campus, Izzatnagar	1231	1080	Dandiya nagla, Baheri	10.11.23
10	Parmanand	Murari Lal	Jatavpura Rithora	878	501	Dohrera	05.12.23
11	Sanjeev kumar	Suresh	56, New Type -I, IVRI Campus, Izzatnagar	630	-	All Birds died due to cold.	29.12.23
12	Total chicks	Total MOU 04		Total chicks 12167	Buy back chicks-9144	Total village -16	



S.N	Self Help Group Name	Registration No	Number of Members	Benefit extended
	Poultry farming			
1.	CARI UTTAM SHG Village Sagalpur	UDYAM-UP-15-0023943	10	300 birds/300kg birds feed
2.	CARI TOTA RAM SHG Village Mastipur	UDYAM-UP-15-0029455	10	300 birds /300 kg feed
3.	CARI SHUBHAM SHG Village Itauwa	UDYAM-UP-15-0025734	10	300 birds /300kg feed
	Goat Farming			
4.	CARI SURENDER SHG Village Dandiya nagla	UDYAM-UP-15-0046957	10	5 Goat and 100 kg feed
5.	CARI NAVYA SHG Village Gunahattu	UDYAM-UP-15-0045656	10	5 Goat and 100 kg feed
6.	CARI VIRAT SHG Village Jabeda jabedi	UDYAM-UP-15-0032111	10	5 Goat and 100 kg feed
7.	CARI GYAN SHG Village pardholi	UDYAM-UP-15-0042588	10	5 Goat and 100 kg feed
8.	CARI ANUJ SHG Village Saripur	UDYAM-UP-15-0045352	10	5 Goat and 100 kg feed
9.	CARI CHARAN SHG Village Bohit	UDYAM-UP-15-0035231	10	5 Goat and 100 kg feed
10.	CARI SEEMA SHG Village Benipur	UDYAM-UP-15-0042082	10	5 Goat and 100 kg feed
11.	CARI DHAKIYA SHG Village Dhakiya	UDYAM-UP-15-0046367	10	5 Goat and 100 kg feed
12.	CARI LADPUR SHG Village Ladpur Usmanpur	UDYAM-UP-15-0047648	10	5 Goat and 100 kg feed
13.	CARI SK SHG Village JATAV PURA RITHORA	UDYAM-UP-15-0041837	10	5 Goat and 100 kg feed
14.	CARI USHA SHG Village Bhagbanpur dhimari	UDYAN-UP-15-0055298	10	5 Goat and 100 kg feed
15.	CARI RAJPAL SHG Village Amrita	UDYAM-UP-15-0055531	10	5 Goat and 100 kg feed
16.	CARI AMAR SHR Village bilpur	UDYAM-UP-15-0055260	10	5 Goat and 100 kg feed
17.	CARI SONI SHG Village Bhartol	UDYAM-UP-15-0055265	10	5 Goat and 100 kg feed
18.	CARI GANGA SHG Village Sundiyba	UDYAM-UP-15-0055488	10	5 Goat and 100 kg feed
19.	CARI LAXMI SHG Village Bithrichin pur	UDYAM-UP-15-0057226	10	5 Goat and 100 kg feed
20.	CARI SUPRIYA SHG Village Harharpur Matakali	UDYAM-UP-15-0058736	10	5 Goat and 100 kg feed
21.	CARI AMITA SHG Village Dohara gotiya	UDYAM-UP-15-0055739	10	5 Goat and 100 kg feed
22.	CARI REVTI SHG Village Sunora nurarpur	UDYAM-UP-15-0058207	10	5 Goat and 100 kg feed
23.	CARI MANOJ SHG Village mastpur sarawa	UDYAM-UP-15-0055710	10	5 Goat and 100 kg feed
24.	CARI RAMWATI SHG Village Bhagwantapur	UDYAM-UP-15-0058951	10	5 Goat and 100 kg feed
25.	CARI AUNDH SHG Village Aundha	UDYAM-UP-15-0058920	10	5 Goat and 100 kg feed

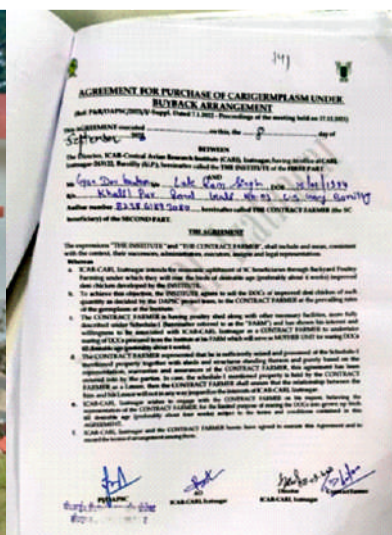


Pig farming

26.	CARI SHAURYA SHG Village Simra Ajooba Vegam	UDYAM-UP-15-0020514	10	10 pig and 300 kg feed
27.	CARI S.R SHG Village Dharampur	UDYAM-UP-15-0019486	10	7 pig 300 and kg feed
28.	CARI CHITANSHI SHG Village Javeda Javedi	UDYAM-UP-15-0031558	13	7 pig and 300 kg feed

Sewing and apparel training

29.	CARI YAKOOB SHG Village Yakoobpur	UDYAM -UP-15-0045037	14	7 Sewing machine and 14 material kits
30.	CARI RIDDHI SHG Village chadakyapuri	UDYAM-UP-15-0043817	14	7 sewing machine and 14 material kits
31.	CARI JAWEDA SHG Village Javeda javedi	UDYAM-UP-15-0046367	14	7 sewing machine and 14 material kits
32.	CARI VERSHA SHG Village Khajuriya julfikar	UDYAM-UP-15-0044425	14	7 sewing machine and 14 material kits
33.	CARI TURKY SHG Village Chainamurapur	UDYAMUP-15-0034204	14	7 sewing machine and 14 material kits
34.	CARI SAHYA SHG Village Rampura, Pilibhit	UDYAM-UP-15-0025318	10	5 sewing machine and 10 material kits
35.	CARI ARCHAN SHG Village Bhitara, Pilibhit	UDYAM-UP-15-0020044	10	5 sewing machine and 10 material kits
36.	CARI RAJ SHG Village Shivpuriya Pilibhit	UDYAM-UP-15-0023943	10	5 sewing machine and 10 material kits
37.	CARI PARI SHG Village Oraya Pilibhit	UDYAM-UP-15-0020514	10	5 sewing machine and 10 material kits
38.	CARI BHARTI SHG Village Chotibihar	UDYAM-UP-15-0047404	14	7 sewing machine and 14 material kids
39.	CARI M.L SHG Village Dharampur	UDYAM-UP-15-0027152	14	7 sewing machine and 14 material kits
40.	CARI ROOPWATI SHG Village Dohara	UDYAM-UP-15-0044575	14	7 sewing machine and 14 material kids
41.	CARI MAYA SHG Village Diyodash	UDYAM -UP-15-0032219	14	7 sewing machine and 14 material kits
42.	CARI SARVESH SHG Village Mandwa Banshipur	UDYAM-UP-15-0030152	14	7 sewing machine and 14 material kits





Creation of Self-Help Groups



Externally Funded Projects Poultry Entrepreneurship Development Initiative – The Agri Business Incubator

The entrepreneurs appeared to be more inclined towards rearing of native chicken particularly, Kadaknath, Aseel and their improved crosses on commercial scale due to growing demand owing to wide spread belief that consumption of native fowls and their products provided better overall immunity. One incubate M/s C & C Enterprises, Bareilly was

provided access to the ABI Laboratory for upscaling the licensed products (CARI Chicken Meat Bites and Quail Egg Pickle) in the ABI Centre of the Institute. The products so produced were marketed by the firm in the Mega Poultry Fair organized by the Institute for celebrating its Foundation Day on 02.11.2023. The success story of M/s A.H. Bater Poultry Farm, Meerut was prepared and published on the Institute's website. Following 4 incubates graduated the incubation programme.

Name of the incubate	Firm & Address
Ms. Swati Yadav	M/s Som Agro & Allied Products, Bareilly
Mr. Krishnapal Singh Rajput	M/s Haldhar Kadaknath Nandani Gram Post Nandni Tehsil Kalapipal Dist SHAJAPUR, MP
Md. Fazil	R/o H.No 11 Urdu Mohalla, Etawah, Uttar Pradesh-206001
Shri Tanvir Nizami	M/s Altan Farm Shop Pvt. Ltd., Amroha, U.P.

Enhancing livelihood security of farming community through livestock and crop integration using proven technologies (Famers' First Programme)

Technical support was proved to the farmers in adopted villages. Since no fund was received under operation head hence, no beneficiaries were inducted in the project during this period. To get set up poultry based integrated farming, a

survey was conducted and Naurangpur village block Alampur Zafrabad, Bareilly was opted. Sh Ramesh Singh, the selected farmer, got in agreement to set up the unit with the costing of about Rs 10 lakh wherein the support of approx. 2 lakh (20 % of unit cost) in terms of building materials will be provided under project. he works on establishing this unit has been initiated.



Model project and demonstration unit for backyard poultry, livestock, vermi-farming and moringa integration (RKVY)

Girigram Takniki Park demonstration unit – a poultry based mixed farming system comprising of moringa plantation, seasonal fodders like barseem, regica, cow-pea, seasonal vegetables, floriculture along with vermi-culture and maggot production was developed on one acre of land dedicated for the purpose. The system ensured availability

of low-cost feed for the poultry throughout the year and generated regular supplementary income. The Girigram Takniki Park technology was replicated at various farms on commercial scale in Varanasi and Hardoi U.P.; Nagpur, Maharashtra, Puranpur, U.K. and Kanyakumari, Kerala. Kadaknath and CARISHYAMA were maintained in the park (Table). The total number of egg produced was 16082.

Table : Details of breed and variety maintained in Girigram Takniki Park.

Breed	Opening balance		Additional birds added (2023-24)	Total poultry	Sold	Mortality	Closing balance
	Male	Female					
Kadaknath	-	107	81	188	201	63*	72
CARI Shyama	24	97	123	244			96
TOTAL	24	204	204	432			168

Enhancing the reproductive and productive efficiencies of chicken and alternate poultry species using artificial insemination (ICAR Emeritus Scientist Scheme)

Packaging of CARI poultry semen diluent and its testing for fertility at different time intervals in chicken

Fresh semen samples (sperm concentration above 5×10^9 /ml) were collected from White Leghorn (WLH) chickens in glass tubes of 5 ml capacity round bottom (length=7cm, diameter=1cm). Semen was diluted with CARI Poultry Semen Diluent at 1:2 to achieve the fixed volume (3 ml) and inseminated during late afternoon. Day of A.I. was considered as the “zero” day of fertilization and next day was considered day 1 and so on. Fertile eggs were collected till 7 days post insemination (dpi). Percent fertility was calculated based on candling and break-out analysis of eggs. One-way ANOVA revealed that percent

fertility was significantly ($p < 0.01$) higher (93.57) during 1-5 dpi than 5-7 dpi (87.57 ± 1.09). No significant difference in fertility was noticed irrespective of storage period (1-3 years) of CARI Poultry Semen Diluent when stored in powder form at low temperature ($3-7^\circ\text{C}$) in 50 ml capacity conical polypropylene sterile tubes. No change in colour was observed in powder form of diluent throughout storage period. Storage of semen diluent at RT resulted in its deterioration of physical characteristics and brownish-black colour within 2-3 weeks after storage. Hence, economically high fertility (above 90%) can be achieved 1-5 days after artificial insemination in chicken using CARI Poultry Semen Diluent. For field validation, insemination of Hubbard broiler breeder chickens revealed 95.37% fertility and 95.46% hatchability on a fertile egg set basis (based on 23206 eggs).



Table: Effect of post-insemination days (5 vs 7) on fertilizing ability of fresh spermatozoa of WLH chicken (Mean $\pm$ SEM, N=7).

Date of AI						Days Fertility period					
	1	2	3	4	5	Fertile/Total egg	%Fertility	6	7	Fertile/Total egg	% Fertility
07.11.2023	84	82	94	100	94	78/85	91	82	87	105/117	89
14.11.2023	100	88	94	94	88	75/81	93	71	75	97/111	87
21.11.2023	100	100	93	88	95	76/80	95	69	75	99/112	88
28.11.2023	100	100	100	100	93	73/74	99	81	73	97/105	92
05.12.2023	100	94	93	88	94	71/76	93	65	59	92/110	84
19.12.2023	93	100	92	88	87	69/75	92	73	83	87/98	89
27.12.2023	100	77	86	100	100	57/62	92	60	71	76/91	84
Total /Avg.						499/533	93.57 $\pm$ 1.02 ^a			653/744	87.57 $\pm$ 1.09 ^b

Mean values with different superscripts (a, b) in row differ significantly (P<0.01)



CARI diluent in powder form at room temperature- number 1 (turning blackish) and remaining at low temperature (unchanged colour)

Table: Field data on fertility and hatchability of commercial Hubbard broiler breeders chicken using CARI poultry semen diluent

Trials No.	Total egg set	Infertile	Fertile	%fertility	Total chicks	Hatchability (%)	
						TES	FES
1	88	02	86	97.72	83	94.31	96.51
2	354	11	343	96.89	309	87.28	90.08
3	265	15	250	94.33	232	87.54	92.80
4	265	09	256	96.60	249	93.96	97.26
5	352	17	335	95.17	324	92.04	96.71
6	353	23	330	93.48	322	91.21	97.57
7	269	13	256	95.16	249	92.56	97.26
8	21260	1359	19901	93.61	19013	89.43	95.53
Total	23206	1449	21757	95.37	20781	91.04	95.46

Identification of key molecular players specially lncRNAs involved in response to NDV challenge in indigenous and exotic chicken breeds using RNA-seq analysis

Immunological differences in indigenous (Aseel, Nicobari, Kadaknath) and commercial chicken (White Leghorn)

Chickens of different genetic background (White leghorn, Aseel, Kadaknath & Nicobari) were experimentally infected with velogenic NDV (G-VII) at 7 wk of age. Spleen, Proventriculus, caecal tonsils, lungs, thymus and blood samples were collected to assess the immunological differences at various time points post infection. Our study



revealed that Aseel manifested better survivability rate and less intense clinical signs on challenge with varied doses of the vNDV. Administration of virus at 108.83 and 107.83 EID₅₀ through intramuscular and oral/intra-ocular routes respectively caused 100% mortality in all chicken breeds at 4 days post infection (dpi). Administration of vNDV at 103.83 EID₅₀ resulted in at least 50% mortality in all breeds. Histopathological scoring of lesions in spleen, caecal tonsil and bursa were less in Aseel. Higher scoring in the spleen was perceived in WLH which indicates higher intensity of lesions in WLH when compared to Aseel. The protein level was also detected to be low in Aseel. On HA analysis, Aseel was found to exhibit higher titre that manifested a faster clearance rate of the virus from the body of the bird. A lower virus titre was pronounced in Nicobari when compared to Kadaknath. RNA seq analysis of spleen samples revealed the higher number of immune genes and cis-lncRNAs co-expressing with these genes than WLH (susceptible) suggesting playing a significant role in Aseel for disease resilience.

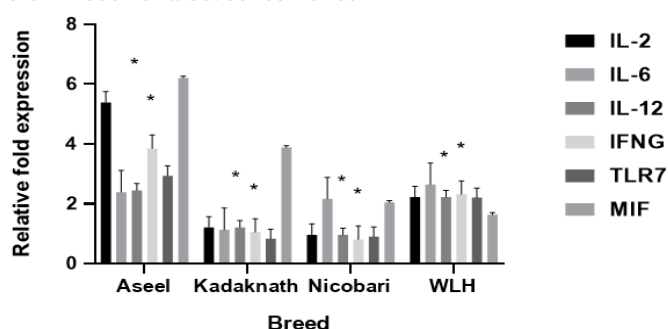


Fig. Interferon Gamma (IFNG) and Toll-like receptor 7 were significantly upregulated higher in Aseel and WLH than Nicobari and Kadaknath. Further higher IL-2 gene upregulation was observed in Aseel chickens.

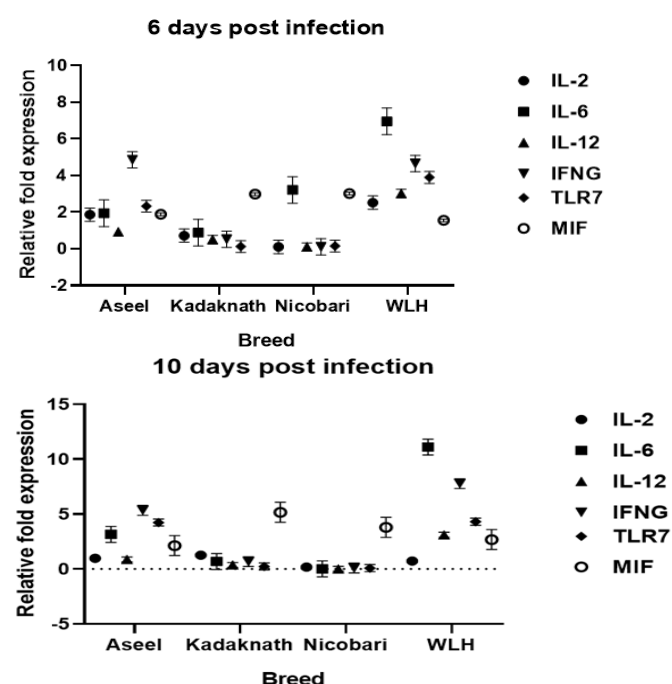


Fig (from top to bottom panel). Immune gene expression analysis in different chicken breeds from 2, 6 and 10 dpc. Interferon Gamma (IFNG), TLR7 and MIF were upregulated from 2 to 10 dpc in all breeds. IL2 and IL6 genes were upregulated in Aseel and WLH from 2 to 10 dpi.

Platinum Genome Assembly and Pan-Genome Variation to Identify Selection Signatures for conservation in Indian Red Jungle fowl (RJF)

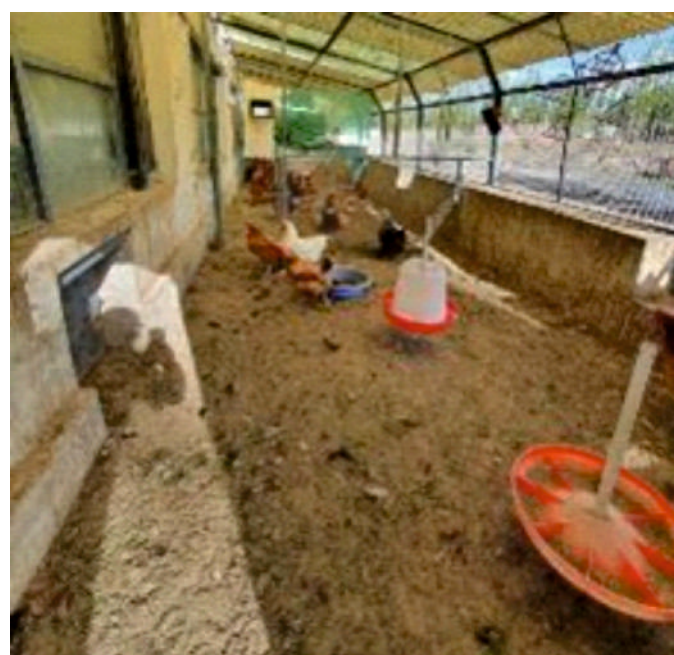
Survey regarding availability of RJF

In order to collect blood samples from RJF in the wild, sites were surveyed in different states and with the approval of the concerned authorities, noose traps along with rice as bait were used to lure the bird into the traps as per following schedule. The presence of RJF was ascertained with the help of forest guides and other signs, like calls, ground scraping marks for foraging, and bird droppings.

1. Runizuni - 2-01-2024 - Site survey (4.30 pm to 6.00 pm)
2. Runizuni - 3-01-2024 - Trap (6.30 am to 12.30 pm) - 500 noose traps
3. RTA1 - 4-01-2024 - Site survey (6.00 am to 7.00 am)
4. RTA1 - 4-01-2024 - Trap (7.30 am to 12.30 pm) - 1000 noose traps
5. Alikatta - 4-01-2024 - Site survey (3.00 pm to 6.00 pm)
6. Alikatta - 5-01-2024 - Trap (7.00 am to 10.30 am) (27 hrs) - 1000 noose traps
7. Karmaziri - 6-01-2023 - Trap (6.30 am to 6.30 pm) - 600 noose traps
8. Karmaziri - 7-01-2024 - Trap (6.00 am to 10.00 am) - 1500 noose traps

Development of climate resilient and sustainable agri-based systems for better food, feed, nutritional and livelihood security options to farming community of cold arid region-Ladakh

Local farmers were engagement for poultry shed facilities in Leh and nearby areas, particularly Nubra Valley. One progressive farmer and entrepreneur expressed interest in rearing and demonstrating CARI germplasm with the Institute's support. Plans are underway for developing an incubator tailored for high-altitude conditions.





Institute technology Management Project-National Agriculture Innovation Fund (NAIF)-Component-1

- A Trademark pertaining to the CARI Signature has been filed in seven different classes with application no.6083682-88 dated 26.08.2023.
- The design of CARI PORTABLE POULTRY INCUBATOR has been published vide application no. 366318-001 dated 26.05.2023 in Journal No.21/2023.

- A patent in respect of CARICOMFORT has been filed vide application no. 202311055661 dated 19.08.2023.
- A patent in respect of CARI PHYTOBIOTIC EGG SPRAY has been filed vide application no. 202311066448 dated 04.10.2023.

