BLRI
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টেকসই উন্নয়ন অভীষ্ট, লক্ষ্যমাত্রা ও সূচকসমূহ

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Preface

Bangladesh Livestock Research Institute (BLRI) is the leading institute at national level dedicated to research and development in livestock and poultry sector under The Ministry of Fisheries and Livestock, Bangladesh. The mandate of the institute is to identify livestock and poultry production and their health constraints, develop solutions through a multi and interdisciplinary research approach and generate technologies compatible with other resources of the farmers to solve those constraints and problems. BLRI has developed 95 Packages and Technologies since its establishment for increasing livestock production. To address the mandates of the institute, BLRI has been conducting need based research activities in the six different disciplines namely, Animal and Poultry Breeding and Genetics; Environment, Climate Resilience and Waste Management; Nutrition, Feeds and Feeding Management; Biotechnology and Dairy Research; Animal and Poultry Diseases and Health; Socio-Economics & Farming System Research. There are 95 technologies included in this directory that will helpful to entrepreneurs, researchers, academicians, farmers and policy makers who are directly or indirectly involved in livestock production and socio-economic empowerment. The institute is acknowledging the strong support of Ministry of Fisheries and Livestock (MoFL), Department of Livestock Services (DLS), Bangladesh Agricultural Research Council (BARC), NGO's, Universities for the research endeavors. The institute highly appreciates all the scientists, officers and others for offering their utmost effort to publish the annual report 2023-24. The Scientific information and knowledge accumulated in annual report 2023-24 will help students, scientists, academicians and policymakers in planning future research and development programs in this sector. Besides research, BLRI has also provided technology based training to the farmers and entrepreneurs on chicken, duck, goat, sheep, cattle, buffalo rearing and their health care practices. Finally, BLRI believes that technological innovation through livestock research and development is contributing at all levels of national development, poverty reduction, employment generation, woman empowerment and safe animal protein production.

(Dr. Shakila Faruque)

Contents

Geographical location of BLRI and Regional Station

Mandates and Organization of the Institute

Mandates

a. To identify the basic problems affecting livestock and poultry both at the national and farm levels;

b. To solve these problems through multi and inter-disciplinary and inter-institutional research;

c. To develop techniques and knowledge for livestock and poultry production to help food and nutrition security for the increasing population, poverty alleviation, employment creation and environment pollution control;

d. To train scientists in the appropriate fields of research, at home and abroad, thereby filling the gap of skilled scientists;

e. To strengthen research-extension-NGO linkage and expedite quick dissemination of the developed and introduced techniques to the end users,

f. To assist the Government and all concerned in policy decisions related to livestock and poultry research and development;

g. To impart training to trainers, farmers and front-line extension of livestock technologies to the farmers.

Organization Structure

BLRI has 10 (ten) research divisions, one support service division, 4 (Four) research centres and 5 (Five) regional stations and one is under construction.

Research Divisions

- Animal Production
- Poultry Production
- Animal Health
- Goat Production
- Sheep Production
- Bio-technology
- Socio-economic
- Farming System Research (On-Farm Research)
- Training, Planning and Technology Testing
- Buffalo Production

Support Service Division

Research Centres

- Dairy Researh and Training Centre
- Poultry Research Centre
- Transbounday Animal Disease Research Centre
- Climate Resilient Livestock Production Research Centre

Regional Stations

- Baghabari, Sirajgonj
- Naikhongchari, Bandarban
- Bhanga, Faridpur
- Jashore Sadar, Jashore
- Godagari, Rajshahi
- Saidpur, Nilphamari

Organogram

Mainstay of Fisheries & Livestock

Board of Management

Director General

Research Divisions

- Animal Production Research Division
- Poultry Production Research Division
- Animal Health Research Division
- Goat Production Research Division
- Sheep Production Research Division
- Buffalo Production Research Division
- Farming System Research Division
- Socio-Economic Research Division
- Bio-technology Division
- Training, Planning and Technology Testing Division