Sl.	Title	Inventors	Purpose	IP Status
1.	CARICOMFORT:	Dr Jaydip Rokade, Dr Prashant Patel, Dr Subrat Kumar Bhanja, Dr Akhilesh Kumar, Dr Ashok Kumar Tiwari and Dr Sandeep Saran	It has been formulated with an aim to prevent body weight loss in broiler chickens during their transportation and also to take care of their wellbeing/welfare. The product protects the birds against loss of proteins and electrolytes from meat because of drip loss process. Thus, the product ensures good meat quality with longer shelf-life.	The patent for the product/process has been filed vide application no. 202311055661 dated 19.08.2023.
2.	CARI PHYTOBIOTIC EGG SPRAY	Dr Jaydip J. Rokade, Dr Sonale Nagesh, Dr Akhilesh Kumar, Dr Ashok K. Tiwari, Dr Monika M, Dr Gautham Kolluri and Dr Sandeep Saran	The product helps in extending the shelf life of table eggs.	A patent for the product/process has been filed vide application no. 202311066448 dated 04.10.2023.
3.	CARI TOXOMIN:	Dr Avishek Biswas, Dr Chandra Deo, Dr Divya Sharma, Dr Basil Hyder PB, Dr Jaydip Rokade and Dr Ashok Kumar Tiwari	It is a herbal toxin binder for protection of feed and feed ingredients from mycotoxins. It helps to improve the production performance of broiler chicken when fed on CARI TOXOMIN supplemented feed and increases the profit margins of poultry farmers.	
4.	CARI-Sweet Egg Sausages	Dr Jaydip Rokade, Dr Ajit Singh Yadav, Dr Ashok Kumar Tiwari, Dr Abhijeet Champati, Ms Meenakshi Pathak, Dr Ashim K. Biswas and Dr Sandeep Saran.	It is an egg based product developed by incorporating whole egg and other functional ingredients using innovative processing method to improve its overall acceptability and shelf-life.	
5.	CARI Chicken Meat Badi	Dr Jaydip Rokade, Dr Ashok Kumar Tiwari, Dr Sandeep Saran, Ms Iqra Rafiq and Dr Monika M	The product contains 52-55% protein on dry matter basis and is very useful for health as well as immunity of the consumers. CARI Chicken Meat Baddi is a healthy food product suitable for cottage industry, that is rich in tradition and taste.	
6.	CARI EGG PEDA	Dr Jaydip Rokade, Dr Monika M Dr Sonale Nagesh Dr Wadajkar Prasad Dr Gauri Jairath Dr Ashim Biswas Dr Ashok Kumar Tiwari	CARI Egg Peda represents a novel approach to enhance the nutritional profile of traditional Indian sweets.	





Effect of “Aquaritin all in one supplement” in water on production performance, immune response and other parameters in broiler and layer chickens

Using a completely randomized design, 400 one-week-old female layer chicks (CARI-Priya) were evenly distributed into four treatment groups, each comprising 100 chicks. The groups were as T1: Control group with no supplement; T2: T1 + 3 ml of AS; T3: T1 + 5 ml of AS; T4: T1 + 7 ml of AS. The findings revealed that the T4 group, receiving 7 ml of AS, exhibited a significant increase in egg production by 7.5% and 10.5% at the 25th and 40th weeks of age, respectively, compared to the control group (T1). Notably, external egg quality parameters, such as egg weight and shell thickness, improved significantly ($P \leq 0.05$), suggesting a positive impact of Aquaritin on extending egg shelf life. Internal egg quality

parameters, including the albumin index and yolk quality, were significantly enhanced ($P \leq 0.05$) in the T3 and T4 groups compared to the control. Additionally, these groups showed a significant reduction in cholesterol levels and an increase in yolk content, indicating improved biochemical parameters. Mineral content, specifically calcium and phosphorus, significantly increased ($P \leq 0.05$) in the T3 and T4 groups, while protein and magnesium content also showed an upward trend. Incorporating Aquaritin AS into the drinking water of layer chickens positively impacts their production performance. The onset of sexual maturity advanced, and egg production notably increased in the groups supplemented with 7 ml of AS, underscoring the supplement's beneficial effects on the productive performance.

Table: Effect of supplementation of Aquaritin in water on production performance and egg quality traits on 40 weeks of age

Parameters	T1	T2	T3	T4
Egg laying age (days)	134	133	130	126
Egg production (%)	78.25	81.35	83.75	88.80
External Characters				
Egg weight (g)	53.15	53.22	53.34	53.89
Shape index (%)	73.53	74.33	73.67	74.56
Egg length (mm)	50.21	50.02	50.55	51.03
Egg width (mm)	36.92	37.18	37.24	38.05
Shell weight (gm)	5.01	5.30	5.42	5.40
Shell thickness (mm)	0.35	0.36	0.36	0.37
Internal Characters				
Albumen weight (gm)	33.39	32.65	32.51	32.28
Albumen length (mm)	82.05	82.15	82.56	82.72
Albumen width (mm)	72.65	72.79	72.99	73.03
Albumen height (mm)	7.24	7.55	7.70	7.85
Albumen index (%)	9.97	10.37	10.55	10.75
Albumin pH	7.99	8.05	8.12	8.09
Yolk weight (gm)	14.75	15.27	15.41	16.11
Yolk length (mm)	40.40	40.22	40.52	41.60
Yolk diameter (mm)	40.20	40.05	40.54	40.72
Yolk height (mm)	15.11	15.42	15.80	16.12
Yolk index (%)	37.59	38.5	38.97	39.59
Yolk pH	6.14	06.32	6.07	6.22

T1: Control; T2: 3 ml Aquaritin; T3: 5 ml Aquaritin; T4: 7 ml Aquaritin

Values bearing different superscripts in a row differed significantly ($P \leq 0.05$); NS=Non-Significant

Table: Effect of dietary supplementation of Aquaritin on biochemical properties of eggs on 25th and 40th weeks of age

Parameters	T1	T2	T3	T4	SEM	P-value
25 Weeks						
TBARS (mg MDA/ kg)	0.07a	0.08b	0.08b	0.08b	0.001	≤ 0.05
Free fatty acid (%)	0.09	0.09	0.09	0.10	0.002	NS
Peroxide value (meq /kg)	1.13	1.09	1.28	1.32	0.021	NS
Cholesterol (mg /100 g)	38.34b	36.13ab	33.89a	33.12a	0.345	≤ 0.05
40th Weeks						
TBARS (mg MDA/ kg)	0.07a	0.07a	0.07a	0.09b	0.001	≤ 0.05
Free fatty acid (%)	0.09b	0.08b	0.08b	0.06a	0.002	≤ 0.05
Peroxide value (meq /kg)	1.30	1.31	1.24	1.28	0.021	NS
Cholesterol (mg /100 g)	44.34b	41.13b	39.67a	38.22a	0.345	≤ 0.05

T1: Control; T2: 3 ml Aquaritin; T3: 5 ml Aquaritin; T4: 7 ml Aquaritin



Table: Effect of supplementation of Aquaritin in water on mineral content (mg/100 gm) on eggs on 25th and 40th weeks of age

Parameters	T1	T2	T3	T4	SEM	P-value
25 Weeks						
Protein	10.8	11.2	11.8	12.1	0.024	NS
Carbohydrate	0.7	0.7	0.8	0.8	0.001	NS
Calcium	57.2a	59.4a	61.2b	63.3b	0.125	≤0.05
Magnesium	11.2	11.6	11.7	12.0	0.022	NS
Phosphorous (µg)	190.2a	192.4a	195.5ab	198.2b	8.021	≤0.05
40th Weeks						
Protein	12.4	12.7	12.8	12.9	0.122	NS
Carbohydrate	0.67	0.69	0.69	0.71	0.003	NS
Calcium	59.1a	60.6a	63.3b	64.6b	0.652	≤0.05
Magnesium	11.9	12.2	12.8	13.1	0.134	NS
Phosphorous (µg)	193.1a	195.5a	198.0ab	203.3b	11.352	≤0.05

Values bearing different superscripts in a row differed significantly (P

Field assessment of biomass (Petroleum Byproduct) as a novel feed source in commercial broiler chicken

In order to evaluate the efficacy of the novel protein source, 4,000 commercial broiler chickens, divided into four groups to assess the impact of incorporating varying levels of biomass (0%, 2.5%, 5%, and 7.5%) into their diets, were raised over a period of six weeks. A corn-soybean meal-based basal diet was prepared for the pre-starter (22.0% protein and 3,000 kcal ME/kg), starter (21.5% protein and 3,050 kcal ME/kg), and finisher (19.5% protein and 3,100 kcal ME/kg) phases, following the ICAR 2013 guidelines. The dietary treatments included: T1 or control group: basal diet without biomass; T2: basal diet with 2.5% biomass; T3: basal diet with 5% biomass; T4: basal diet with 7.5% biomass. The results indicated a significant improvement in body weight (BW) and body weight gain (BWG) among the groups fed biomass, compared to the control group ($p < 0.05$). Feed conversion ratio (FCR) and feed intake (FI) remained similar across all groups. The cell-mediated immunity (CMI) response was higher in T4, although there was no difference in ELISA titres. Serum parameters such as total protein, albumin, globulin, ALT, and AST remained stable, while uric acid levels significantly

increased ($p < 0.05$) with the lowest values observed in the control group. The inclusion of 7.5% biomass in the diet enhanced the expression of nutrient uptake genes, positively influencing the birds' immunity, gut health, and overall economics. The study concluded that biomass could be effectively used as a protein source, replacing up to 7.5% of the conventional soybean meal in broiler chicken diets without adversely affecting production performance under standard experimental conditions (Table).

Table: Effects of dietary supplementation of biomass on cumulative FCR of broiler fed different dietary treatments

Treatment	14 th day	28 th day	42 nd day
T₁(Control)	1.22 ^a ±0.01	1.55 ^b ±0.02	1.77±0.05
T₂(2.5%)	1.19 ^{ab} ±0.01	1.53 ^b ±0.02	1.75±0.02
T₃(5%)	1.13 ^c ±0.02	1.44 ^a ±0.02	1.68±0.01
T₄(7.5%)	1.16 ^{bc} ±0.01	1.49 ^{ab} ±0.01	1.71±0.02
P Value	0.002	0.004	0.137





4. P.G. STUDENTS' RESEARCH AND EDUCATION

The Post Graduate Education and Training (PGET) Section coordinated and monitored the post graduate education programme leading to M.V. Sc., Ph.D. degree in Poultry Science (PSC) discipline and National Diploma in Poultry Husbandry (NDPH) course under the IVRI Deemed University, Izatnagar. The Section also organized the Specialized Training Courses (STC) in various aspects of PSC for different categories of

personnel carrying Poultry Production as a profession in various organization/ institution/departments etc. Additionally, the Section also co-ordinates PG education leading to M.V. Sc. and Ph.D. degree in Animal Genetics and Breeding/Animal Science/Livestock Production & Management /Poultry Science under the State Agricultural University/State Veterinary University.

Annual intake of PG Poultry Science students

Degree program	Discipline	Annual Intake	Degree awarded by
M.V. Sc.	Poultry Science	9	Deemed University, IVRI, Izatnagar
Ph.D.	Poultry Science	4+1*	
NDPH	Poultry Science	5	

*1 Student for ICAR-DPR, Hyderabad

Post graduate students on roll (38)

M.V. Sc. (22)	Ph.D. (16)
Dr Krishna K.S.	Dr Nagesh Sonale
Dr Mohammed Shameeh. P.	Dr Gautham Kolluri
Dr Hanmante Manoj Madhav	Dr Jagdhane Vinay Mohan
Dr Hishalo Tsela	Dr Azhagurja
Dr Rajvardhan	Dr Jayanti L. Agashe
Dr Eddula Praveen Kumar Yadav	Dr Monika M.
Dr Prashant Patel	Dr Mukesh T Nampalle
Dr Vikash Bhardwaj	Dr Abhijeet Champati
Dr Anjana P	Dr Simi Girija
Dr Basil Hyder P B	Dr Siddhartha Srivastava
Dr Landge Rajan Ramesh	Dr Gowthaman V
Dr K Nagabhushan	Dr Abdul Muneer Kandangal
Dr Gaikwad Shriram Anurath	Dr Vikash Bhardwaj
Dr Kurva Shiva Kumar	Dr Hudson G.H
Dr Mohit Kumar	Dr Sruthy Ravi
Dr Wadajkar Prasad Shivaji	Dr Kanmoni Goyari
Dr Deshpande Nilay Dnyaneshwar	
Dr Khandagale Sagar Raghunath	
Dr Priyanka Sharma	
Dr Buddhesh Lokesh Shrikisan	
Dr Priyanka Parte	
Dr Pradeep Rai	

Degree awarded from the IVRI Deemed University

Sl	Name/ roll no.	Thesis Title	Guide
Ph.D.			
1.	Dr Monika M (P-2268)	Post-biotic supplementation for performance and amelioration of endotoxin mediated stress in broiler chickens.	Dr J.S. Tyagi
2.	Dr Gautham Kolluri (P-2086)	Expression analysis of growth regulatory genes and optimization of CRISPR/Cas9 mediated gene editing of actin receptor type IIB (ACVR2B) in broiler chicken.	Dr Avishek Biswas
3.	Dr Mukesh T. Nampalle (P-2273)	Effect of dietary supplementation of para-probiotic on performance, immunity, gut health and their ameliorating efficacy of mycotoxicosis in broiler chicken.	Dr Avishek Biswas
4.	Dr Jayanti Agashe (P-2262)	Dietary interactions of zinc, copper and iron on the performance and skeletal health of turkey poults.	Dr Chandra Deo
5.	Dr Abhijeet champati (P-2311)	Assessment of resistance profile of E coli and evaluation of formic acid and thymol of alternatives to antimicrobials in turkey.	Dr A.S. Yadav



M.V. Sc.			
6.	Dr Manoj Hanmante (M-6371)	Standardization of dietary energy and protein levels for local desi broiler crosses chicken (CSML×Desi).	Dr Simmi Tomer
7	Dr Landge R. Ramesh (M-6334)	Field study on assessment of biomass as a novel protein source for broiler chicken production.	Dr Jaydeep Rokade
8.	Dr Shriram Gaikad (M-6370)	Effect of varying levels of vitamin E and ascorbic acid supplementation on the performance of CARI-VIRAT	Dr Chandra Deo
9.	Dr Basil Hyder P.B. (M-6333)	Development of an herbal toxin binder in broiler chicken.	Dr Avishek Biswas
10.	Dr Anjana P (M-6332)	Pre-incubation sex determination in fertile eggs of white leghorn using egg morphometry and hen's hormonal profile	Dr S.K. Bhanja

Seminars Organized

Major Credit Seminar			
Ph.D.			
1.	Dr Kanmoni Goyari (P-2544)	Role of migratory birds in transmission of avian influenza	19 th May,2023
2.	Dr Vikash Bhardwaj (P-2511)	Poultry farming at high altitude	19 th May,2023
3.	Dr G.H. Hudson (P-2536)	Internet of things (IOT) for smart poultry production	19 th May,2023
4.	Dr Abdul Muneer (P-2461)	Primordial germ cell mediated conservation in chickens	12 th Apr., 2023
5.	Dr Sruthy Ravi (P-2442)	Methods for detection and control of biogenic amines as food safety measure in poultry meat	12 th Apr., 2023
6.	Dr Sonale N. Sambhaji (P-2453)	Post-harvest losses in poultry its management, key initiatives and opportunities	12 th Mar.,2023
7.	Dr Siddhartha Srivastava (P-2439)	Welfare standards and related behavioral effects of commercial layer production	6 th Jan., 2023
8.	Dr Abdul muneer k (P-2461)	Nutrigenomics approaches to overcome the heat stress in poultry	16 th Oct., 2023
9.	Dr Hudson G. H. (P-2536)	Mechanisms and biomarkers of heat stress in chicken	16 th Oct., 2023
10.	Dr Sruthy Ravi (P-2542)	Commercial utilization of poultry manure	18 th Oct., 2023
11.	Dr Kanmoni Goyari (P-2544)	Herbal immune-modulators used in poultry	1 st Dec., 2023
M.V. Sc.			
12.	Dr Basil Hyder P.B. (M-6333)	Development of an herbal toxin binder in broiler chicken	20 th Oct., 2023
13.	Dr Despande Nilay D (M-6402)	A multi-faceted approach to litter management: exploring the advantages of litter and potential of emerging technologies	25 th Oct., 2023
14.	Dr Wadahkar Prasad Shivaji (M-6399)	Decoding the factors responsible for egg spoilage and enhancing egg quality by tackling microbial contamination	25 th Oct., 2023
15.	Dr Pradeep Rai (M-6459)	Early nutrition of broiler chicks	23 rd Nov., 2023
16.	Dr Shiva Kumar Kurva (M-6487)	Avian sex reversal	23 rd Nov., 2023
17.	Dr Sagar Khandagale (M-6421)	Abiotic stress factors in poultry and its mitigation	23 rd Nov., 2023
18.	Dr Lokesh Buddhe (M-6449)	Understanding the role Japanese quail production in the era of climate change	8 th Dec., 2023
19.	Dr Priyanka Sharma (M-6439)	Probiotic encapsulation technology	8 th Dec., 2023



Pre-thesis Submission Seminar

Sl.	Name/roll no.	Topic of seminar	Date
Ph.D.			
1.	Dr Monika M. (P-2268)	Post-biotic supplementation for performance and amelioration of endotoxin mediated stress in broiler chickens.	13.03.2023
2.	Dr Gautham Kolluri (P-2086)	Expression analysis of growth regulatory genes an optimization of CRISPER/Cas9 mediated gene editing of actin receptor type 11b (ACVR2b) in broiler chicken.	02.06.2023
3.	Dr Mukesh T. Nampalle (P-2273)	Effect of dietary supplementation of para-probiotic on performance, immunity, gut health and their ameliorating efficacy of mycotoxicosis in broiler chicken.	02.06.2023
4.	Dr Jaynti Agashe (P-2262)	Dietary interactions of zinc, copper and iron on the performance and skeletal health of turkey poults.	13.06.2023
5.	Dr Abhijeet Champati (P-2311)	Assessment of resistance profile of E coli and evaluation of formic acid and thymol of alternatives to antimicrobials in turkey.	29.08.2023
6.	Dr Simi Girija (P-2365)	Characterization of immunological responses against Newcastle disease virus in indigenous and exotic chicken.	01.12.2023
M.V. Sc.			
7.	Dr Manoj Hanmante (M-6371)	Standardization of dietary energy and protein levels for local desi broiler crosses chicken (CSML×Desi).	18.08.2023
8.	Dr Landge R. Ramesh (M-6334)	Field study on assessment of biomass as a novel protein source for broiler chicken production.	29.08.2023
9.	Dr Shriram Gaikad (M-6370)	Effect of varying levels of vitamin E and ascorbic acid supplementation on the performance of CARI-VIRAT	20.10.2023
10.	Dr Basil Hyder P.B. (M-6333)	Development of an herbal toxin binder in broiler chicken.	20.10.2023
11.	Dr Anjana P (M-6332)	Pre-incubation sex determination in fertile eggs of white leghorn using egg morphometry and hen's hormonal profile	20.07.2023

ORW Seminar

Sl.	Name/roll no.	Topic	Date
Ph.D.			
Nil			
M.V. Sc.			
1.	Dr Anjana P (M-6332)	Pre-incubation sex determination in fertile eggs of white leghorn using egg morphometry and hen's hormonal profile	19.01.2023
2.	Dr Landge R.R. (M-6334)	Evaluation of biomass in filed study as a newer protein source for broiler chicken production	19.01.2023
3.	Dr Basil Hyder P.B. (M-6333)	Development of suitable toxin binder for amelioration of aflatoxicosis in broiler chickens	03.02.2023
4.	Dr Shriram Gaikad (M-6370)	Effect of varying dietary supplementation of Vitamin E and 3 ascorbic acid on performance of CARI-VIRAT growing turkey poults	03.02.2023
5.	Dr Manoj M. Hanmante (M-6371)	Standardization of dietary energy and protein levels in desi broiler cross	15.02.2023
6.	Dr Rajwardhan Nimbalkar (M-6335)	Effect of conventional breeding techniques for development of Kadaknath type chickens	22.03.2023
7.	Dr Mohit Kumar (M-6372)	Effect of postbiotics supplementation on growth, behavioral and neuroendocrine responses in broiler chicken under heat stress	05.04.2023

Training organized for ARS probationers:

Sl.	Name of the Scientist	Duration	Type of training
1.	Dr Monika M	3 Months (30.07.23 to 31.10.23)	Professional attachment training
2.	Dr Geeta Pipaliya	3 Months (24.08.23 to 23.11.23)	Professional attachment training


List of courses for M.V. Sc. and Ph.D. students

Course Code	(Semester-1) Course Title	Theory (T)/ Practical(P)	Credit Hour(s)
PSC-601*	Poultry Breeding and Genetics	T+P	2+1
PSC-602*	Poultry Nutrition and Feeding	T+P	2+1
PSC-604*	Breeder Stock and Hatchery Management	T+P	2+1
PSC-605	Poultry Health and Biosecurity	T+P	2+1
PSC-606	Management of Other Avian Species	T+P	3+1
PSC-691	Major /Minor credit seminar	P	1
PSC-699	Research (For M.V. Sc.)	P	15
PSC-701*	Applied Poultry Nutrition	T+P	2+1
PSC-703	Development in Poultry Processing & Products Technology	T+P	2+1
PSC-707	Diversified Poultry Production	T+P	1+1
PSC-791	Major credit seminar	P	1
PSC-799	Research (For Ph.D.)	P	15

List of Course for M.V. Sc. and Ph.D. students

Course Code	(Semester-1) Course Title	Theory (T)/ Practical(P)	Credit Hour(s)
PSC-603*	Commercial Layer and Broiler Management	T+P	2+1
PSC-609*	Physiology of Poultry Production	T+P	1+1
PSC-607	Poultry Products Technology	T+P	2+1
PSC-608	Poultry Economics, Project Formulation and Marketing	T+P	2+1
PSC-610	Commercial Poultry Nutrition	T+P	1+1
PSC-611	Poultry Welfare and Waste Management	T+P	2+0
PSC-691	Major /Minor credit seminar	P	1
PSC-699	Research (For M.V. Sc.)	P	15
PSC-702*	Recent Trends in Commercial Poultry Production	T+P	2+1
PSC-704	Emerging Diseases of Poultry and Health Management	T+P	2+1
PSC-705	Applied Poultry Breeding	T+P	1+1
PSC-706	Poultry Economics, Marketing and Integration	T+P	2+1
PSC-791	Major credit seminar-II	P	1
PSC-799	Research (For Ph.D.)	P	15

List of Courses-NDPH (I and II Semesters)

Course Code	(Semester-1) Course Title	T/P- Cr. Hr
NPH-401	Principles of Poultry Nutrition	T-1
NPH-402	Analysis of Poultry Feeds	L-1
NPH-403	Egg Products Technology	T-1
NPH-404	Egg Processing Technology	L-1
NPH-405	Fundamentals of Avian Genetics	T-1
NPH-406	Quantification of Avian Genetics	L-1
NPH-407	General Avian Physiology	T-1
NPH-408	Physiological Evaluation	L-1
NPH-409	Incubation and Hatching	T-1



NPH-410	Hatchery Operation	L-1
NPH-411	Importance of Poultry Diseases	T-1
NPH-412	Diagnosis of Poultry Disease	L-1
(II Semester)		
NPH-413	Poultry Breeding	T-1
NPH-414	Evaluation of Breeding Techniques	L-1
NPH-415	Reproductive Physiology	T-1
NPH-416	Reproductive Physiological Techniques	L-1
NPH-417	Applied Poultry Nutrition:	T-1
NPH-418	Poultry Feed Technology	T-1
NPH-419	Poultry Meat Products Technology	T-1
NPH-420	Poultry Meat Processing Technology	L-1
NPH-421	Poultry Housing and Management	T-1
NPH-422	Poultry Management Practices	L-1
NPH-423	Poultry Disease Management	T-1
NPH-424	Disease Prevention and Treatment	L-1





5. AWARDS AND RECOGNITION

National

- Dr. A.K. Tiwari was awarded with Dr CM Singh Award for Excellence in Veterinary Sciences-2022 conferred by National Academy of Veterinary Sciences (India) on 01.07.2023.
- Dr. A.K. Tiwari was conferred by National Academy of Agricultural Science (NAAS) Fellowship-2023.
- Dr. A.K. Tiwari acted as Chairperson for XXXV Annual Convention and National Conference of the IAVMI, at CSK Himachal Pradesh Agricultural University, Palampur, from 7-8, April 2023.
- Dr. A.K. Tiwari has been invited as a Chief Guest for the Valedictory Ceremony of ICAR sports tournament for Eastern Zone (TEZ 2023) at ICAR-IVRI, Izatnagar on 27.04.2023.
- Dr. Gautham Kolluri acted as Rapporteur for a technical session during WVPA-2023 at Jabalpur, Madhya Pradesh.
- Dr Rokade, J.J. Nominated by ICAR as an expert for State Level Livestock Exhibition at during "Mahapashudhan Expo-2023, Shirdi, Ahmednagar Maharashtra.
- Dr J.S Tyagi served as an expert member for Bureau of Indian Standards, GOI, of FAD- 32 committee.
- Dr J.S Tyagi served as DDG(AS) nominee for the assessment of ARS scientists under CAS in the meeting held during October 19-20, 2023.
- Dr. Rokade, J.J. has been nominated as an expert member for Bureau of Indian Standards, GOI, of FAD-18, FAD-5 & FAD- 32 committee.
- Dr. Gautham Kolluri has been nominated as an expert member for Bureau of Indian Standards, GOI of FAD-18 sub-committee.
- Dr Sandeep Saran acted as a QRT member of ICAR-Indian Institute of Soybean Research, Indore for the review period 2017-21. He attended meetings during August 19-27, 2023 at Dimapur and Jabalpur and

September 25-26, 2023 at Pantnagar and Almora.

- Drs A.K. Tiwari, J.S. Tyagi and Simmi Tomar chaired the technical sessions during IPSACON-2023 at Srinagar, Kashmir.
- Dr. Gautham Kolluri and Dr. Rokade, J.J. acted as Rapporteurs during IPSACON-2023 at Srinagar, Kashmir.
- Dr Gautham Kolluri was awarded Avitech Young Scientist Award-2023 from IPASA for the paper entitled *Versatile bulk electroporation protocol for chicken cell culture systems: A necessity for in vitro nutrition, health, and physiological studies in chickens* co-authored by I. Hyder, A. Biswas and J.S. Tyagi during XXXIII IPSACON-2023 held at SKUAST-K, Srinagar, Kashmir from September 13-15, 2023.
- Dr Rokade, J.J. awarded "Best Researcher Award- 2023" from KNP Vet Alumni Association, MAFSU, Nagpur.
- Dr. Simmi Tomar served as an expert member for the selection of veterinary officers at the Rajasthan Public Service Commission on three occasions: from December 7 to December 8, 2023 (2 days), from February 5-7, 2024 (3 days), and from March 18-19, 2024 (2 days).

International

- Dr. A.K. Tiwari and Rokade, J.J. have attended Cage-free training program at Universitas Gadjah Mada, Yogyakarta, Indonesia from October 16-19, 2023.
- Dr. Gautham Kolluri awarded the International Travel Grant Award from British Poultry Science Association for attending XIII ESPG-2023 at Hannover, Germany.
- Dr. Gautham Kolluri awarded the International Travel Support from DST-SERB, Govt. of India for attending XIII ESPG-2023 at Hannover, Germany.
- Dr. Gautham Kolluri awarded the International Travel Grant Award from Houghton Travel Trust, United Kingdom for attending XIII PSA Annual Meeting-2023, Philadelphia, USA.





6. LINKAGE AND COLLABORATION

Sl.	Organization	Purpose	Duration
1.	International Livestock Research Institute, Kenya	Platinum genome assembly and pan-genome variation to identify selection signatures for conservation in Indian red jungle fowl	01.04.2023 to 31.03.2026
2.	Indian Veterinary Research Institute, Izatnagar (Farmer FIRST Programme)	Collaborative programme with CARI on "Enhancing livelihood security of farming community through livestock and crop integration using proven technologies"	28.10.2016 to 31.03.2025
3.	RKVY, New Delhi	Funding of "Model project and demonstration unit for backyard poultry, livestock, vermi-farming and moringa integration"	20.01.2021 to 20.01.2024
4.	ICAR-Emeritus Scientist Scheme	Funding for the project "Enhancing the reproductive and productive efficiencies of chicken and alternate poultry species using artificial insemination"	16.03.2021 to 15.03.2024
5.	Department of Biotechnology, Govt. of India (in collaboration with National Institute of Animal Biotechnology, Hyderabad)	Funding for the project "Identification of key molecular players specially lncRNAs involved in response to NDV challenge in indigenous and exotic chicken breeds using RNA-seq analysis"	01.10.2021 to 31.03.2024
6.	Department of Science and Technology, Govt. of India (in collaboration with ICAR-National Dairy Research Institute, Karnal)	Funding for the collaborative project "Development of climate resilient and sustainable agri-based systems for better food, feed, nutritional and livelihood security options to farming community of Cold arid region-Ladakh"	30.03.2022 to 29.03.2025
7.	M/s J S Aquaritin Global Private Limited, Gurgaon	Sponsored project on "Effects of Aquaritin-all-in-one-supplement-in-water on production performance, immune response other parameters in broiler and layer chickens"	19.01.2022 to 19.07.2023
8.	M/s Indian Oil Corporation Ltd, Faridabad (Haryana)	Sponsored project on "Field assessment of biomass form as a novel feed resource in commercial broiler chickens"	30.09.2022 to 30.09.2023
9.	College of Veterinary and Animal Husbandry, Tripura University, Agartala, Tripura	Institute funded collaborative project under NEH component on "Identification and evaluation of locally available unconventional feed resources for poultry production and nutrigenomic studies in NEH region"	01.12.2020 to 31.11.2023
10.	ICAR-NRC Yak, Dhirang, Arunachal Pradesh	Institute funded collaborative project under NEH component on "Empowering tribal farmers of NEH region through backyard poultry farming (MoU signed on 6.6.2022)"	01.08.2022 to 31.11.2023
11.	Department of Science and Technology, Govt. of India	Funding of collaborative project on "Transgenic chicken for expression of Leukemia Inhibitory Factor (LIF): A potential cytokine in stem cell biology and therapy"	21.01.2022 to 20.01.2025
12.	ANDU&AT, Kumarganj, Ayodhya, U.P.	Umbrella MoU signed for facilitating of student's training/Postgraduate Research	22.10.2022 to 21.10.2025
13.	M/s Dorpie Pvt. Ltd., Varanasi, Uttar Pradesh	MoU signed for organizing sponsored off-campus training programme on <i>Commercial Brown Egg Production</i> at Chandauli district, Varanasi, Uttar Pradesh (MoU signed 28.07.2023).	01.04.2023 to 31.03.2026



Umbrella MoU Signed with People for Animals Public Policy Foundation, Delhi on 13.04.2023



Umbrella MoU Signed with Karnataka Poultry Farmers & Breeders Association (KPFBA), Bengaluru



7. PUBLICATIONS

(a) Research articles in reputed journals

International

1. Marappan, G., J.J. Rokade., G. Kolluri, T.S. Shyam, G. Prabakar, V. Madhupriya, J.S. Tyagi, (2023). Supplementary nucleosides improve the performance through enhanced enzyme activity, intestinal development and transporter genes in broiler chickens. *Nucleosides, Nucleotides and Nucleic Acids*, 42(7): 547-562 (NAAS SCORE: 7.45).
2. Gaganpreet, T., T.K. Biswas, B. Bhushan, S. Naskar, A. Kumar, P. Dandapat, J. Rokade, (2023). Accurate estimation of body weight of pigs through smartphone image measurement app. *Smart Agricultural Technology*, 4: 100194 (NAAS SCORE: 0).
3. Nayak, N., S.K. Bhanja, E.B. Chakurkar, A. R. Sahu, K. Ashitha, N. Shivasharanappa, and A. D. D'Mello, 2023. Impact of bioclimatic factors on physio-biochemical and molecular response of slow-growing poultry reared in tropics. *Tropical Animal Health and Production*, 55: 253 (NAAS SCORE: 7.89).
4. Nayak, N., S.K. Bhanja, E.B. Chakurkar, A. R. Sahu, J.S. Tyagi, B. Das, K.R. Shinde, A. Champati, 2023. Acquisition of thermotolerance in slow growing poultry: Elucidating through sequential mechanism of thermal conditioning from embryonic and early post-hatch period. *International Journal of Biometeorology*, (NAAS SCORE: 9.74).
5. Deo, C., A Biswas, D. Sharma, J.L. Agashe, A.K. Tiwari, (2023). Effect of various copper sources and concentrations on performance, skeletal growth and mineral content of excreta in broiler chickens. *Biological Trace Element Research*, (NAAS SCORE: 9.90).
6. Biswas, A., C. Deo, D. Sharma, M. Ansari, and A.K. Tiwari, (2023). Production performance, haematological parameters, serum biochemistry and expression of HSP-78 in broiler chickens fed dietary ascorbic acid from heat stress. *International Journal of Biometeorology* (NAAS SCORE: 9.74).
7. Biswas, A., C. Deo, D. Sharma, and A.K. Tiwari, (2023). Dietary probiotics supplementation is a unique strategy for enhancing physiobiochemical characteristics, antioxidant capacity and oxidative stability of broiler meat. *Heliyon. Accepted* (NAAS SCORE: 9.78).
8. economic and environmental security. *Indian Journal of Poultry Science*, 58(2): 89-97 (NAAS SCORE: 5.85).
3. Rokade J.J., V.K. Saxena, M. Monika, M. Gopi, S. Tomar, Sandeep Saran, Chandrahas. C. Ghotekar, (2023). Feeding of *Bacillus Subtilis* as a Potential Probiotic Feed Supplement in Broiler Chicken. *Animal Nutrition and Feed Technology*, 23: 233-246 (NAAS SCORE: 6.00).
4. Aruna, T.S., S. Kumar, S.K. Bhanja, P. Kumar, C. Chaudhari, and R. Meena, (2023). Genotyping of Myostatin gene in white turkey using PCR- RFLP. *The Pharma Innovation Journal* 2023, SP-12(8): 576-578 (NAAS SCORE: 5.23).
5. Meena, R., S. Kumar, S.K. Bhanja, T.S. Aruna, C. Chaudhary, (2023). Assessing genetic and phenotypic parameters of economic traits in Rhode Island Red (RIR) chicken layers. *Indian Journal of Poultry Science*, 58(2): 99-102 (NAAS SCORE: 5.85).
6. Meesam R., D. Chandra, A. Nasir, A. Biswas, S. Divya. J.J. Rokade, (2023). Dietary selenium and zinc supplementation alters growth and immunity of broiler chicken. *Indian Journal of Animal Sciences*, 93(5):487-493 (NAAS SCORE: 6.29).
7. Monika M., J.S. Tyagi, J.J. Rokade, N.S. Sonale, Sky, M. Gopi, K. Gautham, A. Matin, S. Bhanja, (2023). Characterization of lactic acid bacteria postbiotics & its in-vitro evaluation for antibacterial effect, anti-inflammatory and antioxidant properties. *Indian Journal of poultry science*, 57(3):301-308 (NAAS SCORE: 5.85).
8. Girija, S., G. Kolluri, J.S. Tyagi, M.M. Ansari, T. Singh, A. Kaliappan, and A.K. Tiwari, 2023. Assessing cytokine responses in indigenous and exotic chicken breeds following velogenic Newcastle disease virus challenge. *Indian Journal Poultry Science*, 58(2): 139-144 (NAAS SCORE: 5.85).
9. Girija, S., J.S. Tyagi, A.K. Mariappan, A.T. Faslu Rahman, S. Sharma, T. Singh, V. Srivastava, and G. Kolluri, (2023). Studies on biochemical profile in indigenous and exotic chicken challenged with velogenic Newcastle disease virus (vNDV). *Indian Journal of Poultry Science*, 58(3):191-194 (NAAS SCORE: 5.85).
10. Johnson, D.C., M. Chander, M.P. Sagar, M.R. Verma and A.P. Patil, (2023) Assessing organic poultry farming knowledge among tribal farmers: A tailored knowledge test. *Indian Journal of Extension Education*, 59(4): 141-144 (NAAS SCORE: 5.95).
11. Sruthy, R., J.J. Rokade, S.K. Bhanja, M.P. Shameeh, M. Monika, P. Patel, V. Gowthaman, M. Mehra, G. Kolluri, and M. Gopi, (2023). Exploring the impact of stocking densities and colored LED lights on welfare and performance in broiler chickens. *Indian Journal of Poultry Science*, 58(3): 289-294 (NAAS SCORE: 5.85).
12. Naveen, K., M.P. Sagar, R. Bharti, B. Saivinay, and A.R.

National

1. Sharma, R., Saran, S. and Kumar, S., (2023). Estimated incremental benefits of complete vaccination against Newcastle disease in layers. *Acta Scientific Veterinary Sciences*, 5 (4): 55-57 (NAAS SCORE: 0).
2. Sharma, R., Saran, S. and Tyagi, J.S. (2023). Indian poultry sector: strategies for nutritional, socio-



Khan, (2023). Constraints faced by trainees and resource persons during virtual training programme on poultry production management. *Biological Forum*, 15(5a): 187-189 (NAAS SCORE: 4.96)

13. Tak, L., B. Bais, Singodia, M. and Ansari, M. (2023). Formulation and Quality Evaluation of Kadaknath Freeze Dried Meat Soup Powder Incorporated with Oat Flour and Mint Leaves Powder. *Journal of Animal Research*, 13(05): 847-853 (NAAS SCORE: 5.43)
14. Singh, V., C. Deo, S. Doley, A. Chakraborty, R.S. Godara, M. Singh, L. Sahoo, G. Kadirvel, B. Das and V.K. Mishra (2023). Effect of feeding rice-based brewers dried grain on bone development and nutrient digestibility in laying hens. *Indian Journal of Hill Farming*, 36(2): 208-215. (NAAS SCORE: 4.67).

(b) Technical Paper/Popular articles

1. Monika, M. and Rokade, J.J. (2023). Scope and prospects of establishing an Organic Poultry Farm. *Kheti-wallah Magazine*. pp 33-41.
2. Rokade, J.J., Monika, M., Sonale, N. and Tiwari, A.K. (2023). AMR Challenges in poultry and way forward. E-Manual on Antimicrobial resistance in foodborne and pathogen. ICAR-IVRI, Izatnagar, Bareilly, UP. 44-52.84-91.
3. Rokade, J.J. and Nagesh, S. (2023). Kukut prasaskaran ki sthapanana --kukut mans aur anda utpadan me start up. Training entitled Hygienic processing and value addition of poultry products organised by ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly. pp.1-4.

(c) Book (Authored/edited):

1. Rokade, J.J., G. Kolluri, N. Sonale, M. Monika, Abhijeet and A.K. Tiwari (2023). Advanced training on climate resilient & welfare friendly poultry production. Published by ICAR-CARI, India (ISBN: 978-93-5786-010-9). pp. 1-238.
2. Tiwari A.K., J.J. Rokade, S. Saran and G. Kolluri (2023). CARI Technologies & Service. Published by ICAR-Central Avian Research Institute Izatnagar, India. pp.1-70.
3. Kolluri, G., Rokade, J.J., Girija, S., Ansari, M. and Biswas, A. (2023). Advances in research methodologies and innovations in avian biology: integrating genomics and phenomics (ISBN: 978-93-5916-955-2). pp. 1-125.
4. Kolluri, G., Rokade, J.J., Phand, S. and Das, S. (2023). Innovations in lab to land based production and processing technologies for sustainable poultry production (E-book). (ISBN: 978-93-91668-75-4). pp. 1-66.
5. Gaurav, J., Divya, Jain, R. and Singh, N.J. (2023). Goat Production and Management (Indian Journal of Livestock Veterinary and Animal Sciences) (ISBN:978-81-963487-2-4). pp. 1-290.

(d) Book Chapters/technical bulletin/ manuals/ compendium

1. Jairath, G., Bagdas, R., Gopinath, D., GorakhMal, and Rokade, J.J., (2023). Advanced processing techniques for microbiological safety in poultry meat. In: Advanced Training on Climate Resilient and Welfare friendly poultry production. ICAR-CARI, India. Eds. Rokade, J.J., Kolluri, G., Sonale, N., Monika, M., Abhijeet, C. and Tiwari, A.K. (ISBN: 978-93-5786-010-9). pp. 230-238.
2. Kolluri, G., Simi, G. and Matin, A. (2023). CRISPR/Cas9: designing of guides, vector construction and screening for CRISPR edits. In: Advances in Research Methodologies and Innovations in Avian Biology: Integrating Genomics and Phenomics. Eds. Kolluri, G., Rokade, J.J., Girija, S., Ansari, M. and Biswas, A. (ISBN: 978-93-5916-955-2). pp. 29-52.
3. Kolluri, G. and Singh, T., (2023). Poultry Biosecurity Measures: Mitigating the on-farm losses. In: Innovations in lab to land based production and processing technologies for sustainable poultry production. Eds. Kolluri, G., Rokade, J.J., Phand, S. and Das, S. (ISBN: 978-93-91668-75-4). pp. 35-46.
4. Kolluri, G. and Tiwari, A.K., (2023). Poultry viral diseases and intervention measures: An Indian perspective. In: Poultry India Yearbook -2023 (4th Ed.) Eds. V. Sadana (ISBN: 978-81-963610-1-3). pp. 65-76.
5. Kolluri, G., Nampalle, M.T., Agashe, J.L. and Biswas, A., (2023). Recent Advances in Mitigating Mycotoxicosis in Chicken. In: Recent advances in avian health and management. Eds. Tiwari, S.P., Sharma, R.K., Verma, J., Goyal, G., Chouhan, L. and Shinde, A. (ISBN: 978-93-89399-78-3). pp. 125-133.
6. Kolluri, G., Simi, G., Srivastava, V. and Singh, T., (2023). Important poultry diseases and their differential diagnosis. In: Advanced processing techniques for the microbiological safety in poultry meat. In: Advanced training on climate resilient and welfare friendly poultry production. ICAR-CARI, India. Eds. Rokade, J.J., G. Kolluri, N. Sonale, M. Monika, Abhijeet, C., and A.K. Tiwari (ISBN:978-93-5786-010-9). pp. 56-71.
7. Rokade, J.J. and Monika, M., (2023). Application of biotechnology in poultry nutrition. In: recent trends in poultry nutrition. Eds. M.T. Banday, Sheikh Adi and M.A. Wani (ISBN:978-93-5786-010-9) pp. 39-53.
8. Rokade, J.J., Monika, M., Sky, Bhanja, S.K. and Tiwari, A.K., (2023). Precision poultry farming: for better health & welfare of poultry. In: Recent advances in avian health and management. Eds. Tiwari, S.P., Sharma, R.K., Verma, J., Goyal, G., Chouhan, L. and Shinde, A. (ISBN: 978-93-89399-78-3). pp. 170-175.
9. Rokade, J.J., Monika, M., Sky, Bhanja, S.K. and Tiwari, A.K., (2023). In vitro meat: boon or threat to Indian poultry meat industry. In: recent advances in avian health and management. Eds. Tiwari, S.P., Sharma, R.K., Verma, J., Goyal, G., Chouhan, L. and Shinde, A. (ISBN: 978-93-89399-78-3). pp. 188-196.