Support Service Division

- Administration Section
- Security Unit
- Transport Unit
- Engineering Section
- Publication and Public Relation Section
- Library Section
- Accounts Section
- ICT Section
- Store and Procurement
- Research Farm

Regional Stations

- Naikhongchari, Bandarban
- Bhangha, Faridpur
- Jeshore Sadar, Jeshore
- Rajabarihat, Rajshahi
- Saidpur Niphamari
- Baghabari, Sirajgonj

Research Centers

- Poultry Research Centre
- Dairy Research and Training Centre
- Transboundary animal Disease Research Centre
- Climate Resilient Livestock Production Research Centre

Board of Management

The institute is administered by a Board of Management. The Board is the highest making body in the Institute's organizational structure and holds full responsibility determine and execute policies and undertakings of the Institute within the frame of policy directives issued by the Ministry of Fisheries and Livestock of Bangladesh Government. The Director General is the executive head and works on behalf of the Board of Management. The Board of Management, consists of:

Chairman
Hon'ble Minister, Ministry of Fisheries and Livestock.

Vice-Chairman
Secretary, Ministry of Fisheries and Livestock, ex-officio.

Member
❖ Two Members of Parliament to be nominated by the Hon'ble Speaker.

❖ Secretary, Ministry of Finance, ex-officio.

❖ Member (Agriculture), Planning Commission, ex-officio.

❖ Executive Chairman, Bangladesh Agricultural Research, Farmgate, ex-officio.

❖ Vice-Chancellor, Bangladesh Agricultural University, Mymensingh, ex-officio.

❖ Director General, Department of Livestock Services ex-officio.

❖ Two persons to be nominated by the Government from among persons having interest in Livestock and poultry.

❖ Two persons to be nominated by the Government from among persons engaged in research activities in the institute.

Member Secretary
Director General, Bangladesh Livestock Research Institute.

Technical Committee

The Technical Committee (TC) is an advisory body which provides professional input, scrutinizes and reviews the technical aspects of research programs including research budget and recommend for final approval to the Board of Management. The TC is composed of multidisciplinary and inter-institutional experts with the following members:

❖ **Director General**   **Chairman**
  Bangladesh Livestock Research Institute

❖ **Dean**   Member
  Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh

❖ **Dean**   Member
  Faculty of Animal Husbandry, Bangladesh Agricultural University, Mymensingh

❖ **Dean**   Member
  Agricultural Economics and Rural Sociology, Bangladesh Agricultural University, Mymensingh

❖ **Member Director (Livestock)**   Member
  Bangladesh Agricultural Research Council (BARC)

❖ **Representative (Specialist)**   Member
  Climate Resilient, Ministry of Environment

❖ **Representative (Specialist)**   Member
  National Institute of Biotechnology, Gonokbari, Savar, Dhaka

❖ **Representative (Director)**   Member
  Department of Livestock Services (DLS)

❖ **Director (All)**   Member
  Bangladesh Livestock Research Institute, Savar, Dhaka

❖ **Additional Director**   Member
  Support Service Division, BLRI

❖ **Head (All Research Division/ Project Director)**   Member
  Bangladesh Livestock Research Institute, Savar, Dhaka

❖ **Representative (Former CSO)**   Member
  Bangladesh Livestock Research Institute, Savar, Dhaka

❖ **Director (Research)**   Member- Secretary
  Bangladesh Livestock Research Institute, Savar, Dhaka

Animal Health Research Division

Serological and outbreak investigation of Peste des Petits Ruminants (PPR) in Bangladesh and development of vaccine seed from circulating local isolates

PPR disease is a highly contagious viral infection that affects small ruminants and poses a threat to food security and sustainable livelihoods in Bangladesh. Since 1993, it has spread throughout the country with high morbidity and death rates. WOAH and FAO are aiming to eliminate PPR by 2030 worldwide, but in Bangladesh by 2027. We executed sero-monitoring and outbreak investigations of PPR disease in goats in selected areas to discover conferred immunity and to characterize circulating PPRV from recent PPR outbreaks. A total of 600 serum samples were collected from vaccinated goats, especially in Jashore (n = 100), Chuadanga (n = 100), Jhinaidah (n = 100), Rajshahi (n = 100), Chapai Nawabganj (n = 100), and Dhaka (n = 100). Of the 600 samples, 300 were from LRI-vaccinated goats, and 300 were from goats immunized with imported vaccines.The collected sera were tested using competitive c-ELISA (ID Vet, France) for PPRV-specific antibodies. In addition, sixty-three (63) suspected PPR samples were collected from different outbreak areas, namely Jashore, Chapai Nawabganj, Jhinaidah, Manikgonj, and Dhaka. All samples were processed, and RNA was extracted using an RNA extraction kit (Invitrogen, Thermo Fisher Scientific®, USA). RT-PCR was performed to target the N gene (352 bp) and F gene (448 bp) of the PPRV. The inoculum was prepared for PPRV isolation in primary lamb testicular cells (LTC). A total of three RT-PCR-positive samples were sent for gene sequencing to analyze the PPRV phylogenetically. For virus shedding, conjunctival, nasal, and rectal swab samples were collected randomly at 3, 7, and 14 days post-vaccination. Sero-monitoring results showed that 78.00% (234/300) and 91.00% (273/300) of goats were antibody-positive after receiving vaccination from LRI-manufactured and imported PPR vaccines, respectively. Among unvaccinated kids under three months of age, 68.00% (34/50) and 82.00% (41/50) kids were carrying antibodies to PPR, respectively, in the LRI-produced and imported PPR vaccine whose mothers had been immunized with the PPR vaccine. RT-PCR revealed 19.05% (12/63) of field samples were PPRV-positive (Figure 1). For the primary isolation of PPRV, primary LTC was used. When over 70% CPE was observed, harvested and confirmed PPRV by RT-PCR. In our study, we could not confirm virus shedding after vaccination. Both male and female goats have protective antibodies against the PPRV after vaccination, while imported PPR vaccines showed higher levels. The study suggests that proper vaccination and herd immunity can reduce PPR disease outbreaks, supporting the ongoing eradication drive.
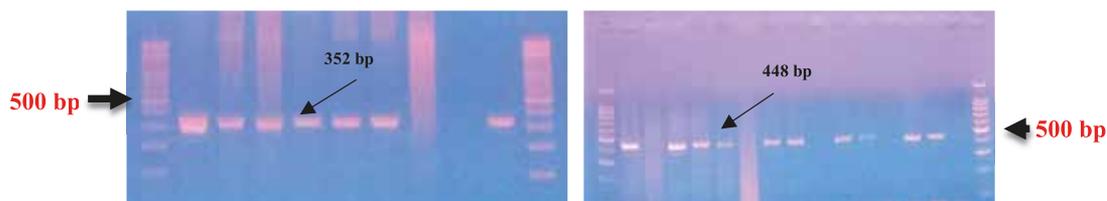
Figure-1: Amplification of the portion of N gene (352 bp)-left and F gene (448 bp)-right of PPR virus

Development of duck plague vaccine seed from circulating strain

Duck plague (DP) is an acute, infectious viral disease of ducks, geese, and swans. The disease imposes substantial constraints on the growth of the duck industry. In Bangladesh, the disease was first reported in 1980, and a considerable number of ducks die each year due to DP, resulting in massive economic losses. Immunization is the most effective technique for controlling the DP; however, the immunization program in Bangladesh is not generally available because of the scarcity of vaccines. Thus, the current work was performed to isolate, identify, and characterize the circulating DPV for developing a live-attenuated vaccine. A total of 41 tissue samples (liver, spleen, and intestine) were collected from ducks suspected of having DP. Out of 41 tissue samples, 16, 12, 7, and 6 were collected, respectively from Kishoreganj, Sunamganj, Netrokona, and Bagerhat. All samples were processed and subsequently DNA was extracted using a commercial DNA extraction kit. Conventional PCR was carried out targeting the DNA polymerase gene of DPV (OIE, 2017). Inoculum was made from PCR-positive samples described in OIE (2017) and inoculated into a primary chicken embryo fibroblast (CEF) monolayer prepared from 9–11-day-old ECEs and then observed for cytopathic effect (CPE) regularly up to 10 days post-inoculation (dpi). At least three blind passages were performed from each PCR-positive sample for the isolation of DPV. Of the 41 samples, 13 (31.70%) were confirmed DPV by PCR. The expected PCR amplicon appeared at 446 bp for the DNA polymerase gene of DPV. Regarding locations, the highest DP cases were detected in Kishoreganj (41.66 %). So, DPV is circulated among ducks in the studied areas of Bangladesh. CPE was observed on CEF from PCR-positive field samples at three dpi. This year, we confirmed two DPV isolates from field samples. Our target is