10. Rokade, J.J., Ravi, S., Champati, A. and Tiwari, A.K., (2023). Emergence of AMR in Poultry: Innovative approach for replacement of antibiotic feed additives. In: Advanced training in poultry production with special emphasis on recent techniques in antimicrobial resistance and food safety. Eds. Aswathi, P.B. and Vergis, J. (ISBN: 978-93-91716-09-7). pp.18-29.
11. Rokade, J.J., Sky, Monika, M., Landge, R., Bhanja, S.K., and Tiwari, A.K., (2023). New era of sustainable poultry production: Precision farming. In: Poultry India Yearbook -2023 (4th Ed.) Eds. V. Sadana (ISBN: 978-81-963610-1-3). pp.77-88.
12. Rokade, J.J., Sonale, N. and Landge, R., (2023). Concept of Poultry Welfare-Basic Parameters for Welfare evaluations. In: Advanced training on climate resilient and welfare friendly poultry production. Eds. Rokade, J.J., G. Kolluri, N. Sonale, M. Monika, Abhijeet and A.K. Tiwari (ISBN: 978-93-5786-010-9). pp.12-19.
13. Rokade, J.J., Sonale, N. and Tiwari, A.K., (2023). Central Avian Research Institute- Ke Abhinav Mulyavardhit Utpad: Swayrojar Ka Ek Umada Avasar. In: Eds. Barbuddhe, S.B. Gadekar, Y.P. and Chatload, L. (ISBN: 978-93-5913-497-0). pp. 39-43.
14. Rokade, J.J., Sonale, N., Monika, M., Jairath, G. and Tiwari, A.K., (2023). Post-harvest losses in poultry, its management key initiatives, and opportunities. In: Poultry Production Current insights. Eds. Khan, A.A., Sheikh, A and Sheikh I.U. (ISBN: 978-81-952140-1-3). pp.201-214.
15. Rokade, J.J., Sruthy, R. and Tiwari, A.K., (2023). Self-Resilience through Diversified Commercial Poultry Farming. In: Multidisciplinary Portrait of Agriculture: Concept & Practices. Eds. P. Sheoran, P. Bhadauria, S.S. Bhadauria, R.A. (ISBN- 978-93-91995-10-2). pp. 204-214.
16. Rokade, J.J., Sruthy, R., Sonale, N., (2023). Lighting technique for amelioration of stress in poultry. In: Advanced training on climate resilient and welfare friendly poultry production. Eds. Rokade, J.J., G. Kolluri, N. Sonale, M. Monika, Abhijeet, C., and A.K. Tiwari (ISBN: 978-93-5786-010-9). pp. 133-137.
17. Simi, G. and Kolluri, G., (2023). Duck integration models under village conditions with special focus on polythene duck pond: A CARI initiative. In: Innovations in lab to land based production and processing technologies for sustainable poultry production. Eds. Kolluri, G., Rokade, J.J., Phand, S. and Das, S. (ISBN: 978-93-91668-75-4). pp. 11-14.
18. Singh, T., Simi, G., Matin, A., Srivastava, V. and Kolluri, G., (2023). Total RNA isolation, cDNA synthesis and RNA integrity analysis. In: Advances in research methodologies and innovations in avian biology: integrating genomics and phenomics. Eds. Kolluri, G., Rokade, J.J., Girija, S., Ansari, M. and Biswas, A. (ISBN: 978-93-5916-955-2). pp. 1-6.
19. Simi, G., Singh, T., Srivastava, V. and Kolluri, G., (2023). Setting up of qPCR experiments. In: Advances in research methodologies and innovations in avian biology: integrating genomics and phenomics. Eds. Kolluri, G., Rokade, J.J., Girija, S., Ansari, M. and Biswas, A. (ISBN: 978-93-5916-955-2). pp. 7-11.
20. Singh, V., Chakraborty, A., Kolluri, G., Sahoo, L., Singh, M., Shinde, A., Chouhan, L., Rokade, J.J., Kumar, A., Kumar, R. and Das, B. (2020). Poultry Hatchery: A profitable venture in North East India. In: Recent advances in avian health and management. Eds. Tiwari, S.P., Sharma, R.K., Verma, J., Goyal, G., Chouhan, L. and Shinde, A. (ISBN: 978-93-89399-78-3). pp.160-169.
21. Sonale, N., Kolluri, G. and Rokade J.J., (2023). Nutritional Manipulation to Combat heat stress of Poultry. In: Innovations in lab to land based production and processing technologies for sustainable poultry production. Eds. Kolluri, G., Rokade, J.J., Phand, S. and Das, S. (ISBN: 978-93-91668-75-4). pp.63-66.
22. Sonale, N., Kolluri, G. and Rokade J.J., (2023). Post-Harvest losses in eggs and their mitigating strategies. In: Innovations in lab to land based production and processing technologies for sustainable poultry production. Eds. Kolluri, G., Rokade, J.J., Phand, S. and Das, S. (ISBN: 978-93-91668-75-4). pp. 47-51.
23. Sonale, N., Rokade, J.J., and Monika, M., (2023). Kukut mans aur ande ka prsanskarn Atmanirbhar Bharat ka ek Yashasvi udyam. In: Eds. Barbuddhe, S.B. Gadekar, Y.P. and Chatload, L. (ISBN: 978-93-5913-497-0). pp. 44-50.
24. Tiwari, A.K. and Kolluri, G., (2023). Sustainability of Indian Poultry sector in context of privatization. In: Innovations in lab to land based production and processing technologies for sustainable poultry production. Eds. Kolluri, G., Rokade, J.J., Phand, S. and Das, S. (ISBN: 978-93-91668-75-4). pp. 1-4.
25. Tyagi, J.S. and Kolluri, G., (2023). CARI rural poultry incubator: A wealth from waste-based technology for enhancing rural livelihoods. In: Innovations in lab to land based production and processing technologies for sustainable poultry production. Eds. Kolluri, G., Rokade, J.J., Phand, S. and Das, S. (ISBN: 978-93-91668-75-4). pp. 20-24.
26. Tyagi, P.K. and Rokade, J.J., (2023). Enzyme technology in poultry in chicken nutrition: present and future scenario. In: Recent trends in poultry nutrition. Eds. M.T. Banday, Sheikh, A and Wani, M.A. (ISBN: 978-81-191103-79-9). pp. 101-117.
27. Deo, C. and Divya, S. (2023). Recent advances in organic minerals in poultry nutrition. In: Recent trends in poultry nutrition. Eds. M.T. Banday, Sheikh, A and Wani, M.A. (ISBN: 978-81-191103-79-9). pp. 39-52.
28. Saran, S. (2023). Least cost feed formulation using spreadsheets. In: Advanced Training on Climate Resilient and Welfare friendly poultry production. ICAR-CARI, India. Eds. Rokade, J.J., G. Kolluri, N. Sonale, M. Monika, Abhijeet and A.K. Tiwari (ISBN: 978-93-5786-010-9). pp.217-229.
29. Saran, S. (2023). Entrepreneurial Opportunities in Poultry Sector and Business Models. In:



- Entrepreneurship development programme on animal feed technologies, Eds. L.C. Chaudhary, A.K. Verma, A. Kala, R. Tiwari and B. Kumar. pp. 62-68.
30. Saran, S. (2023). Role of agribusiness incubators in entrepreneurship development with special reference to poultry and allied business. In: Innovations in lab to land based production and processing technologies for sustainable poultry production. Eds. Kolluri, G., Rokade, J.J., Phand, S. and Das, S. (ISBN: 978-93-91668-75-4). pp. 59-62.
31. Mohan, J., Kolluri, G. and Srivastav, V., (2023). Semen collection and artificial insemination in chickens: A journey of CARI. In: Advances in research methodologies and innovations in avian biology: integrating genomics and phenomics. Eds. Kolluri, G., Rokade, J.J., Girija, S., Ansari, M. and Biswas, A. (ISBN: 978-93-5916-955-2). pp. 65-72.
32. Kolluri, G. and Hyder, I., (2023). Publishing avian research in high impact journals: Learning experience-II. In: Advances in research methodologies and innovations in avian biology: integrating genomics and phenomics. Eds. Kolluri, G., Rokade, J.J., Girija, S., Ansari, M. and Biswas, A. (ISBN: 978-93-5916-955-2). pp. 122-125.
33. Tyagi, J.S., Kumar, S.S. and Kumar, S. (2023). Collection of fertile eggs, handling, setting, hatchability and fertility analysis. In: Advances in research methodologies and innovations in avian biology: integrating genomics and phenomics. Eds. Kolluri, G., Rokade, J.J., Girija, S., Ansari, M. and Biswas, A. (ISBN: 978-93-5916-955-2). pp. 73-75.
34. Rokade J.J., Prasad, W., Nagbushan K., Nagesh, S., Monika, M. and Tiwari, A.K. (2023). Cage-Free Farming: A pathway to sustainable egg production & enhanced animal welfare. In: Poultry production and management: Recent Trends. Eds. Verma, J. and Goyal, G. (ISBN- 978-93-58874-09-9). pp. 204-214.
35. Monika, M., Rokade J.J., Sonale, N., Prasad, W., Nagbushan, K. and Kerketta, S., (2023). Organic poultry farming Navigating Opportunities, challenges & Certification in India. In: Poultry production and management: Recent Trends. Eds. Verma, J. and Goyal, G. (ISBN- 978-93-58874-09-9). pp. 204-214.
36. Geeta, Monika M, M V L N Raju & Rokade J.J., (2023). Atmanirbhar Bharat – harnessing potential of rural poultry sector for women empowerment and financial/social security. In: Research and technology advancements in agriculture. Eds. Srinivasa Rao, Ch., Dhandapani, A., Kumar, S. (ISBN- 978-93-340-3808-8). pp. 223-242.
37. Ansari MM (2023). Molecular technique for analysis of Thermotolerant gene. In: Advanced Training on Climate Resilient and welfare friendly Poultry Production. Eds. Rokade, J.J., G. Kolluri, N. Sonale, M. Monika, Abhijeet and A.K. Tiwari. (ISBN: 978-93-5786-010-9). pp. 06-11.
38. एम पी सागर एवं अशोक कुमार तिवारी (2023). विकसित देशी मुर्गी प्रजातियाँ। सूचना पत्रक संख्या 1/2023
38. एम पी सागर एवं अशोक कुमार तिवारी (2023). विकसित व्यावसायिक ब्रायलर प्रजातियाँ। सूचना पत्रक संख्या 2/2023
- (e) Presentation in webinar/ workshop/ meetings/ trainings/conferences**
1. Anjana, P., Bhanja, S.K., Sruthy, R and Basil, H. (2023). Using hen's hormonal profile and egg morphometry, pre-incubation sex determination in fertile eggs of White Leghorn. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 125 (Abstract no. KA-03).
 2. Bhardwaj, V., Deo, C., Divya., Biswas, A., Bhanja, S.K. and Agashe, J.L. (2023). Effect of feeding variable dietary levels of calcium and available phosphorous on growth, immune response and skeletal health of turkey poult. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 118 (Abstract no. YS-07).
 3. Champati, A., Bhanja, S.K., Yadav, A.S., Rokade, J.J., Sonale, N.S., Landge, R., Sky, Divya, Biswas, A., Saha, S.K., Singh, M. and Agrawal, R.K. (2023). The GRAS compounds formic acid and thymol affecting the performance, immunity, gut health, carcass traits and resistance profile of *E. coli* isolated in turkey birds. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 127 (Abstract no. KA-07).
 4. Goel, G., Upmanyu, V., Ajay Kumar, Sonal, Shinde, A., Laxmi, C., Shrman, K, Bhanja, S. K. and Saxena, V.K. (2023). Expression profile of different cytokines in guinea fowl spleenocytes after in vitro exposure to salmonella enteritidis. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 04 (Abstract no. GBB-07).
 5. Goel, G., Upmanyu, V., Kumar, A., Sonal, Bhanja, S.K. and Sharma, D. (2023). Comparative analysis of resistance to Salmonella enterica serovar Enteritidis in guinea fowl and chicken. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 71 (Abstract no. HBW-35).
 6. Kaliappan, A., Ramakrishnan, S., Verma, S.K., Panwar, K., Thomas, P., Kolluri, G., Dey, S. and Chellappa, M.M. (2023). Polymorphism in the leucine-rich repeats of the TLR7 gene in different breeds of chicken. WVPA-2023 held at NDVSU, Jabalpur from February 24-25, pp. 76 (Abstract No. DMBC-14).
 7. Khan, A.R., Sagar, M.P., Kumar, N. and Saivinay, B. (2023). Extent of knowledge of scientific broiler farming practices among commercial poultry farmers in temperate and sub-tropical area of Jammu and Kashmir. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 38 (Abstract no. MEW-10).
 8. Kolluri, G., Biswas, A., Hyder, I., Tyagi, J.S., and Kues, W. (2023). Expression analysis of growth regulatory genes and optimization of CRISPR/Cas9 mediated gene editing



- of activin receptor type IIB (ACVR2B) in broiler chicken. In: Proc. "XII ESPG-2023" held at Hannover, Germany from November 6-8, pp. 52 (Abstract no. P-09).
9. Kolluri, G., I. Hyder, A. Biswas and Tyagi, J.S. (2023). Versatile bulk electroporation protocol for chicken cell culture systems: A necessity for in vitro nutrition, health, and physiological studies in chickens. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 120 (Abstract no. YS-09).
 10. Kumar, N., Sagar, M.P., Saivinay, B. and Khan, A.R. (2023). Impact of virtual training programme on knowledge about scientific poultry farming practices among trainees. In: Proc. "IEEC-2023" held at BHU, Varanasi from January 27-30. pp. 94 (Abstract no. IEEC/2023/ABS/1.2/148).
 11. Rashid, A.K., Sagar, M.P., Naveen, K. and Saivinay, B. (2023). Extent of knowledge of scientific broiler farming practices among commercial poultry farmers in temperate and sub-tropical area of Jammu and Kashmir. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 38 (Abstract no. MEW-10).
 12. Nayak, N., Bhanja, S.K., Chakurkar, E.B., Sanjeev, K., Tyagi, J.S., Sahu, A.R. and Chandrahas (2023). Evaluation of adaptability and acquisition of thermotolerance in slow growing birds reared in tropical climate. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 115 (Abstract no. YS-03).
 13. Pandey, M., Kumar, S., Kolluri, G., Chandrahas, Bhanja, S.K. and Verma, A. (2023). Expression profiling and association studies of CRBP IV and cGH gene with egg production in Kadaknath. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 08 (Abstract no. GBB-12).
 14. Rokade, J.J., Chandrahas, Bhanja, S.K., Monika, M. and Tiwari, A.K. (2023). Sustainable improvement of rural livelihood by backyard poultry production & CARI Interventions. In: Proc. "XX SOCDAB-2023" held at MAFSU, Parbhani from February 23-24 pp. 240-252 (Abstract no. 01).
 15. Sharma, R. and Saran, S. (2023). Indian poultry sector: strategies for nutritional, socio-economic and environmental security. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. (Abstract no. LP-01).
 16. Simi, G., Kaliappan, A., Singh, T., Ramakrishnan, S., Mariappan, A.K., Tyagi, J.S., Tiwari, A.K. and Kolluri, G. (2023). Mortality patterns in indigenous and exotic chicken challenged with velogenic Newcastle disease virus (vNDV). In: Proc. WVPA-2023 held at NDVSU, Jabalpur from February 24-25, pp. 75 (Abstract No. DMBC-13).
 17. Simi, G., Kolluri, G., Rahman, F., Asok Kumar, M. and Abinaya, K. (2023). Comparative scoring for lesions induced by velogenic Newcastle disease virus (NDV) in indigenous and exotic chicken. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15. pp. 53 (Abstract no. HBW-06).
 18. Singh, T., Girija, S., Fathima, A., Srivastava, V. and Kolluri, G. (2023). Zoo-technical and biochemical indices of different chicken breeds challenged with velogenic Newcastle disease virus. In: Proc. WVPA-2023 held at NDVSU, Jabalpur from February 24-25, pp. 73 (Abstract No. DMBC-11).
 19. Sky, Rokade, J.J., Monika M., Patel, P., Landage, R., Champati, A., Sonale, N.S. and Asawaree, H., (2023). The study of expression of different stress-related genes in transported stressed and antioxidant supplemented broiler. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 1-15, pp. 4 (Abstract no. GBB-06).
 20. Sonale, N.S., Rokade, J.J., Akhilesh, K., Monika, M., Abhijeet, C., Rajan, L., Sky and Tiwari, A.K. (2023). Assessing the impact of storage duration and temperature on the table egg quality. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 79 (Abstract no. PV-06).
 21. Tiwari, A.K. and Kolluri, G. (2023). Newcastle disease: A need for vaccine updation in India? In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 1-4 (Abstract no. LP-01).
 22. Waadajkar, P., Rokade, J.J., Monika, M. and Sonale, N.S. (2023). Assessment of Welfare and meat Quality parameters of desi birds reared under deep litter verses cage rearing system. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 62 (Abstract no. HBW-22).
 23. Wani, M.A., Tyagi, Pramod K., Adil, S., Bhanja, S. K., Goel, A. Kolluri, G., Rokade, J. J. and Kumar, S., (2023). Expression of nutrient transporter genes in response to dietary rice gluten meal and protease enzyme supplementation and the consequent effects on the performance, haemato-biochemical profile and gut health in broiler chicken. In: Proc. "IPSACON-2023" held at SKUAST-K, Srinagar from September 13-15, pp. 121 (Abstract no. YS-11).
 24. Divya, Deo, C. and Biswas, A. (2023). Effect of dietary supplementation of Achyranthes Aspera powder on growth performances, serum biochemistry and gut health of broiler chickens. In: Proc. "SVBBI-2023", held at ICAR-IVRI from December 14-15, pp. 87 (Abstract no. PP_V4)
- ### Radio /TV Talk
- Rokade, J.J. (2023). Vichar Vimarsh" Programme on the topic "Sardiyon me Pashu Bakri aur murgiyon ki dekhbhal" DD Kisan, Govt of India, New Delhi recorded 03.04.2023.
 - Saran, S. (2023). Kukkut Palan: Sardiyon main dekhbhal. Radio talk at AIR, Bareilly on 7.11.2023.



8. PARTICIPATION IN WORKSHOPS, WEBINARS, CONFERENCES AND TRAINING

Programme	Duration	Participants
National		
National Symposium and XX Annual Convention of SOCDAB-2023 at College of Veterinary and Animal Sciences (COVAS), Parbhani, Maharashtra	February 23-24	Dr. Rokade, J.J.
World Veterinary Poultry Association Conference on "Recent Advances in Avian Diseases and Management : A Global Perspective" at NDVSU, Jabalpur, Madhya Pradesh	February 24-25	Dr Gautham Kolluri
Review-cum-workshop (online) of ITMUs/ZTMCs/ABIs	June 27	Dr Sandeep Saran
ICAR Foundation and Technology Day	July 16	Dr A.K. Tiwari Dr Gautham Kolluri Dr Rokade, J.J
Meeting on ICAR-CSR Guidelines (Online) under the chairmanship of Hon'ble Secretary DARE & DG ICAR	August 01	Dr Sandeep Saran
Brainstorming Workshop on "Researchable issues for Sustainable Agriculture under Climate Change Scenario at VNMKV Parbhani.	August 7-8	Dr Sandeep Saran
XXXVIII Conference (IPSACON 2023) and National Symposium on "Innovative Poultry Production Strategies for Nutritional, Socio-economic and Environmental Security" at SKUAST, Srinagar, Kashmir	September 13-15	Dr A. K. Tiwari Dr Jagbir Singh Tyagi Dr Sandeep Saran Dr Simmi Tomar Dr Gautham Kolluri Dr Rokade, J.J Dr Matin Ansari
One day Training for Members of Technical Committees organized by Bureau of Indian Standards, at NITS, Delhi	October 9	Dr J.S. Tyagi Dr Sandeep Saran Dr Rokade, J.J
Sensitization workshop of ICAR ABIs at NASC Complex, New Delhi	October 17-18	Dr Sandeep Saran
XVI Agricultural Science Congress on "Transformation of agri-Food systems for Achieving Sustainable development Goals" at CMFRI, Kochi, Kerala	October 10-13	Dr. M.P. Sagar Dr. Rokade, J.J
Review meeting (Online) of ICAR Institutes by DG, ICAR	December 7	Dr Sandeep Saran
International		
XII European Symposium on Poultry Genetics (ESPG-2023) at Hannover, Germany	November 6-8	Dr Gautham Kolluri
International Training program on Food Safety Epidemiology at ICAR-IVRI, Izatnagar, Uttar Pradesh	December 11-13	Dr Gautham Kolluri Dr Rokade, J.J
International cage-free training program organized by Global Food Partners and Faculty of Animal Science at Universitas Gadjah Mada, Yogyakarta, Indonesia	October 16-19	Dr A.K. Tiwari Dr Rokade, J.J









9. CONSULTANCY, PATENTS AND COMMERCIALIZATION OF TECHNOLOGY

- ❖ A Trademark pertaining to the **CARI Signature** has been filed in seven different classes with application no.6083682-88 dated 26.08.2023.
- ❖ The design of **CARI PORTABLE POULTRY INCUBATOR** has been published vide application no. 366318-001 dated 26.05.2023 in Journal No. 21/2023.
- ❖ A patent in respect of **CARICOMFORT** has been filed vide application no. 202311055661 dated 19.08.2023.
- ❖ A patent in respect of **CARI PHYTOBIOTIC EGG SPRAY** has been filed vide application no. 202311066448 dated 04.10.2023.
- ❖ Following MoUs were signed with various clients in private and public sector for supply of pure line germplasm developed/improved by the Institute. These MoUs were signed in accordance with the germplasm supply policy adopted by the Institute in order to safeguard its intellectual properties.

Sl.	Name of Technology	Clients to which technology was commercialized	Date of igned MoU/License	Amount Received (INR)
1.	Supply of Adults KADAMBARI™ /SWETAMBARI™/ CHITAMBARI™ (Guinea Fowl)	Mr. Ghanshyam S/o Mangal Chand R/o Ram Singh KI Dhani Neem ka Dhana Ram Singh Ki Dhani Shyampur Sikar -332718 Rajasthan	04/01/2023	165000/-
2.	Supply of Quail Eggs (CARIUTTAM™)	Shri Afzal Haleem S/o Shri Mohd. Haleem, Meerut- 25002	31/03/2023	27500/-
3.	Supply of DOCs of CARIRED™	The Superintendent, State Poultry Farm, Barabanki (U.P.)	16/04/2023	47300/-
4.	Supply of DOCs of ASEEL PEELA	The Superintendent, State Poultry Farm, Barabanki (U.P.)	16/04/2023	8250/-
5.	Supply of DOCs of CARIRED™	The Assistant Director Govt. Hatchery Farm Hisar HR	24/04/2023	40000/-
6.	Supply of DOCs of ASEEL PEELA	The Assistant Director Govt. Hatchery Farm Hisar HR	24/04/2023	10000/-
7.	Supply of DOCs of Japanese Quail (CARIUTTAM™)	Mr. Abbas Rizvi S/o Zubair Hasan, Meerut - 250222 (U.P.)	26/04/2023	16500/-
8.	Supply of 4 DOCs of KADAKNATH (Pure Line)	Shri Subal Sarkar S/o Hajari Lal Sarkar, Purnapur, Pilibhit (U.P.)	28/04/2023	27280/-
9.	Supply of 2 days old chicks of CARILALIMA™	Shri Rajesh Kumar Saxena S/o Mahesh Chand, Shastri Nagar, Bareilly (UP)	01/05/2023	20240/-
10.	Supply of DOCs of KADAKNATH (Pure Line)	Shri Rajesh Kumar Saxena S/o Mahesh Chand, Shastri Nagar, Bareilly (UP)	04/05/2023	22000/-
11.	Supply of DOCs of KADAMBARI™, CHITAMBARI™ and SWETAMBARI™ (Guinea Fowl)	Shri Dharamveer Singh s/o Shri Jaypal, Bans Khara, Udham Singh Nagar UK	12/05/2023	30166/-
12.	Supply of Fertile eggs of KADAKNATH (Pure Line)	The Dept. of Animal husbandry Lakshadweep	13/07/2023	77000/-
13.	Supply of Fertile Quail Eggs of CARIUTTAM™ & CARI BROWN™	M/s SRS Country Chicken TN	15/07/2023	39600/-
14.	Supply of CSML™ fertile Eggs	Bihar Animal Sciences University, Patna	21/07/2023	57750/-
15.	Supply of CSFL™ fertile Eggs	Bihar Animal Sciences University, Patna	21/07/2023	57750/-
16.	Supply of DOCs of TURKEY CARIVIRAT™	Shri Narendra Singh S/o Shri Deep Singh, Sikar, Jaipur	10/08/2023	143000/-
17.	Supply of DOCs of CSFL™ and CSML™ (Parent Line)	M/s MK Poultry and Hatchery, Ganjam, Odisha	14/08/2023	92400/-
18.	Supply of DOCs of CSFL™ and CSML™ (Parent Line)	Shri Aslam S/o Shri Rais, Ratanpur, Rampur (UP)	21/08/2023	134750/-
19.	Supply of CSML™ Fertile eggs (Parent Line)	Shri Narendra Singh S/o Shri Deep Singh, Sikar, Jaipur	28/08/2023	77000/-
20.	Supply of fertile quail eggs of CARIUTTAM™ & CARIBROWN™	M/s SRS Country Chicken, Tamil Nadu	07/09/2023	118800/-



21.	Supply of DOCs of ASEEL PEELA and KADAKNATH	Dr Shripal Siyak, RAJUVAS, Bikaner	12/09/2023	26400/-
22.	Supply of DOCs of CARISWETA™ (Japanese Quail)	Shri Ajeet Kumar Saxena S/o Shri Balveer Sahai Saxena, Bareilly	20/10/2023	11000/-
23.	Supply of DOCs of CARIBROWN™ (Japanese Quail)	Shri Ajeet Kumar Saxena S/o Shri Balveer Sahai Saxena, Bareilly	20/10/2023	11000/-
24.	Supply of DOCs of CARIUTTAM™ (Japanese Quail)	Shri Ajeet Kumar Saxena S/o Shri Balveer Sahai Saxena, Bareilly	20/10/2023	11000/-
25.	Supply of DOCs of CARIUJJAWAL™ (Japanese Quail)	Shri Ajeet Kumar Saxena S/o Shri Balveer Sahai Saxena, Bareilly	20/10/2023	11000/-
26.	Supply of DOCs of CARISUNHERI™ (Japanese Quail)	Shri Ajeet Kumar Saxena S/o Shri Balveer Sahai Saxena, Bareilly	20/10/2023	11000/-

A. Technologies assessed and transferred: 08

Name of the technology	Clients	Date of signing of the License	License Fee (INR)
Bundled Licensing Agreement for Commercialization of Egg Ras Malai, Chicken Meat Bites, CARI Egg Kulfi & CARI EGG Waffles	Mr. Mohd. Fazil S/o Saif Mo kamil H.No. 11, Urdu Mohalla Itawa, UP	17/02/2023	23200/-
Bundled Licensing Agreement for commercialization of Chicken Patties, Butterd Fried Quail, Functional Chicken Seek Kababs	Mr. Mohd. Fazil S/o Saif Mo kamil H.No. 11, Urdu Mohalla Itawa, UP	17/02/2023	23200/-
CARI Egg Rabri Malai	Mr. Mohd. Fazil S/o Saif Mo kamil H.No. 11, Urdu Mohalla Itawa, UP	17/02/2023	13800/-
CARI Portable Poultry Incubator	M/s Grandlay Electrical & Eng. Co, Bareilly, UP (Shakir Hussain)	09/06/2023	35400/-
CARI CHICKEN BADDI	Mr. Mohd. Fazil S/o Saif Mo kamil H.No. 11, Urdu Mohalla Itawa, UP	09/06/2023	11800/-
CARI Meat Pickle	Mr. Mohd. Fazil S/o Saif Mo kamil H.No. 11, Urdu Mohalla Itawa, UP	09/06/2023	17700/-
CARIHERBIGROW and CARIHERBISTRESSMIN	M/s JS Water Energy Life Co. Gurugram, Haryana	01/09/2023	162000/-
CARI Multi Grain Egg Biscuit	M/s Dorpie Pvt. Ltd., Varanasi, Uttar Pradesh	02/11/2023	11800/-

- The Institute signed Technology Licensing Agreements with entrepreneurs for transfer of CARI CHICKEN BADDI, CARI OIL BASED SPICY CHICKEN PICKLE and CARI PORATABLE POULTRY INCUBTOR on June 9, 2023 in the gracious presence of Dr B.N. Tripathi, DDG (Animal Science), ICAR, New Delhi.

❖ **Contract Research Project:** The following Contract Research Projects were implemented during the year-

- CRP entitled "Effects of Aquaritin all in one supplement in water on production performance, immune response other parameters in broiler and layer chicken" was signed with M/s JS Aquaritin Global Pvt. Ltd, Gurgaon Haryana at a total cost of Rs. 13,06,260/- from January 19, 2022 to till date. (Ongoing).
- CRP entitled "Field assessment of biomass form as a novel feed source in commercial broiler chickens" was signed with M/s Indian Oil Corporation Limited, Faridabad (Haryana) at a total cost of Rs.18,04,070/- from 30.9.2022 to till date. (Ongoing).

❖ **Umbrella MoU:** Prepared and signed MoU for the following Umbrella MoUs-

Sl	Purpose of the Umbrella MoU	Contracting Party	Date of signing MoU
1.	For facilitating of Human Resource Training/Research	People for Animals Public Policy Foundation, Delhi	13.04.2023
2.	For facilitating of Training/ Research	Bihar Animal Sciences University, Patna	25.05.2023
3.	For facilitating of Collaborative Research and Academic Engagements	Karnataka Poultry Farmers & Breeders Association (KPFBA), Bengaluru	25.10.2023



MoU signed with Shri Shakir Hussain, M/s Grandlay Electrical & Eng. Co, Bareilly, UP for the technology pertaining to the CARl Portable Poultry Incubator.



MoU signed with Mr. Mohd. Fazil S/o Saif Mo kamil Itawa, UP for transferring the technologies pertaining to CARl CHICKEN BADDI and CARl Chicken Meat Pickle



MoU Signed with M/s JS Water Energy Life Co. Gurugram, Haryana for transferring the technologies pertaining to formulation of CARIHERBIGROW and CARIHERBISTRESSMIN



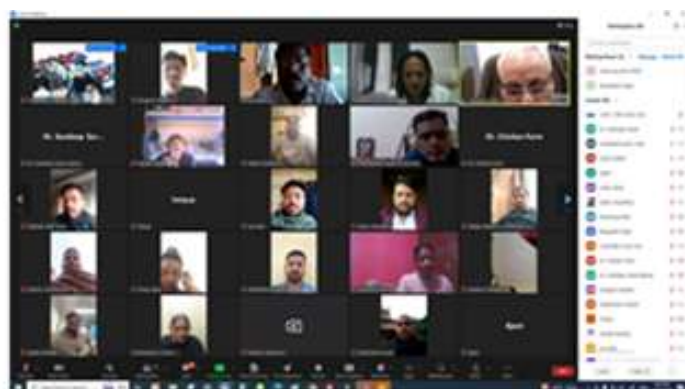


10. WORKSHOP, WEBINARS & TRAINING ORGANIZED

Programme	Duration	Participants	Course Director / Co-ordinator
Entrepreneurship Development Programmes			
Commercial Poultry Farming and Management	Feb 27 – March 03	75	Dr. Sandeep Saran Dr. Rokade, J.J
Commercial Poultry Farming for Self-employment	May 29 – June 02	43	Dr. Sandeep Saran Dr. Rokade, J.J
Commercial Poultry Farming: A Key to Prosperity	September 18-22	52	Dr. Sandeep Saran Dr. Rokade, J.J
Commercial Poultry Farming	December 11-15	39	Dr. Sandeep Saran Dr. Rokade, J.J
Short-term training programmes			
Poultry Production Management	January 02-07	30	Dr M.P. Sagar
Poultry Production Management	March 20-25	46	Dr M.P. Sagar
Poultry Production Management	June 05-09	66	Dr M.P. Sagar, Dr M. Ansari
Poultry Production Management	August 21-25	80	Dr M.P. Sagar, Dr Divya
Poultry Production Management	October 16-20	85	Dr M.P. Sagar, Dr M. Ansari
Poultry Production Management	December 04-08	64	Dr M.P. Sagar, Sh. S R Meena
Specialized Training Programmes			
Broiler Production	July 10-15	12	Dr M.P. Sagar Dr Rokade, J.J. Dr Simmi Tomar
Poultry Diseases & Biosecurity Measures	Nov. 27- Dec. 02	07	Dr M.P. Sagar Dr Gautham Kolluri
Awareness cum Training Programmes under DAPSC			
Off-campus training on Backyard Poultry Production Management	January 06	13	Dr J.S. Tyagi Dr Gautham Kolluri
Off-campus training on Backyard Poultry Production Management	February 10	45	Dr J.S. Tyagi Dr Gautham Kolluri
Off-campus training on Backyard Poultry Production Management	February 14	10	Dr J.S. Tyagi Dr Matin Ansari
Pig Production and Management	May 31	10	Dr J.S. Tyagi Dr Matin Ansari
Off-campus training on Backyard Poultry Production Management	Jun 14	65	Dr J.S. Tyagi Dr Matin Ansari
Pig Production and Management	June 15	20	Dr J.S. Tyagi Dr Gautham Kolluri
Off-campus training on Backyard Poultry Production Management	July 05	35	Dr J.S. Tyagi Dr Gautham Kolluri
Off-campus training on Backyard Poultry Production Management	July 21	65	Dr J.S. Tyagi Dr Gautham Kolluri
Off-campus training on Backyard Poultry Production Management	July 31	70	Dr J.S. Tyagi Dr Gautham Kolluri
Off-campus training on Backyard Poultry Production Management	August 14	92	Dr J.S. Tyagi Dr Gautham Kolluri
Backyard Poultry Production Management	August 21	22	Dr J.S. Tyagi Dr Rokade, J.J
Off-campus Sewing training	September 26-10	42	Dr J.S. Tyagi Dr Matin Ansari
Off-campus Sewing training	December 12-26	28	Dr J.S. Tyagi Dr Gautham Kolluri
Goat Production and Management	October 21	100	Dr J.S. Tyagi Dr Matin Ansari
Off-campus Sewing training	October 28-11	45	Dr J.S. Tyagi Dr Gautham Kolluri
Off-campus training on Backyard Poultry Production Management	November 06-09	59	Dr J.S. Tyagi Dr Gautham Kolluri
Off-campus Sewing training	November 17-December 01	42	Dr J.S. Tyagi Dr Divya
Off-campus Sewing training	November 19-December 03	35	Dr J.S. Tyagi Dr Divya
Backyard Poultry Production and Management	November 24	35	Dr J.S. Tyagi Dr Matin Ansari



Off-campus training on Backyard Poultry Production Management	December 11	42	Dr J.S. Tyagi Dr Matin Ansari
Off-campus training on Backyard Poultry Production Management	December 16-19	54	Dr J.S. Tyagi Dr Gautham Kolluri
Awareness cum Training Programmes under DAPST			
Off-campus training on Backyard Poultry Production Management	March 01-03	86	Dr. S.K. Bhanja Dr. Divya
Backyard Poultry Production and Management	December 19-21	30	Dr. Divya Dr. Chandra Deo
Externally Funded Programmes			
Advanced Training on Climate Resilient and Welfare friendly poultry production (under DST-SERB Karyashaala, GoI)	January 11-21	20	Dr. Rokade, J.J. Dr. Gautham Kolluri Dr. Matin Ansari Dr. Avishek Biswas
Advances in Research Methodologies and Innovations in Avian Biology: Integrating Genomics and Phenomics (under DST-SERB Karyashaala, GoI)	July 23-31	25	Dr. Gautham Kolluri Dr. Rokade, J.J. Dr. Matin Ansari Dr. Avishek Biswas
Off-campus training programme on Commercial Brown Egg Layer Production	August 5-7	100	Dr Gautham Kolluri
Other activities			
World Egg Day	October 13	100	Dr. Rokade J.J Dr. Gautham Kolluri
Webinar on "Role of IP for women in poultry"	April 26	50	Dr A.K. Tiwari
Webinar on "AMR in poultry"	April 29	45	
Webinar on "Overview of antimicrobial resistance & research initiatives to address it" during World Anti-microbial Awareness Week-2023	November 20	50	Dr Gautham Kolluri











11. DISTINGUISHED VISITORS



Dr B.N. Tripathi, Deputy Director General (Animal Sciences), Indian Council of Agricultural Research, New Delhi, visited the Institute on 09.06.2023 and inaugurated the newly constructed "Psychrometric Chamber" and "Poultry Demonstration Shed". He also planted trees in the CARI New Campus and visited the Institute's farm and laboratories.



(L-R) Dr S.K. Bhanja, Former Director, NIRD, Hyderabad; Dr T.A.S. Ganai, HoD, Animal Genetics and Breeding, Khalsa College of Vet. & Animal Science, Amritsar; Shri Shashank Bhatia, Progressive Farmer and Hon'ble Agri. Minister's nominee; Prof. Pankaj Shukla, Dean, College of Vet. Sci., DUVASU, Mathura and Dr V. Ravinder Reddy, VC, PV Narsimha Rao Telangana Vet. University, Hyderabad visited the Institute on 4.7.2023 for attending the Research Advisory Committee meeting.



"The Institute over the last 45 years have contributed very significantly in the breeding and production of several avian species. These achievements have been acknowledged world-wide and have helped to increase the income of farming sector, especially in backyard poultry sector. I wish the Institute and its team of dedicated scientists all success in their endeavours."

-Dr S.P. Kimothi, Member (Animal and Fishery Sciences), Agricultural Scientists Recruitment Board during his visit on 21.07.2023 to the Institute for the valedictory function of the High End Workshop "Karyashala" on Advances in Research Methodologies & Innovations in Avian Biology Integrating Genomics and Phenomics.



Dr Amrish Kumar Tyagi, Assistant Director General (Animal Nutrition), Indian Council of Agricultural Research, New Delhi, India visited the Institute on 22.07.2023 to inaugurate the High End Workshop "Karyashala" on Advances in Research Methodologies & Innovations in Avian Biology Integrating Genomics and Phenomics.



Dr R.C. Agrawal, Deputy Director General (Education), Indian Council of Agricultural Research, New Delhi, visited the Institute on 02.11.2023 and inaugurated the Mega Poultry Fair organized to celebrate the Institute's 45th Foundation Day.

Dr Triveni Dutt, Director; Dr S.K. Mehndiratta, Joint Director (Academic) and Dr Rupsi Tiwari, Joint Director (Extension Education), IVRI, Izatnagar visited the Institute on the occasion of Institute's 45th Foundation Day on 02.11.2023.



Dr K.B. Raju, Economic Advisor to the Chief Minister, Uttar Pradesh visited the Institute on 8.11.2023

Witnessed diverse varieties developed by CARI. Nicely maintained. My compliments to director sir and his team. Keep it up.

-Dr Jitendra Kumar, ADG (NASF), ICAR, New Delhi during his visit to the Institute on 23.12.2023

Par excellent germplasm of divergent poultry species and varieties. Not seen so far in India. Hats off to those who developed it and the director (Present) Dr A.K. Tiwari for keeping it in such a beautiful shape & as Head of CARI.

-Dr Gurvinder Singh Brah, Retd Director, Institute of Animal Biotechnology, Prof. AG&B, & Officiating In-charge, Poultry Breeding & Genetics Farm, GADVASU, Ludhiana during his visit to the Institute on 28.12.2023



12. Personalia

DIRECTOR

Dr Ashok Kumar Tiwari

Head of Division/Section

Division of Avian Genetics and Breeding	Dr Sanjeev Kumar (till 05.01.2023) Dr. Raj Narayan (w.e.f. 06.01.2023)
Division of Avian Nutrition and Feed Technology	Dr Chandra Deo
Division of Avian Physiology and Reproduction	Dr Jagbir Singh Tyagi
Division of Post-Harvest Technology	Dr J.J Rokade
Poultry Housing and Management Section	Dr S.K. Bhanja (till 14.06.2023) Dr Jagbir Singh Tyagi (w.e.f. 15.06.2023)
Technology Transfer Section	Dr M.P. Sagar
Avian Medicine Section	Dr Gautham Kolluri
Prioritization, Monitoring and Evaluation Section	Dr Sandeep Saran
Poultry Economics and Agribusiness Research Section	Dr Sandeep Saran
Post-Graduate Education and Training Section	Dr Avishek Biswas (till 27.10.2023) Dr Chandra Deo (w.e.f. 28.10.2023)
ABI Centre	Dr Sandeep Saran

Farm/Unit-Coordinator/In-charges

Desi Fowl Unit	Dr J.J Rokade
Experimental Layer Farm	Dr Gautham Kolluri
Experimental Broiler Farm	Dr Simmi Tomar
Experimental Turkey Unit	Dr Simmi Tomar
Experimental Guinea Fowl Unit	Dr Simmi Tomar
Experimental Quail Farm	Dr Raj Narayan
Feed mill and Processing Unit	Dr Chandra Deo
Experimental Hatchery Unit	Dr Jagbir Singh Tyagi
Library	

Coordinator
In -charge
Dr Jagbir Singh Tyagi
Shri P.N. Yadav

AKMU

Coordinator
In -charge
Dr Sandeep Saran
Shri P.N. Yadav

Poultry Processing Plant and Marketing Center

Dr J.J Rokade

Electrical and Instrumentation

Coordinator
In -charge
Dr Jagbir Singh Tyagi
Shri Kapil Kumar Sharma

Civil Engineering and Maintenance

Coordinator
JE-Civil
Dr Jagbir Singh Tyagi
Shri Shatyapal Sharma

Estate Unit

Coordinator
JE-Civil
Dr Jagbir Singh Tyagi
Shri Shatyapal Sharma

Games and Sports

Chairman
Secretary
Dr Jagbir Singh Tyagi
Dr Mohd. Matin Ansari



Nodal Officers

MIS-FMS and RTI online Vigilance Officer	Dr Gautham Kolluri Dr S.K. Bhanja (till 14.06.2023) Dr Gautham Kolluri (w.e.f. 09.10.2023)
Institutional Biosafety Committee (IBSC)	Dr S.K. Bhanja (till 14.06.2023) Dr Gautham Kolluri (w.e.f. 09.10.2023)
Aadhaar Enabled Biometric Attendance System	Dr Gautham Kolluri (w.e.f. 19.09.2023)
Institute Animal Ethics Committee (IAEC)	Dr Mohd. Matin Ansari
Institute Technology Management Unit	Dr Sandeep Saran
Centralized Public Grievance Redress and Monitoring System	Dr J.J. Rokade
Krishi Portal	Dr Gautham Kolluri
HRD	Dr Avishek Biswas (till 23.08.2023) Dr Mohd. Matin Ansari (w.e.f. 24.08.2023)

Scientific Staff (as on 31.12.2023)

Name	Designation	Education & Qualification
Dr A.K. Tiwari	Director	Ph. D
Dr Sanjeev Kumar (On deputation)	Principal Scientist	Ph. D
Dr Jagbir Singh Tyagi	Principal Scientist	Ph. D
Dr Sandeep Saran	Principal Scientist	Ph. D
Dr Raj Narayan	Principal Scientist	Ph. D
Dr Chandra Deo	Principal Scientist	Ph. D
Dr M.P. Sagar	Principal Scientist	Ph. D
Dr (Mrs.) Simmi Tomar	Principal Scientist	Ph. D
Dr (Mrs.) Divya	Principal Scientist	Ph. D
Dr Chandrasah (On deputation)	Principal Scientist	Ph. D
Dr Rokade Jaydip Jaywant	Scientist (Senior Scale)	Ph. D
Dr Gautham Kolluri	Scientist (Senior Scale)	Ph. D
Dr Matin Ansari	Scientist (Senior Scale)	Ph. D
Dr M. Sirajuddin	Scientist	M.V. Sc.