Figure-1: Confluent cell monolayer of chicken embryo fibroblast (left) and infected cell monolayer showing detachment and rounding of cell and syncytia formation (right).

to attenuate these isolates and last year isolates in the DF-1 (chicken fibroblast) cell line for vaccine seed development. A wild, virulent strain of DPV is a pre-requisite for the development of a live attenuated vaccine seed. So, we have to collect more field samples to find out the wild virulent DPV isolates.

Molecular detection and risk factors assessment associated with bovine viral diarrhoea virus infection in farm animals of bangladesh

Bovine Viral Diarrhoea Virus (BVDV) and Rotavirus in Cattle of Bangladesh: Prevalence and Risk Factors. Bovine viral diarrhoea virus (BVDV) is a significant pathogen of cattle worldwide, causing considerable economic losses, with higher losses per dairy cow (USD 24.85) than beef cattle. This study aimed to determine the seroprevalence of BVDV and to detect BVDV and rotavirus in farm cattle, along with their associated risk factors. A total of 200 blood and 120 fecal samples were collected from cattle in Belkuchi, Sirajganj (blood: 100; feces: 60) and Dhamrai, Dhaka (blood: 100; feces: 60). Serum was separated from blood and stored at -20°C for further BVDV antibodies test using commercial ELISA kit. All the samples were processed for molecular detection of BVDV and rotavirus. Risk factors were analyzed using univariable logistic regression. Among 200 serum samples, 101 (50.5%) were positive for BVDV antibodies by indirect ELISA—48% in Belkuchi and 53% in Dhamrai. A significant difference was observed among age groups ($p = 0.001$, Fisher's test). Seroprevalence was lower in cattle under 1 year (25.6%) compared to over 1 year (56.5%) (OR: 3.734; 95% CI: 1.655–8.429). Crossbred cattle showed higher seropositivity (54.4%) than local breeds (35%) with statistical significance (OR: 2.249; 95% CI: 0.935–5.410; $p = 0.028$). Molecular detection revealed 25% (30/120) of fecal samples positive for BVDV—21.67% (13/60) in Belkuchi and 28.33% (17/60) in Dhamrai. Additionally, bovine rotavirus was detected in 5.83% (7/120) of diarrheic fecal samples. In conclusion, this study confirms the active circulation of BVDV and rotavirus among cattle in Bangladesh. The findings underline the need for regular surveillance, enhanced biosecurity, and targeted vaccination to reduce the economic burden and improve livestock health management.

Elucidating the antimicrobial resistance pathogens evolution and combating the MDR (Enteric Pathogens) with bacteriophage in companion and farm animals

Antimicrobial resistance (AMR) is a growing global threat. This study investigated the patterns of AMR in companion animals and farm animals, the impact of urbanization on the development and spread of AMR, and the mechanisms of antimicrobial resistance gene (ARG) transfer. A total of 508 samples (feco-rectal and environmental) were collected from urban and rural areas of Dhaka, Barisal, and

Sylhet districts between July 2023 and June 2024. Four enteric pathogens such as *Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa,* and *Enterococcus faecalis* were identified using microbiological and molecular methods. Of these, *E. coli* was the most predominant, followed by *K. pneumoniae, E. faecalis* and *P. aeruginosa.* Antibiotic susceptibility testing revealed significant multi-drug resistance (MDR) in: *K. pneumoniae* (56.87%), *E. faecalis* (53.57%), *E. coli* (33.33%) and *P. aeruginosa* (16%). Extended spectrum beta lactamase (ESBL) production was confirmed in 5% of *E. coli* and 2.29% of *K. pneumoniae* samples. Some antibiotics such as Amikacin and Tigecycline are displayed effective against *E. coli* and *K. pneumoniae.* Genetic analysis identified high levels of resistance genes such as blaCTX-M, blaNDM5, OXA-48 and mobile genetic elements (such as class 1 integron and IncQ plasmids), which were more prevalent in urban farms. Rates of MDR and resistance genes are significantly higher in urban farms than in rural farms, indicating an increase in AMR as a result of urbanization. In addition, 10 bacteriophages effective against E. coli and Salmonella spp. have been identified, which may be used for therapeutic purposes in the future. These results highlight the urgent need for continuous AMR monitoring, judicious use of antibiotics, and the application of alternative treatment methods such as bacteriophages, especially in rapidly urbanizing farm areas.

Surveillance of extremely zoonotic pathogen (Brucella species) at different areas of Bangladesh

Globally, Brucellosis is a major zoonotic disease causing economic losses in livestock and posing public health risks. This 2023–2024 study in Bangladesh aimed to detect Brucella in cattle and to mitigate the spread and spillover of Brucella organisms in livestock farming system. A total of 234 blood samples from cattle across Rajshahi (45), Sirajganj (35), Dhaka (106) and Bandarban (48) were tested by the Rose Bengal plate (RBPT) and cELISA methods, showing seroprevalence rates of 12.82% (n=30) and 10.68% (25) respectively. Additionally, 4 out of 23 clinical samples from a Dhaka farm were analyzed by PCR. Infected animals were isolated and treated per WHO guidelines with strict biosecurity measures. Following a deworming plan (Ivermectin + Clorsulon), combined antibiotic treatment, and strict biosecurity, significant improvement was observed in controlling brucellosis in cattle. Among 160 treated animals, antibody response increased from 10.81% to 56.25%, compared to a control group of 74. Local and crossbred cattle showed similar immune improvements after three months. Ivermectin use also boosted antibody levels over 3 month and 6month intervals. Farmer awareness programs supported disease management. The study also aimed to isolate Brucella spp. from seronegative but clinically affected animals, contributing to better outbreak control strategies in Bangladesh.

Diversification and magnitude of endo-parasite in livestock in different agro-ecological zone of Bangladesh.

Gastrointestinal parasitic infections (endo-parasites) are a major challenge to profitable livestock farming in tropical and subtropical regions, causing reduced growth, low milk yield, poor body condition, and increased treatment costs. This study aimed to assess the prevalence and intensity of endo-parasites in five agro-ecological zones (AEZs) of Bangladesh and to develop a parasite infestation map. A total of 640 fecal samples were collected from cattle across selected AEZs, regardless of age, sex, or breed, and tested using direct smear and McMaster techniques. Results showed 423 samples (66.03%) were positive for one or more parasites. Five types of parasites were identified such as Paramphistomum spp. (20.00%), Haemonchus spp. (12.50%), Fasciola spp. (8.91%), Coccidian oocysts (8.59%) and Schistosoma spp. (3.91%).Paramphistomum spp. had the highest prevalence, especially in the Brahmaputra Jamuna floodplains, while Schistosoma spp. was least common, especially in the Ganges floodplain. Parasitic infections were most common during the rainy season due to favorable conditions for parasite development. A significant correlation was found between Schistosoma spp. and Coccidian oocysts ($p<0.05$).Differences in prevalence across AEZs were linked to host, parasite type, seasonal changes, and ecological conditions. The study reveals the current status of endo-parasitic loads across various agro-ecological zones in Bangladesh, aiding the development of targeted control strategies and infection mapping in identified hotspot areas.