Technical Staff

Name	Designation	Educ. & Qualification
Shri P.N. Yadav	Chief Technical Officer (T-9)	M. Sc.
Shri S.R. Meena	Asstt. Chief Tech. Officer (T-7-8)	M. Sc.
Shri Kundan Kumar	Sr. Technical Officer (T-6)	B.Sc.
Shri Kapil Kumar Sharma	Sr. Technical Officer (T-6)	M.A. & ITI (Elec.)
Shri Arun Kumar	Technical Officer (T-5)	M.A. (Economics)
Shri Jaideep Arora	Technical Officer (T-5)	M.Sc.
Shri Ravi Kumar Goel	Technical Officer (T-5)	12 th
Shri Arvind Kumar	Technical Officer (T-4)	10 th
Shri Rakesh Jaiswara	Technical Officer (T-4)	M.Sc.
Shri Shatya Pal Sharma	Technical Officer (T-3)	Diploma Civil Eng.
Shri Pradeep Kumar	Technical Officer (T-3)	B.Sc. & DMLT

Administrative Staff

Name	Designation	Name	Designation
Shri Lal Bahadur Gujer	Administrative Officer	Smt. Prema Joshi	U.D.C
Shri G.D. Mainali	Assistant. Adm. Officer	Shri Ajay Kumar	U.D.C
Shri Kailash Chand	F&A.O	Shri Vijai Kumar Gupta	L.D.C
Shri Lalit Prakash	Personal Secretary	Smt. Urmila Devi	L.D.C
Smt. Reeta Adhikari	Assistant	Shri Umesh Kumar Tirpathi	L.D.C
Shri A.K. Sharma	Assistant	Ms. Divya Saxena	L.D.C
Smt. Rekha Rani	Assistant		



Skilled Supporting Staff

Name	Name	Name
Shri Abdulla Khan	Shri Krishan Kumar	Shri Rishi Pal Singh
Shri Ahsan Ali Khan	Smt. Maya Anaria	Shri Samiuddin S/o Shri Nijamiddin
Shri Akeel Mohd.	Shri Mohd. Saleem	Shri Samiuddin S/o Shri Safruddin
Smt. Asha Devi	Shri Narayan Singh	Smt. Seema George
Shri Bhole Singh	Shri Narendra Singh Basera	Shri Surjan Singh
Shri Bhubaneswar Prasad	Shri Nazir Ahmad	Shri Sushil Singh
Shri Both Singh	Shri Om Prakash S/o Sh. Ayodhya Prasad	Shri Taqbirul Hassan
Shri Dhaneswar Kumar Bharti	Shri Pappu	Shri Ved Prakash Sagar
Shri Dilip Singh	Shri Preetam Lal	Shri Veer Kumar
Shri Dori Lal	Shri Raj Pal	Shri Vijay Shankar
Shri Ghasi Ram	Shri Rajan Kumar	Shri Vinod .D. Singh
Shri Gulam Masih	Shri Rajveer Singh	Shri Vinod Singh
Shri Harish Chandra	Shri Ram Murti Lal	Shri Zaheer Uddin
Shri Jitendra Kumar Verma	Shri Ramesh Chandra Kandpal	Shri Zakir Ali
Shri Jugendra Pal Singh	Shri Ranjan Kr. Dev	Smt. Saroj
Shri Klimuddin	Shri Ravi Narayan Lal	Smt. Sunita
Shri Kolvin	Shri Ravindra Kr. Pohan	

Cadre Strength

Category	Sanctioned Strength	In-Position	Vacant
Scientific	22+1	16+1	06
Assistant Director (OL)	01	0	01
Technical	50	13	37
Administrative	17	13+1	04
Supporting Staff	85	56	29

Promotions/Appointments

Name	Designation	Promoted/Appointed on
Shri Lalit Prakash	Personal Secretary	2023

Transfer

Name	Designation	Transferred to
Dr. Sanjeev Kumar	Principal Scientist	Registrar, BASU Patna Bihar on deputation
Dr. S.K. Bhanja	Principal Scientist	Head, Regional Station, Bhubaneswar, (DPR, Hyderabad)
Dr. Avishek Biswas	Principal Scientist	Head, Division of Cattle Nutrition and Management ICAR- Central Institute for Research on Cattle, Meerut

Promotions under Modified Assured Career Progression (MACP) Scheme

Name of Employee	Due Date of MACP	Date of MACP
Shri Sushil Singh, SSS	18.01.2023	02.05.2023
Shri Akhil Mohd., SSS	01.06.2023	02.05.2023
Shri Vinod D. Singh, SSS	01.06.2023	02.05.2023
Shri Gulam Masih, SSS	01.06.2023	02.05.2023



Superannuation

Name	Designation	Superannuated on
Dr. Amitabh Mishra	Chief Tech. Officer (T-9), Medical Officer	31.01.2023
Shri Ram Ashrey	Skilled supporting staff	28.02.2023
Shri Daulat Ram	Skilled supporting staff	30.06.2023
Shri Sushil Kumar Saxena	Skilled supporting staff	30.06.2023
Shri Anwar Alam Khan	Asstt. Adm. Officer	31.07.2023
Shri Mahendra Singh Martolia	Sr. Technician (T-2)	31.08.2023
Shri Dharam Pal Mishra	Skilled supporting staff	31.10.2023
Shri Anil Kumar Sharma	Assistant	30.11.2023
Shri Ajay Lal	Skilled supporting staff	30.11.2023
Shri P.N. Yadav	Chief Tech. Officer (T-9)	31.12.2023

Demise

Name	Designation	Date
Shri Sachin Kant Sharma	Upper Division Clerk	12.12.2023





13. EXPENDITURE AND REVENUE

Expenditure		Rs in lakhs
Head of Account	Budget Allocation	Utilization
1. Grant in Aid- Capital		
A. Land	0.00	0.00
B. Buildings	0.00	0.00
Office Buildings	258.02	258.02
Residential Buildings	0.00	0.00
Minor works	0.00	0.00
Other Capital Expenditure		
C. Equipment	86.90	86.90
D. Information Technology	0.43	0.43
E. Library Books & Journals	0.00	0.00
F. Vehicles, Vessels	0.00	0.00
G. Livestock	0.00	0.00
H. Furniture & Fixtures	2.15	2.14
I. Others	0	0
Total G-I-A Capital	347.50	347.49
2. Grant-in-aid Salary		
A. Establishment expenses	1195.97	1195.97
B. Wages	0.00	0.00
C. Overtime Allowances	0.00	0.00
Total Establishment Expenses	1195.97	1195.97
3. Grant-in-aid General		
Pension & Other Retirement Benefits	466.00	466.00
4.Travelling Allowances		
i) Domestic TA/Transfer TA	7.96	7.96
ii) Foreign TA	0.00	0.00
Total Travelling Expenses	7.96	7.96
5. Research and Operational Expenses		
1) Research Expenses	503.90	503.80
2) Operational Expenses	149.39	149.39
Total - Research, Operational	653.29	653.19
6. Administrative Expenses		
A. Infrastructure	166.42	166.42
B. Communication	3.51	3.51
R/M- Equip,vheicle etc.	42.56	42.56
Office Buildings	67.23	67.23
Residential Buildings	3.04	3.04
Minor works	0.00	0.00
Others (excluding TA)	195.67	195.81
Total Administrative Expenses	478.43	478.57
7. Miscellaneous Expenses		



A. HRD	2.88	2.89
B. Other items Fellowships, Scholarship, etc	0.00	0.00
C. Publicity & Exhibition	2.50	2.50
D. Guest House- Maintenance	4.94	4.88
E. Other miscellaneous	0.00	0.00
Total miscellaneous expenses	10.32	10.27
Total Grants in Aid -General	1616.00	1615.99
Grand Total – Capital + Revenue (Salaries + General)	3159.47	3159.45
Loans, Advances	7.00	0.00

Revenue generated

S. No.	Head of Account	Amount
1	Sale of Farm Produce	14,49,672
2	Sale of Fish & Poultry	1,35,49,690
3	Sale of Land	0
4	Sale of Building	0
5	Sale of Vehicle, other Machine tools	7,29,117
6	Sale of Livestock	0
7	Sale of Publication and advertisement	3,000
8	Licence Fee	13,09,923
9	Interest earned on loans & advances	5,62,375
10	Leave salary and pension contribution	32,59,778
11	Receipts from schemes	0
12	Analytical and testing fee	1,12,340
13	Pre-shipment fee	0
14	Application fee from candidates	0
15	Diploma Charges	0
16	Receipts from services rendered	0
17	Unspent balance of Grants of previous years	54,64,987
18	Interest earned on short term deposits	5,80,163
19	Income generated from Internal Resource Generation schemes	
	a) Training	7,91,014
	b) Consultancy	0
	c) Contract Research	3,93,088
	d) Sale of Technology	2,63,200
	e) other (Specify the source)	0
20	Net Profit in Revolving funds	0
21	Recoveries of Loans & Advances	9,97,616
22	Miscellaneous Receipts	3,25,532
(A)	TOTAL: OTHER RECEIPTS (A)	2,97,91,495



14. APPROVED ON-GOING RESEARCH PROJECTS

Total Institute Projects – 19 Institute + 1 AICRP + 4 Service + 09 Externally + 02 CRP (Total 35 Projects)

Sl.	Project Code No.	Project Title	Principal investigator	Co-Investigator
PROGRAMME-1: PRODUCTIVITY ENHANCEMENT OF SELECTED POULTRY SPECIES (16)				
Sub Programme – (i) Enhancement of productivity, reproductive efficiency and immune-competence of selected diversified poultry species along with development of improved package of practices. (15)				
1.	P-1/2020/1-IAV/ L10/6600 DOS: 28.10.2020 DOC: 27.10.2025	Genetic improvement of turkey for higher body weight	Dr. S.K. Bhanja (till 14.06.2023) Dr(Mrs.) Simmi Tomar (w.e.f. 15.06.2023)	Dr. Raj Narayan
2.	P-1/2021/1-IAV/ L10/6600 DOS: 01.04.2021 DOC: 31.03.2024	Establishing feed efficient turkey (<i>Meleagaris gallopavo</i>) line using metabolism related candidate gene polymorphism and gut microbiome information	Dr. S.K. Bhanja (till 14.06.2023) Dr(Mrs.) Simmi Tomar (w.e.f. 15.06.2023)	Dr. Simmi Tomar (till 14.06.2023) Dr. Chandra Deo
3.	P-1/2021/1-IAV/ L10/6400 DOS:01.04.2021 DOC:31.03.2024	Genetic improvement and genomics in pearl variety of Guinea fowl	Dr(Mrs.) Simmi Tomar	Dr Jaydip Rokade Dr Gautham Kolluri
4.	P-1/2019/1-IAV/L36/ 3700/6000 DOS:01.06.2019 DOC:30.05.2023	Studies on certain dietary antioxidants and their interaction in poultry	Dr.Chandra Deo	Dr. (Mrs) Divya Dr. Avishek Biswas (till 27.10.2023)
5.	P-1/2019/1-IAV/ L36/3740/6000 DOS: 13.10.2019 DOC: 31.07.2023	Exploring herbs, essentials oils, plant and plants natural compounds for development of natural growth promoter	Dr. (Mrs) Divya	Dr. Chandra Deo Dr. Avishek Biswas (till 27.10.2023)
6.	P-1/2021/1-IAV/ L30/6000 DOS:01.02.2021 DOC:31.01.2024	Identification and evaluation of locally available unconventional feed resources for poultry production and nutrigenomic studies in NEH region	Dr. Avishek Biswas (till 27.10.2023) Dr Chandra Deo (w.e.f. 28.10.2023)	Dr Chandra Deo (till 27.10.2023) Dr Tapan Kumar Das Dr Jowel Debnath Dr Bikas Chand Debnath
7.	P-1/2021/1-IAV/L34/ 3900/6100 DOS: 01.04.2021 DOC: 31.03.2024	Development of multi strain postbiotics as an effective alternative to antibiotics growth promoters and in vivo evaluation in broiler chicken under biotic and abiotic stress conditions	Dr. Jagbir Singh Tyagi	Dr. Gautham Kolluri Dr. Rokade J.J. Dr. Divya Dr. Mohd. Matin Ansari
8.	P-1/2021/1-IAV/L50/6100 DOS:01.04.2021 DOC:31.03.2024 (extension as per IRC held on 02-04 Aug 2023)	Achieving reproductive rejuvenation in spent hens of commercial and desi varieties through convergence of physiological and nutritional manipulations	Dr. M. Sirajudeen	Dr J S Tyagi Dr Gautham Kolluri
9.	P-1/2022/1-IAV/ L10/6510 DOS:01.04.2022 DOC:31.12.2025	Genetic improvement of three distinguished plumage and egg colours varieties of broiler and layer type domesticated Japanese Quails.	Dr Raj Narayan	Dr S. K. Bhanja (till 14.06.2023) Dr Rokade J. J.



10.	P-1/2019/1-IAV/ L36/3740/6000 DOS:13.10.2023 DOC:12.10.2026	Non-antibiotic approaches to enhance host immunity, gut health and growth performance in poultry.	Dr. (Mrs) Divya	Dr. Chandra Deo Dr. Mohd. Matin Ansari Dr Gautham Kolluri
11.	P-1/2019/1-IAV/ L36/3740/6000 DOS:01.08.2023 DOC:31.07.2026	Effect of thermal conditioning of Japanese quail embryo on epigenetic changes induced postnatal thermo-tolerance.	Dr. Mohd. Matin Ansari	Dr Jagbir Singh Tyagi Dr Gautham Kolluri Dr Rokade J. J.
12.	Service project	Quality assessment of feed stuffs and poultry feed	Dr. Avishek Biswas (till 27.10.2023) Dr Chandra Deo (w.e.f. 28.10.2023)	-
13.	Service project	Monitoring of poultry diseases and implementation of bio-security measures including vaccination for achieving better survivability and productivity in CARI birds.	Dr. Gautham Kolluri	-
14.	Service project	Production of DOCs of diversified poultry germplasm	Dr Jagbir Singh Tyagi	-
15.	No.CAU/COVSc-JLK/ ICAR-NEH-COMP/ 2023-24/1111 dated 28.02.2024 DOS:04.03.2024 DOC:31.03.2028	Evaluation of CARI improved germplasm in NEH region and its popularization under the aegis of ICAR-NEH scheme	Dr. Mohd. Matin Ansari	Dr Gautham Kolluri Dr Rokade JJ Dr Imtiwati Dr Bhabesh Mili

Sub Programme – (ii) Development of package of practices for rural poultry production system (1)

1.	Component – AICRP-PB, Hyderabad (w.e.f. 21.07.2018)	Improving the broiler parent lines and to develop the meat type crosses for rural poultry production	Dr Simmi Tomar	Dr. Jaydip J. Rokade
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PROGRAMME 2: CLIMATE RESILIENT POULTRY PRODUCTION SYSTEM AND WASTE MANAGEMENT (0)

Sub Programme – Impact assessment, adaptation evaluation and amelioration strategies to combat extremes of climate through genetic / molecular, nutritional, physiological, shelter management and evolving efficient technologies for utilization of poultry waste.

PROGRAMME 3: VALUE ADDITION, FOOD SAFETY, QUALITY ASSURANCE AND PRODUCT DEVELOPMENT (3)

Sub Programme – Development of value added poultry feed and poultry products with functional attributes and quality assurance including product development.

1.	Service project	Development of different value added poultry products for income generation	Dr. Rokade J. J.	--
2.	P-1/2021/1-IAV/L73/3940 DOS: 01.04.2021 DOC: 31.03.2024	Applications of safe alternatives to antibiotics as prophylactic agents in diversified poultry species to reduce AMR burden of Escherichia Coli	Dr. S. K. Bhanja (till 14.06.2023) Dr. Gautham Kolluri (w.e.f. 15.06.2023)	Dr. Jaydip J. Rokade
3.	P-1/2019/1-IAV/ L36/3700/6000 DOS:01.09.2023 DOC:30.08.2026	Development of feeding package for CARINIRBHEEK and CARISHYAMA improved native chickens for optimum meat and eggs production	Dr. Chandra Deo	Dr. Divya Dr Avishek Dr. Jaydip J. Rokade



PROGRAMME 4: HRD, MARKET INTELLIGENCE AND TECHNOLOGY DISSEMINATION (5)

Sub Programme – (i) Market intelligence, contingency planning and economic implications of emerging issues in poultry value chain.(3)

1.	P-1/2019/1-IAV/L00/ 6100/4610 DOS:01.06.2019 DOC:31.05.2023	Optimization the welfare of broiler chickens with special emphasis on transport	Dr. Rokade, J.J.	Dr. S.K. Bhanja Dr. Jagbir Singh Tyagi
2.	P-1/2022/1-IAV/C00/6000 DOS: 28.07.2022 DOC: 28.07.2025	Development of training modules and digital applications for transfer of poultry production technologies	Dr. M. P. Sagar	--
3.	P-1/2019/1-IAV/L36/ 3740/6000 DOS:01.08.2023 DOC:31.07.2026	Innovative strategies to reduce post-harvest losses to achieve better welfare of chicken	Dr. Rokade, J.J.	Dr A K Tiwari Dr Gautham Kolluri Dr Akhilesh Dr. Mohd. Matin Ansari

Sub Programme – (ii) Skill development, capacity building for different stakeholders and transfer of technology. (2)

1.	P-1/2018/1-IAV/E00/6000 DOS: 01.06.2018* DOC: 31.03.2026 DAPST Project	Socio-economic empowerment of tribal population in selected districts of Uttar Pradesh and Uttarakhand through intervention of poultry technologies	Dr Sanjeev Kumar (till 05.01.2023) Dr S. K. Bhanja (06.01.2023- 14.06.2023) Dr Divya (w.e.f. 15.06.2023)	Dr. Sandeep Saran Dr. Chandra Deo Dr. Divya (till 14.06.2023)
2.	P-1/2019/1-IAV/E30/6000 DOS: 01.07.2019 DOC: 01.07.2024 DAPSC Project	Entrepreneurship opportunities and skill development for self-sustainable livelihood and nutritional security for socially privileged groups (Scheduled Caste)	Dr. Jagbir Singh Tyagi	Dr. Sandeep Saran Dr. Gautham kolluri Dr. Rokade J.J. Dr.(Mrs) Divya Dr. Mohd. Matin Ansari

*The project was approved for three years in principle, however initially for one year, and next two year subject to availability of grant from the Council.a

EXTERNALLY FUNDED PROJECTS – (9)

Sl.	Sanction order No.	Title of the project	Name of PI	Name of Co-PI
1.	No.IP&TM-7(5)/2013-IPR dated 1.1.2016 (ABI Project); extended vide F.No.1(1)/2023- PIM dated 29.03.2023 DOS : 01.01.2016 DOC: 31.03.2026	Poultry Entrepreneurship Development Initiative – The Agri Business Incubator	Dr Sandeep Saran	Dr. Jagbir Singh Dr J.J. Rokade (w.e.f. 08.01.2024)
2.	No.A.Extn.-20-3/2011-AE.I dated 28.10.16 DOS : 28.10.2016 DOC:31.03.2026 (extended vide F.No.1(1)/2023- PIM dated 29.03.2023)	Enhancing livelihood security of farming community through livestock and crop integration using proven technologies	Dr. Jagbir Singh Tyagi (CCPI)	
3.	No.AS/10/6/2020-ASR-II dated 17.09.2020 (RKVY Project) DOS: 20.01.2021 DOC: 20.01.2024	Model project and demonstration unit for backyard poultry, livestock, vermi-farming and moringa integration	Dr Raj Narayan	Dr Simmi Tomar
4.	No.9(2)/2016-ES-HRD(Pt) dated 16.03.2021 (Emeritus Scientist Scheme) DOS: 16.03.2021 DOC: 15.3.2024	Enhancing the reproductive and productive efficiencies of chicken and alternate poultry species using artificial insemination	Dr Jag Mohan	--
5.	No.BT/PR32656/AAQ/1/763/ 2019 dated 20.09.2021 (DBT Project) DOS: 01.10.2021 DOC: 19.03.2024	Identification of key molecular players specially lncRNAs involved in response to NDV challenge in indigenous and exotic chicken breeds using RNA-seq analysis	Dr Gautham Kolluri	Dr Jagbir Singh Tyagi



6.	No.CRG/2021/007904 dated 06.01.2022 (DBT Project) DOS: 21.01.2022 DOC: 20.01.2025	Transgenic chicken for expression of Leukemia Inhibitory Factor (LIF): A potential cytokine in stem cell biology and therapy.	Dr S K Bhanja (CCPI) (till 14.06.2023) Dr Gautham Kolluri (w.e.f. 15.06.2023)	--
7.	Collaborative project with NDRI, Karnal as Lead Centre(DST Project) DOS: 01.04.2022 DOC: 31.03.2025	Development of climate resilient and sustainable agri-based systems for better food, feed nutritional and livelihood security options to farming community of cold arid regions-Ladakh	Dr Jagbir Singh Tyagi (CCPI)	Dr Sandeep Saran Dr Gautham Kolluri
8.	F.No. IP&TM-7(1)/2017-IPR dated 02.01.2018 extended vide F.No.1(1)/2023-PIM dated 29.03.2023 DOS: 02.01.2018 DOC: 31.03.2026	Institute technology Management Project-National Agriculture Innovation Fund (NAIF)-Component-1	Dr Sandeep Saran	---
9.	Ref: email dated 8.12.2022 from Dr H. Rehman, Regional Representative for South Asia, ILRI, Pusa, New Delhi-12 DOS: 01.01.2023 DOC: 31.12.2026	Pangenome analysis and identification of selection signatures for conservation of Red Jungle fowl	Dr Simmi Tomar (CCPI)	Dr A. K. Tiwari Dr J. J. Rokade

CONTRACT RESEARCH PROJECTS - (2)

Sl.	Sponsoring Agencies / Date of Start and Completion	Title of the project	Name of PI	Name of Co-PI
1.	M/s J S Aquaritin Global Private Limited, Gurgaon DOS: 19.01.2022 DOC: 19.07.2023	Effects of "Aquaritin all in one supplement" in water on production performance, immune response other parameters in broiler and layer chickens	Dr Avishek Biswas	Dr Chandra Deo Dr (Mrs) Divya Dr J.J. Rokade
2.	M/s Indian Oil Corporation Ltd, Faridabad (Haryana) DOS: 30.09.2022 DOC: 30.09.2023	Field assessment of biomass form as a novel feed resource in commercial broiler chickens	Dr J.J. Rokadea	Dr Gautham Kolluri Dr Sandeep Saran Dr A. K. Tiwari





15. IMPORTANT ACTIVITIES AND SERVICES

Research Advisory Committee (RAC) Meeting

The RAC meeting was held on July 4, 2023, under the chairmanship of Dr. V. Ravinder Reddy, Vice Chancellor of PV Narasimha Rao Telangana Veterinary University, Hyderabad. Dr. T.A.S. Ganai, HoD of Animal Genetics and Breeding, KCVAS, Amritsar; Dr. Ashok Kumar Tiwari, Director of ICAR-CARI, Izatnagar; Prof. Pankaj Shukla, Dean of CoVAS & AH, DUVASU, Mathura; and Shri Shashank Bhatia, Progressive Farmer and nominee of the Agriculture and Farmers' Welfare Minister were amongst the attendees, who were members of the RAC. Furthermore, two members of the RAC, Dr. K. P. Singh, a Progressive Farmer and Hon'ble Agri. Minister's nominee, and Professor Anandamoy Kundu from RPCAU, Samastipur, Bihar, participated virtually via Zoom. Dr. Avishek Biswas served as Member Secretary. The meeting began with opening remarks from the chairman, followed by Dr. Avishek Biswas presenting the Action Taken Report (ATR) on the recommendations from the previous RAC meeting. Subsequently, research highlights were presented division-wise by the respective Heads of Division/Section. The meeting concluded with a vote of thanks from Dr. Matin Ansari, Scientist (SS) and Nodal Officer, RAC-2023.

Sl.	Name	Designation
1.	Dr Ashok Kumar Tiwari, Director, CARI, Izatnagar	Chairman
2.	The Additional Director, Animal Husbandry, Bareilly, U.P.	Member
3.	The Dean, College of Veterinary and Animal Science, G.B. Pant University, Pantnagar, (U.K.)	Member
4.	Shri Mahesh Kumar, Sr. F&AO, ICAR Hqrs. New Delhi – (On line)	Member
5.	Dr. S.K. Singh, Joint Director (R), ICAR-IVRI, Izatnagar	Member
6.	Dr. R.S. Kataria, Principal Scientist, NBAGR, Karnal (On line)	Member
7.	Dr. L.C. Chaudhary, Principal Scientist, ICAR-IVRI, Izatnagar	Member
8.	Shri Shashank Bhatia, Bhatia Farm, Jugrunagar, Baheria, Distt. Bareilly	Member
9.	Dr. Sandeep Saran, I/c HD/PME, CARI, Izatnagar	Special Invitee
10.	Shri Kailash Chand, Finance & Account Officer, CARI, Izatnagar	Special Invitee
11.	Shri L.B. Gujer, A.O., CARI, Izatnagar	Member Secretary

The Director presented his welcome address followed by presentation of ATR by the Member Secretary on the recommendations of the 49th IMC meeting. Dr Sandeep Saran presented the achievements of the Institute. The agenda items were presented by the Member Secretary before the IMC for its consideration. At the end, the Member Secretary presented the formal vote of thanks.

Online RTI and Appeal Management Information System (RTI-MIS)

- Dr Sandeep Saran, Nodal Officer, RTI and the CPIO (Scientific Matters), and Shri G D Mainali, CPIO (Administrative and Allied Matters) disposed-off all 11 RTI requests pertaining to scientific and administrative matters in the Institute. Dr Gautham Kolluri served as Nodal Officer, Online RTI, and managed the 5 RTI requests received through its portal (<https://rtionline.gov.in/RTIMIS/>). Dr Saran also compiled and prepared the detailed information/data under section

Institute Research Committee (IRC) Meeting

- IRC-2023: was held during August 02-04, 2023 under the chairmanship of Dr A.K. Tiwari, Director. Dr Sandeep Saran, Member Secretary IRC conducted the meeting. The Divisional IRC meetings were also held in the Institute. All the scientists attended the IRC meeting.

Standing Finance Committee (SFC) 2021-25

- The Institute revised the budgetary proposals amounting to ~Rs.61 crores and submitted to the NBAGR, Karnal, the lead scheme for the period 2021-25 under the thematic area "Animal genetic resource management, production and improvement". Total 10 drafts have been submitted till 31.12.2023.

50th Institute Management Committee (IMC) Meeting

- The 50th Management Committee meeting of Central Avian Research Institute was held on 28th July, 2023 in the New Campus Committee Room of the Administrative Block of the Institute under the Chairmanship of Dr. Ashok Kumar Tiwari, Director, CARI, Izatnagar. The following were present in the meeting-

(4) of the RTI Act 2005 pertaining to Voluntary Disclosure of Information. The updated information was placed on the Institute website and the information returns in this regard was submitted to the CIC in online mode.

Implementation Status of ICAR-ERP (MIS-FMS)/ SPARROW

- The Indian Council of Agricultural Research has successfully developed and implemented the ERP solution for Management Information System (MIS) including Financial Management System (FMS). The institute as important constituent of the system has operationalized various modules like Project Management, Financial Management, Material Management and Payroll etc. albeit with some constraints. The system continues to be evolved and upgraded on basis of arising needs in day-to-day functioning. The Smart Performance Appraisal Report



Recording Online Window (SPARROW) has also been made functional in the Institute for all the staff and their APARs for 2022-23 were filled up on SPARROW platform.

Feed Storage and Processing Unit

The main activity of the section includes procurement and storage of different feed ingredients, feed formulation, quality control and ensuring balance feeds for valuable germ plasm of

layers, broilers, guinea fowls, quails and turkeys maintained under different Division/ Sections of the Institute as well research projects involving poultry at IVRI. During the period under report, the feed unit has manufactured and supplied 9767.39, qtl different types of poultry feed. Detailed break up of feed supplied to different divisions/sections/farms of the Institute and other organizations is as under.

Sl.	Project/ Division/organization	Total Quantity (Qtls)
1.	Broiler farm	2120.85
2.	Layer farm	2019.00
3.	Desi fowl farm	2159.50
4.	Quail farm	774.80
5.	Guinea fowl unit	879.30
6.	Turkey unit	1195.03
7.	Avian Nutrition and Feed Technology Division	24.45
8.	Avian Physiology and Reproduction Division	92.00
9.	Poultry Housing and Management Section	92.30
10.	P H T Division	7.25
11.	Demo shed	85.90
12.	IVRI, Izatnagar	68.96
13.	Morringa project	78.00
14.	DAPSC Project	101.80
15.	TSP Project	47.25
16.	DUVASU, Mathura	20.00
17.	CSIR-IITR, Lucknow	1.00
Total		9767.39

Marketing Center

Revenue generated through sale of experimental byproducts

Month	Sale of Meat (INR)	Sale of Eggs (INR)
January	102314	268375
February	91159	305140
March	109491	21000
April	52767	205750
May	105102	239100
June	187410	293700
July	97065	328910
August	160250	506865
September	163758	649922
October	153581	707794
November	119720	442825
December	150450	334905
Total	14,93,067	43,04,286

Gross Sales (INR)

57,97,353



Germplasm Cell

Revenue generated through sale of germplasm

Germ plasm Supplied	Chicks/Fertile eggs (No.)	Live Birds (Kg)	Revenue Generated (INR)
Desi	36203		52,71,443/-
Layer	12497		
Broiler	34402		
Guinea Fowl	1054	10500	
Quail	19123		
Turkey	7044		
Total	110323	10500	

Agricultural Knowledge Management Unit (AKMU)

- Sh. P. N. Yadav supervised the activities of Agricultural Knowledge Management Unit (AKMU) of the Institute under the guidance of Dr Sandeep Saran, Co-ordinator of this unit. The AKMU managed the local area network of about 70 nodes operational in the Institute. The AKMU also assisted the scientists and staff of the institute in maintaining and troubleshooting their computer systems and other day-to-day functioning of their individual computer systems and the network as a whole. Also liaised with the NKN Nodal Officers at Lucknow for maintenance of Internet services in the Institute. The CCTV, EPABX and Internet facilities were made operational in the new campus of CARI while integrating the same with the existing facilities in the old CARI campus.

Library and Information Services.

- During the period under report 23 new publications were added to the library collection. This brings the total number of books, bound volumes of journals and thesis etc. in the library to 6286.
- CARI library subscribed only one online journal. In addition, a number of national and international serial publications, annual reports and newsletters were also received on gratis. Besides, a number of daily and weekly Hindi and English newspapers and magazines subscribed.
- Wi-Fi facility is made available in the library, so that, library users may use their own Laptop and other electronic gadgets to access internet.
- CARI being a member of Consortium for e-Resources in Agriculture (CeRA), is getting access to more than 2000 online full text journals. Document Delivery Request (DDR) services were also exchanged among the members libraries under CeRA.
- CARI library also provided Internet, e-mail, information retrieval through CD-ROM database and Xerox services to the scientists and students.

Rajbhasha Anubhag (हिन्दी अनुभाग)

राजभाषा कार्यावन्त्यन समिति की बैठकों का आयोजन

- समीक्षाधीन अवधि के दौरान राजभाषा हिन्दी के प्रयोग की प्रगति की समीक्षा के लिए संस्थान में दिनांक 17-03-2023, 30-05-2023, 18-10-2023 तथा 22-12-2023 को राजभाषा कार्यावन्त्यन समिति की बैठकें आयोजित की गईं। उक्त बैठकों के दौरान राजभाषा नीति तथा नियमों के अनुपालन के लिए चर्चा के उपरान्त उनके अनुपालन पर बल दिया गया।
- राजभाषा प्रयोग से संबंधित तिमाही प्रगति रिपोर्ट तैयार कर भारतीय कृषि अनुसंधान परिषद् मुख्यालय सहित भारत सरकार के राजभाषा विभाग को भेजी गई। संस्थान के अधिकारियों तथा कर्मचारियों के राजभाषा ज्ञान संबंधी विवरण को अद्यतन किया गया तथा प्रवीणता प्राप्त अधिकारियों तथा कर्मचारियों को हिन्दी काम करने के लिए व्यक्तशः आदेश जारी किए गए।

कार्यशाला का आयोजन

- समीक्षाधीन अवधि के दौरान संस्थान में राजभाषा हिन्दी को बढ़ावा देने के लिए वर्ष में नियमनुसार हिन्दी कार्यशालाओं का आयोजन किया गया, जिसमें राजभाषा अधिनियम तथा राजभाषा नियमों के संबंध में जानकारी दी गई और कुल 52 अधिकारियों तथा 34 कर्मचारियों को प्रशिक्षित किया गया। इसके अतिरिक्त राजभाषा अधिनियम राजभाषा तथा नियमों के अनुपालन के लिए अनेक परिपत्र तथा निर्देश जारी किए गए।

हिन्दी पखवाड़ा का आयोजन

- संस्थान में 14-29 सितम्बर, 2023 तक हिन्दी पखवाड़ा का आयोजन किया गया। इस अवसर पर संस्थान के निदेशक डॉ. अशोक कुमार तिवारी ने माँ सरस्वती के चिल पर माल्यार्पण तथा दीप जलाकर कार्यक्रम का उद्घाटन करते हुए कहा कि हिन्दी का प्रयोग केवल प्रशासनिक कार्यों में ही नहीं हो रहा है बल्कि वैज्ञानिकों द्वारा हिन्दी में लिखे गए शोध-पत्रों, व्याख्यानों, प्रशिक्षणों एवं प्रकाशनों के माध्यम से संस्थान की नवीन प्रौद्योगिकीय उपलब्धियों को जन-जन तक पहुँचाने के लिए भी हिन्दी प्रयोग किया जा रहा है। हिन्दी पखवाड़ा के दौरान संस्थान में निबंध लेखन, वाद-विवाद, कम्प्यूटर पर हिन्दी टंकण, टिप्पणी तथा मसौदा लेखन, सामान्य ज्ञान, अनुवाद तथा शब्दावली परिचय प्रतियोगिताओं का आयोजन किया गया।
- संस्थान में पिछले बारह वर्षों से हिन्दी में शोध-पत्र लेखन प्रतियोगिता का आयोजन किया जा रहा है। समीक्षाधीन वर्ष में भी हिन्दी में शोध-पत्र लेखन प्रतियोगिता का आयोजन किया गया, जिसमें मूल रूप से हिन्दी में लिखे गए कुल 05 शोध-पत्र प्राप्त हुए, जिनमें से 03 शोध-पत्रों को नगद पुरस्कार तथा शेष को सांत्वना पुरस्कार प्रदान किया गया। कार्यक्रम के अन्त में डॉ. अशोक कुमार तिवारी, निदेशक ने पुरस्कार विजेताओं को पुरस्कार तथा स्मृति चिह्न प्रदान किया। कार्यक्रम के आयोजन हिन्दी अनुभाग के पारस नाथ यादव, सहायक मुख्य तकनीकी अधिकारी तथा प्रधान वैज्ञानिक डॉ. दिव्या, राजभाषा अनुभाग ने किया।



Engineering and Maintenance Section

The Engineering and Maintenance Section of the Institute has completed over 158 diverse tasks, including immediate repairs and replacement of various fixtures such as bib cocks, angle valves, gate valves, wash basins, sinks, waste couplings, waste pipes, G.I. pipes, PVC pipes, sockets, tees, elbows, nozzle cocks, pillar cocks, butt hinges, sliding door bolts, handles, plaster, and repairs of doors and windows in various laboratories, experimental farms, and residential complexes. Besides, this section coordinated with CPWD to undertake various infrastructure development projects.

Key jobs included:

- Construction of a Psychrometric chamber.
- Preparation of estimates for the repair and renovation of the Demo shed (exterior).
- Installation of reinforced cement 6mm thick corrugated sheets in the Guinea fowl and Nutrition shed.
- Installation of aluminum doors in DPS.
- Repairing 137 cages across the Quail farm, Broiler farm, Desi farm, and Layer farm.
- Installation of MS doors, fly-proof and iron frames in the Slaughterhouse.
- Fabrication of 173 tree guards.
- Providing roofs for three sheds in the Moringa farm.
- Repairing wheelbarrows, rickshaws, and tractor trolleys in the Quail farm, Desi farm, Layer farm, and Turkey farm.

Renovation of Trainees' Hostel cum Guest House. Additionally, the Section prepared the inaugural plaque for the Demo shed and Psychrometric chamber and contributed to the Annual Day celebrations, including painting the administrative building, boundary walls, plants, stage, and security office. The section also managed the operation and maintenance of the sewer pump for the residential complex and the overhead tank at the new campus.



Renovation of Trainees Hostel cum Guest House



Fabrication of Tree Guards



Renovation of sheds in the Giri Gram Takniki Park

Electrical Section & Instrumentation Section

A total of 983 diversified electrical tasks, have been accomplished by the Electrical and Instrumentation Section. These tasks included immediate repairs and replacements of burnt or damaged wires, cables, main switches, and LED lights in various laboratories and experimental farms. Specific repair and rewinding jobs performed details:

- Exhaust Fans (16)
- Ceiling Fans (72)
- Single Phase Motors:
 - 1.0 HP (04)
 - 2.0 HP (02)
 - 0.5 HP (03)
- Three Phase Motors:
 - 1.5 HP/2.0 HP/3.0 HP/7.5 HP (04)
- Mono Block Pump: 0.5 HP (01)
- Window Type Air Conditioners (27)
- Split Type Air Conditioners (12)
- Refrigerators (04)



- Deep Freezes (02)
- Water Coolers (01)
- Renovation of Trainees' Hostel cum Guest House
- Providing and fixing of overhead electrical line from marketing centre to broiler farm.

Also, all glow sign boards were repaired as per need and armoured cable work was carried out in the old campus, farm, and new campus areas. Other equipment repaired included water bath centrifuges, -20°C and -80°C fridges, and stabilizers. SOS services were also provided as and when required.



Providing and fixing of overhead line from marketing centre to the broiler farm



Servicing of 33 KVA Sub-station of new campus

International Yoga Day

The 9th International Yoga Day was celebrated on June 21, 2023 in the Institute in the premises of CARI New Campus. The theme for the International Day of Yoga 2023 was '*Yoga for Vasudhaiva Kutumbakam*' or '*Yoga for the Welfare of All as One World-One Family*'. One hour yoga practice was performed under the guidance of yoga expert Dr Amitab Mishra and Sh. Ramesh Chand Pant. Students, scientists, technical, administrative, skilled staff and contractual staff members actively participated in the Yoga Day celebration. The staff members who were not able to present in the premise practiced yoga in their respective homes. Dr J.S. Tyagi acted as coordinator of this event.



World Egg Day-2023 Celebration

The week starting Oct. 7, 2023 marked a series of events as a prelude to the World Egg Day under the theme “Eggs for a Healthy Future”. Various activities and competitions were organized in which over 50 students of IVRI and CARI participated. Throughout the week, students participated in engaging events such as egg-eating contests, creating colourful rangolis on the theme of “The Role of Eggs in the Fight Against Malnutrition,” creative egg photography, egg painting, elocution, and quizzes. The entire event showcased the students' creativity and enthusiasm, highlighting the institute's dedication to fostering a lively and interactive academic environment. Further, as part of the World Egg Day celebration on October 13th, 2023, an awareness program on the nutritive value of eggs in human health was conducted for primary school children at the IVRI campus. Dr Divya delivered an informative speech detailing the nutritional benefits of eggs and their positive impact on health.

Following this, Dr Matin and Dr Nagesh visited the Jeevandhara Rehabilitation and Research Institute to raise awareness among mentally challenged students and staff. Boiled eggs were also distributed in both the schools.

The Institute celebrated World Egg Day on October 13th, 2023. Mr. Shailendra Singh, Regional Passport Officer was invited as the chief guest in the closing ceremony of the programme. Dr. Ashim Kumar Biswas delivered a lecture on “Eggs: The Powerhouse of Life”. The Chief Guest emphasized the importance and benefits of eggs in our daily lives. In his opening remarks, Dr. A.K. Tiwari highlighted the Institute's pivotal role in developing a number of varieties of diverse poultry species and value-added products suitable for backyard poultry farming. He also applauded Institute's contributions to disseminating these innovations to poultry farmers and entrepreneurs across the country. Dr Jaydip Rokade and Dr Gautham Kolluri coordinated the event.



World Soil Day

- The world soil day was celebrated on 5th Dec., 2023 at the Village Persona, Naktiya, Bareilly by Dr M. P. Sagar, Principal Scientist and Shri. Rakesh Jaiswara, Technical officer (T-5). On this occasion, the farmers were made aware of the effects of indiscriminate use of inorganic fertilisers and motivated them to apply balanced doses of fertilizers and to adopt natural farming in agriculture for maintaining and improving the soil health. The information on nano fertilizers was also provided to them. They were also advised to get soil health card and apply fertilizers in the field after testing of soil from laboratory. The vedios provided by the ICAR were also shown to participating farmers.



Games and Sports

Preparations were made for the participation in the ICAR Zonal Sports Tournament (North Zone) 2023 to be organized by ICAR-CIPHET, Ludhiana from January 17 to 20, 2024 at Ludhiana. Besides, several friendly cricket matches were organized between Institute Staff and Poultry Science Students.



Institute Foundation Day

The Institute celebrated its 45th Foundation Day on Nov. 2, 2023 in the gracious presence of Dr R.C. Agarwal, DDG (Education), ICAR, New Delhi as the Chief Guest and Dr Triveni Dutt, Director, IVRI, Izatnagar as the Guest of Honour in the function. In the Mega Poultry Fair organized to mark the occasion, a total of 27 stalls by various start-ups/ firms/ departments associated with poultry and allied businesses including various state line departments were setup. The Fair witnessed an influx of over 800 visitors. A Poultry Farmers Meeting (Kukkut Krishak Sangoshthi) was also organized to address the issues and concerns of poultry farmers by the Institute. One progressive farmer Shri Satish Verma was felicitated for his excellent contribution towards adopting and popularizing CARI poultry technologies. Besides, the selected SC beneficiaries of the DAPSC project were distributed the certificates along with huts, growers, feed, drinkers and feeders etc. A cultural evening was also organized in which the students of IVRI deemed university participated and presented a variety entertainment programme. Following publications/ technologies were also released on this occasion.

1. Naming of new desi-broiler cross CARISAMRIDDHI™
2. CARI EGG PEDA™ - processing technology
3. CARI Technologies & Services
4. CARI TOXOMIN™ - herbal toxin binder

Participation in Exhibitions

The Institute participated in the following regional exhibitions with an objective to enhance awareness about poultry production technologies and to showcase a range of value-added products.

- **Global Investor's Summit:** Hosted by the Government of Uttar Pradesh in Lucknow from February 10-13, 2023.
- **Pandit Deen Dayal Upadhyay Vrahad Pashu Arogya Fair:** Organized by the Department of Animal Husbandry, Bareilly, Uttar Pradesh, on March 19, 2023, at Gularia Uprala, Majhgawan Block, Bareilly.
- **Farmer Fair on Kisan Divas:** Organized by the Department of Agriculture, Bareilly, Uttar Pradesh, on December 23, 2023, at Bilva Agril Farm, Bareilly.

Swachhta Campaign 3.0

A Swachhta Pakhwara was organized from Sept.15 to Oct. 2, 2023. The event commenced with the Swachhta Oath, followed by cleaning and sweeping activities at both the new





and old campuses of CARI. The cleanliness drive covered various areas, including the playground, the road between the SBI Bank and the Marketing Center, the lawn in front of the Quail Farm, and the Maintenance Section lawn. Discarded items, such as farm implements were collected from farm areas and gathered at a designated location for evaluation and auction.

Additionally, demonstrations on converting *waste into wealth* through vermicomposting and maggot production using vegetable waste were conducted. On Sept. 28, 2023, the Institute staff organized a bicycle rally in the surrounding areas to promote the message of 'Swachhata Hi Seva'.



A special Swachhata Campaign 3.0 was also organized during Oct. 2-31, 2023. In line with the objectives of the Campaign, various cleanliness activities were conducted. The campaign was launched under the leadership of Director Dr Ashok Kumar Tiwari, coinciding with the celebration of Gandhi Jayanti. During the event, safai mitras (sanitation workers) were felicitated and honored for their contributions in maintaining cleanliness in the Institute's premises. In addition, the scientific, administrative, and technical staff carried out cleanliness activities in front of the New Campus on Oct. 2, 2023. Specific sites for these activities were identified in both, the old and the new campuses and were cleaned as per the schedule provided by the Council. Furthermore, old records were identified and disposed off following administrative procedures during the Campaign. Swachhata oath was also administered to all the scientists and staff during the Campaign.





Scientists and Staff Taking Swachhta Oath

Another Swachhta Pakhwara was organized during Dec. 16-31, 2023. Following the plan suggested by the Council, various activities were conducted including taking the Swachhta Oath, cleaning and sweeping different areas, demonstrations on converting *waste into wealth* through vermicomposting, and tree planting at both the new and old campuses. A series of lectures on waste management and medical waste management were delivered by various resource persons. On Dec. 18, 2023, a Swachhta awareness program was held at the MGMG village panchayat in Dandia, Bareilly, U.P. This program featured lectures on village sanitation, personal hygiene, vermicomposting, and the benefits of cleanliness. Kisan Divas was celebrated on Dec. 23, 2023, as part of the Swachhta program to commemorate the birthday of former Prime Minister, late Sh. Choudhary Charan Singh. The SHGs (stakeholders in DAPSC project) participated in the event. The farmers were made aware about the contributions of Sh. Charan Singh for the development of farming community. Besides, on Dec. 24, 2023 at village Bhagnapur, Bareilly, the Institute's staff educated the villagers on using agricultural and animal husbandry waste to generate wealth.

Celebration of International Year of Millets-2023

To celebrate the International Year of Millets 2023, declared by the UNO, the following awareness programs and activities were organized at both the village and institute levels:

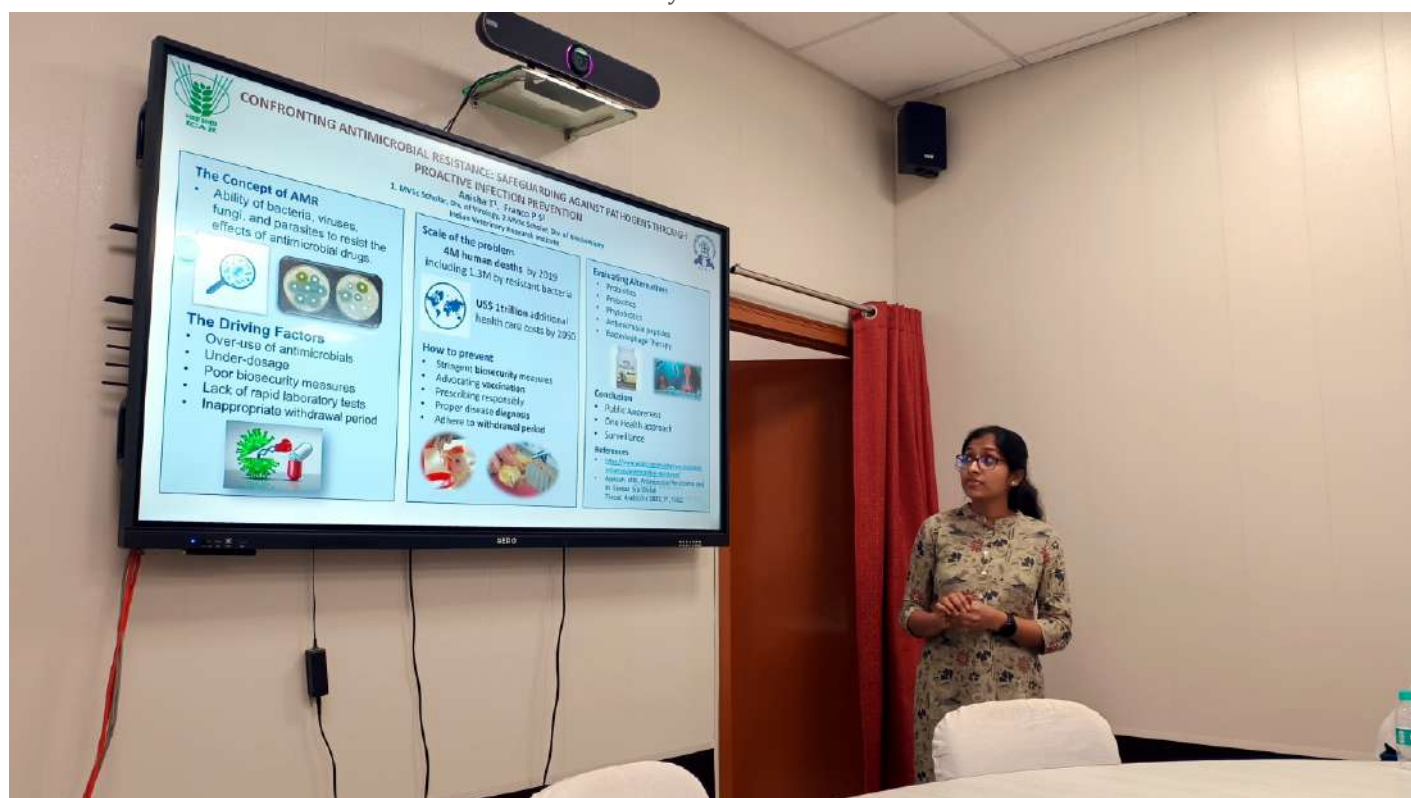
- Awareness was spread through the upload of banners on social media platforms.
- Information about millets was shared with farmers, students, trainees, and entrepreneurs participating in various institute training programs.
- Multigrain biscuits were displayed at the Global Investor's Summit held in Lucknow from February

10-14, 2023, to raise awareness about millets among entrepreneurs and government officials.

- An awareness program on millets was conducted for 200 farmers, students, and government officials during the Pashu Arogya Mela in village Gularia, Majhgawan, on March 19, 2023.
- An awareness program on millets was organized in the MGMG village of Dandia on September 15, 2023, to motivate farmers to grow and consume millets.
- Another awareness program on millets was held in the village of Amour, Fatehganj (W), on September 19, 2023, to encourage farmers to cultivate and include millets in their diet.

World AMR awareness week

ICAR-CARI has celebrated world AMR awareness week from 18-24 November 2023. Dr. Gautham Kolluri has co-ordinated the programme under the chairmanship of Dr. A.K. Tiwari, Director. E-posters have been prepared on various aspects of AMR and displayed in general public, office and lab premises of the institute to create awareness among institute staff, visitors and students. On 20.11.2023, a national webinar was organized and Dr. Deepak Rawool, Principal Scientist, ICAR-NRCM delivered a talk on Overview of antimicrobial resistance and research initiatives to address it, and was attended by 52 participants. On, 22.11.2023, an E-poster competition was organized for undergraduate, postgraduate and doctoral students on *Preventing antimicrobial resistance Livestock-Humans-Poultry*. The awareness week was concluded with a "Go Blue" by wearing a blue dress by all the institute staff and students. A small programme was organized to share the views of various experts on AMR and the winner of e-poster competition were presented with certificates and mementos.





Mera Gaon Mera Gaurav

An awareness program on millets was organized on September 15, 2023, in Dandia village, Bareilly. Farmers were informed about the International Year of Millets declared by the UNO. Dr. M.P. Sagar, Principal Scientist and Nodal Officer, discussed various aspects of millets, including types, nutritional and medicinal properties, and encouraged farmers to grow these crops for better returns.



Another Swachhta program was held on December 18, 2023, in Dandia village, highlighting the importance of a clean and green environment and personal hygiene. Villagers were advised to place kitchen and animal shed waste in composting pits for use as FYM in crops and motivated to prepare vermicompost for added value to cow dung.

Other relevant information such as infrastructural development:

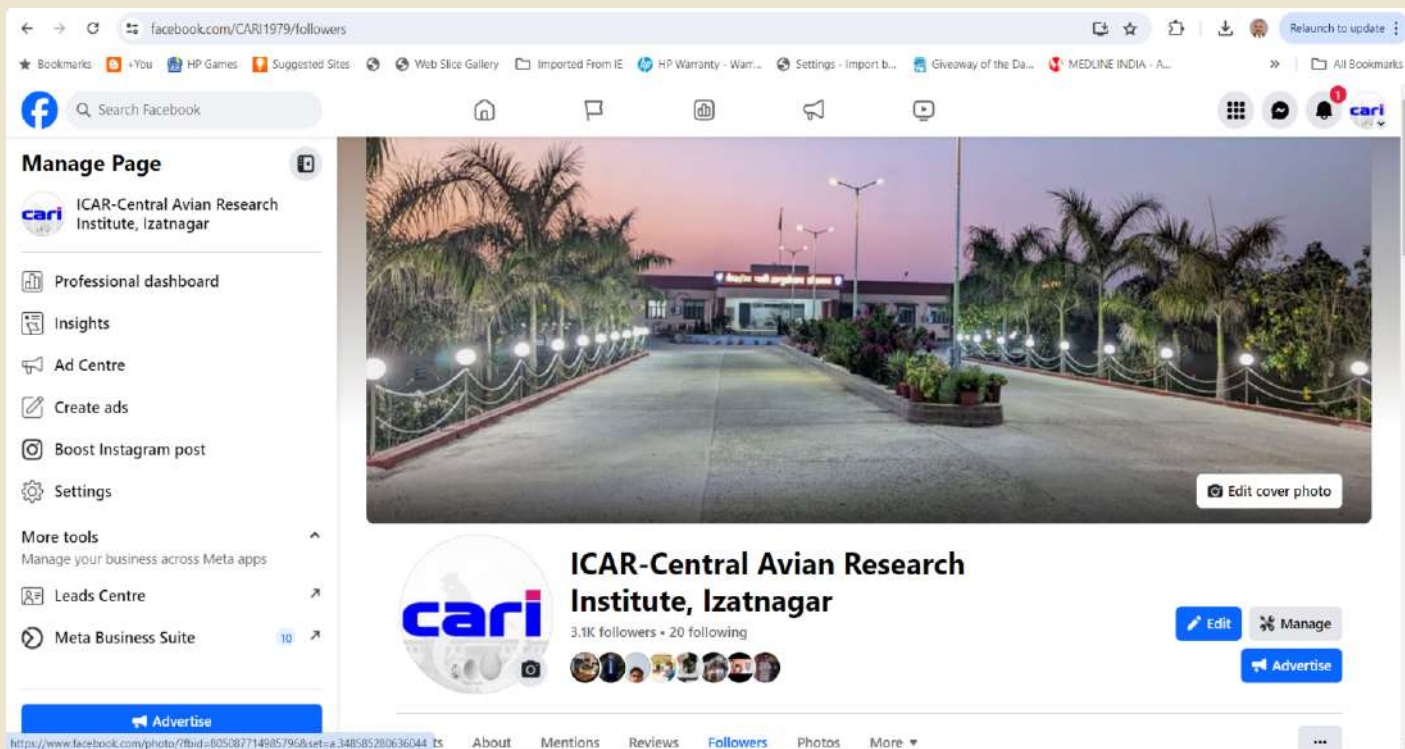
Infrastructure created:

Repair and renovation of Quail shed.

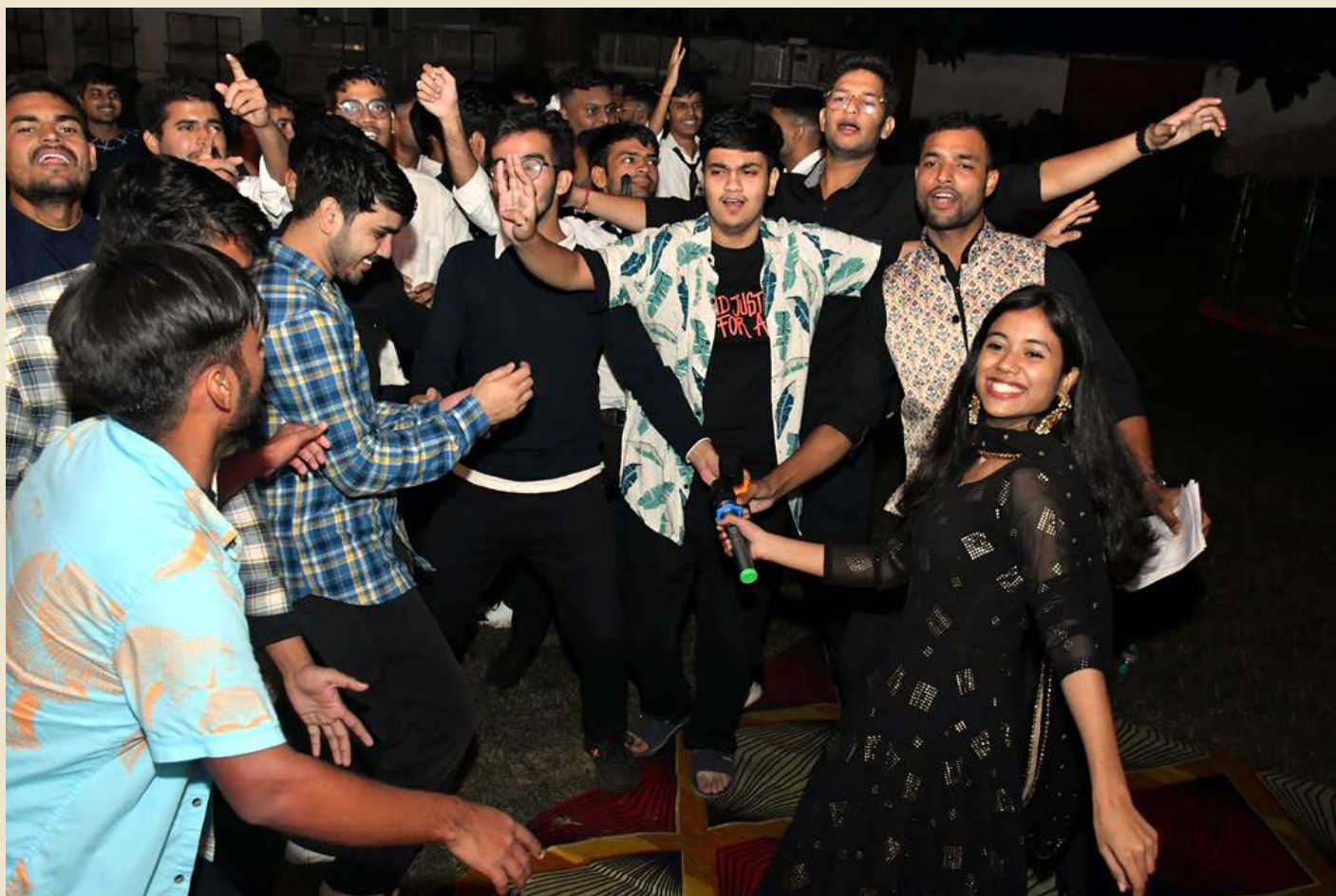
Development of Lawn and Plantation: The landscaping work along with the development of lawns in front of the Administrative-cum-lab. building in the new campus was completed. About 500 trees/ plants of various species were planted as a part of the greenery drive in the premises of CARI.



SOCIAL ACTIVITY



CULTURAL PROGRAMME





FARMERS VISIT



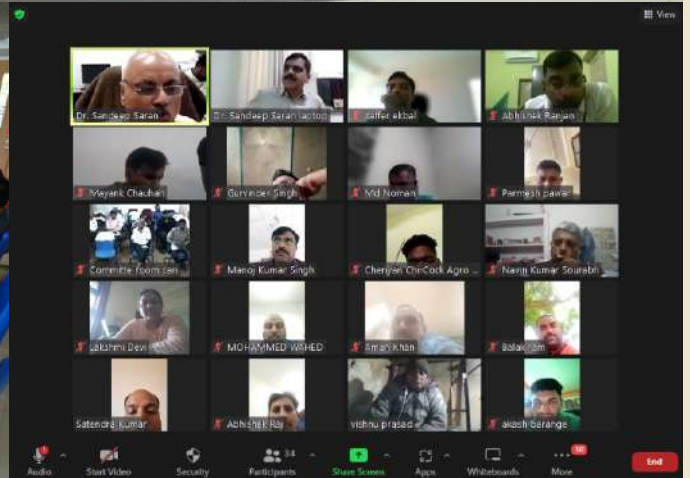


Distribution Camp





Training & Meeting





Marketing Centre





CARI IN THE NEWS

12 लाख में सबको पिको तक ले जाया है कन्नड़, इतने दिनों में आम मुर्गी का बच्चा होता है उपोत्पन्न डेढ़ किलो, कम समय में अधिक बच्चा बढ़ने से लोग चकित

पॉल्ट्री फार्मर की आय बढ़ाएगी सीएआरआई की रंगीन मुर्गी 'समृद्धि'

उदयगड पिको के अलावा पिको मुर्गी को आम मुर्गी के बच्चे के रूप में भी जाना जाता है। यह मुर्गी 12 लाख में सबको पिको तक ले जाया है कन्नड़, इतने दिनों में आम मुर्गी का बच्चा होता है उपोत्पन्न डेढ़ किलो, कम समय में अधिक बच्चा बढ़ने से लोग चकित।

पिको मुर्गी का बच्चा होता है उपोत्पन्न डेढ़ किलो, कम समय में अधिक बच्चा बढ़ने से लोग चकित। पिको मुर्गी का बच्चा होता है उपोत्पन्न डेढ़ किलो, कम समय में अधिक बच्चा बढ़ने से लोग चकित।



आठवीं पीढ़ी में बेहतर रिजल्ट

सीएआरआई ने प्रोटीन से भरपूर अंडे का पेड़ा किया तैयार

हि विचार प्रोटीन से भरपूर अंडे का पेड़ा तैयार किया गया है। यह पेड़ा प्रोटीन से भरपूर है और इसे आसानी से खाया जा सकता है।

प्रोटीन से भरपूर अंडे का पेड़ा तैयार किया गया है। यह पेड़ा प्रोटीन से भरपूर है और इसे आसानी से खाया जा सकता है।

वन मुर्गी जितनी ताकतवर हो सकेंगी देसी मुर्गियां

शोध वन मुर्गी जितनी ताकतवर हो सकेंगी देसी मुर्गियां। शोधकर्ताओं ने देसी मुर्गियों की ताकत और गतिशीलता को बढ़ाने के लिए प्रयोग किए हैं।

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वन मुर्गी

अंडों को सुरक्षित रखेगा कैरी एग शील्ड

नया तरीका अंडों को सुरक्षित रखेगा कैरी एग शील्ड। यह शील्ड अंडों को सुरक्षित रखेगा और इसे आसानी से लगाया जा सकता है।

अंडों को सुरक्षित रखेगा कैरी एग शील्ड। यह शील्ड अंडों को सुरक्षित रखेगा और इसे आसानी से लगाया जा सकता है।



कैरी एग शील्ड

गर्म क्षेत्रों में भी ज्यादा अंडे देंगी ठंडे प्रदेशों वाली मुर्गियां

सीएआरआई गर्म क्षेत्रों में भी ज्यादा अंडे देंगी ठंडे प्रदेशों वाली मुर्गियां। शोधकर्ताओं ने ठंडे प्रदेशों की मुर्गियों की अंडे देने की क्षमता को बढ़ाने के लिए प्रयोग किए हैं।

गर्म क्षेत्रों में भी ज्यादा अंडे देंगी ठंडे प्रदेशों वाली मुर्गियां। शोधकर्ताओं ने ठंडे प्रदेशों की मुर्गियों की अंडे देने की क्षमता को बढ़ाने के लिए प्रयोग किए हैं।

तैयार हुआ देसी रंगीन मुर्गा, पॉल्ट्री फार्मर की बढ़ाएगा आय

उदयगड तैयार हुआ देसी रंगीन मुर्गा, पॉल्ट्री फार्मर की बढ़ाएगा आय। यह मुर्गी रंगीन है और इसे आसानी से खाया जा सकता है।

तैयार हुआ देसी रंगीन मुर्गा, पॉल्ट्री फार्मर की बढ़ाएगा आय। यह मुर्गी रंगीन है और इसे आसानी से खाया जा सकता है।

तीन प्रौद्योगिकियों को 95वें स्थापनादिवस पर प्रमाण पत्र

आईसीएआर तीन प्रौद्योगिकियों को 95वें स्थापनादिवस पर प्रमाण पत्र। यह प्रमाण पत्र तीन प्रौद्योगिकियों को प्रमाणित करता है।

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आईसीएआर

इंक्यूबेटर बढ़ाएगा मुर्गी पालकों की आय

मौत की बड़ी और अचर का भी एमआयु किया गया साइज इंक्यूबेटर बढ़ाएगा मुर्गी पालकों की आय। यह इंक्यूबेटर मुर्गियों को अंडे देने में मदद करता है।

इंक्यूबेटर बढ़ाएगा मुर्गी पालकों की आय। यह इंक्यूबेटर मुर्गियों को अंडे देने में मदद करता है।



वन मुर्गी

मुर्गी-मुर्गीयों को फूड प्लाज्मिन्स से बचाएगी 'टॉक्सिमिन'

सीएआरआई मुर्गी-मुर्गीयों को फूड प्लाज्मिन्स से बचाएगी 'टॉक्सिमिन'। यह टॉक्सिमिन मुर्गियों को फूड प्लाज्मिन्स से बचाएगा।

मुर्गी-मुर्गीयों को फूड प्लाज्मिन्स से बचाएगी 'टॉक्सिमिन'। यह टॉक्सिमिन मुर्गियों को फूड प्लाज्मिन्स से बचाएगा।

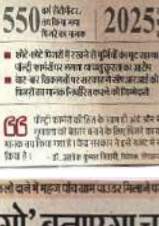


सीएआरआई

पॉल्ट्री फार्मरों को पशु कूरता के धब्बे से बचाएगा सीएआरआई का पिंजरा

हि विचार पॉल्ट्री फार्मरों को पशु कूरता के धब्बे से बचाएगा सीएआरआई का पिंजरा। यह पिंजरा पशु कूरता के धब्बे से बचाएगा।

पॉल्ट्री फार्मरों को पशु कूरता के धब्बे से बचाएगा सीएआरआई का पिंजरा। यह पिंजरा पशु कूरता के धब्बे से बचाएगा।



पिंजरा

मुर्गियों का तनाव कम करेगा 'कैरी हर्बीस्ट्रेसमिन', बढ़ेगा अंडा उत्पादन

हि विचार मुर्गियों का तनाव कम करेगा 'कैरी हर्बीस्ट्रेसमिन', बढ़ेगा अंडा उत्पादन। यह हर्बीस्ट्रेसमिन मुर्गियों का तनाव कम करेगा।

मुर्गियों का तनाव कम करेगा 'कैरी हर्बीस्ट्रेसमिन', बढ़ेगा अंडा उत्पादन। यह हर्बीस्ट्रेसमिन मुर्गियों का तनाव कम करेगा।



वन मुर्गी

सीएआरआई का हर्बल प्रोडक्ट 'हबीगो' बनाएगा चूजों को दमदार

हि विचार सीएआरआई का हर्बल प्रोडक्ट 'हबीगो' बनाएगा चूजों को दमदार। यह हबीगो चूजों को दमदार बनाएगा।

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सीएआरआई





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