Surveillance and molecular evolution of avian influenza virus in Bangladesh

Avian influenza (AI) is a transboundary zoonotic viral disease caused by Influenza A virus (Orthomyxoviridae), affecting birds and mammals. Bangladesh first reported highly pathogenic avian influenza (HPAI) outbreaks in 2007. From 2007 to 2011, multiple outbreaks caused high poultry mortality and some human infections. The virus spread via domestic poultry, waterfowl, and migratory birds, introducing several HPAI clades. Currently, four H5N1 clades, including 2.2.2, 2.3.2.1a, 2.3.2.1c, and 2.3.4.2, have been detected, with clade 2.3.2.1a still circulating. The aim of this study was to investigate the molecular evolution of avian influenza viruses (AIVs) circulating in Bangladesh. A total of 346 oropharyngeal and cloacal swabs were collected from 58 farms across 10 districts in 7 divisions: Gazipur, Dhamrai, Cumilla, Bogura, Rangpur, Cox's Bazar, Barisal, Chattogram, Narsingdi, and Sylhet. Samples were transported under cold conditions to the NRL-AI and stored at -80°C. Viral RNA was extracted using the MagMAX™-96 AI/ND Viral RNA Isolation Kit on a KingFisher ™ Flex robot. All samples were screened for the AIV matrix gene and subtypes (H5,

H9, N1, N2, N6) using RT-qPCR. Among the 346 samples, 14.45% (n=50) were positive for AIV type A. Detection rates varied by region, with the highest prevalence in Sylhet (90%) and Rangpur (50%). Subtype analysis revealed that 43 of 50 AIV-positive samples contained H9N2. Seven samples were co-infected with both H5 and H9. Of the H5-positive samples, six were H5N1 and one was H5N6. These were propagated in SPF embryonated chicken eggs. Whole genome sequencing was performed on ten A/H5N1 isolates from different species, including chicken, duck, quail, turkey, peacock, and ostrich. Phylogenetic analysis showed that all H5 viruses belonged to clade 2.3.2.1a, closely related to strains previously identified in Bangladesh. In conclusion, both H5N1 and H9N2 subtypes are co-circulating among diverse avian species in Bangladesh. Continued surveillance and molecular characterization are crucial to monitor virus evolution and mitigate the risk of zoonotic spillover and future influenza pandemics.

Development of an NSP ELISA kit for differential diagnosis of FMDV infected from vaccinated animals

Foot-and-mouth disease (FMD), an economically devastating, highly contagious disease, affects all types of domestic and wild cloven-hoofed animals. Every year globally total impact of FMD is US$ 6.5 to 21 billion for endemic countries and >US$1.5 billion for FMD-free countries. In Bangladesh, FMD is endemic and the financial losses due to the FMD infection are 18 thousand crore taka annually. Enzyme-linked immunosorbent assays (ELISAs) using immobilized NSPs (nonstructural proteins) have been used in FMD-free regions to demonstrate freedom from infection and in endemic countries for disease surveillance. The current research work (2023-2024 fiscal year) was aimed at the determination of circulating FMDV serotypes from clinically suspected cattle in seven districts of Bangladesh for the development of the local NSP-based ELISA kit. All samples were subjected to RNA extraction and RT-PCR for detection using universal primers and then serotyping of FMDV using serotype-specific primers at FMD laboratory in BLRI. A total of 81 clinically suspected samples were collected from 7 different outbreak areas namely as Dhaka (n=13), Dinajpur (n=18), Kurigram (n=12), Rangpur (n=11), Shariatpur (n=17), Sathkhira (n=5) and Mymensingh (n=5) of Bangladesh.

Out of 81 samples, 41.97% (n=34) samples were positive for FMDV. Three different serotypes of FMDV i.e. O, A, and Asia 1 were found in the positive samples. Among the positive samples, 46% (n=16), 40% (n=13) and 4% (n=2) were FMD serotype O, Asia 1 and A respectively. Out of the positive samples, 10% (n=3) were content the mixed serotypes like type O plus Asia 1 or O plus A. From the positive samples FMD serotype O and Asia 1 has isolated. All samples were stored for the molecular characterization and to select FMDV strain for NSP based ELISA kit development or development of multivalent FMD vaccine.

Animal Production Research Division

Qualitative and quantitative improvement of Napier cultivars under on station condition

The current study was undertaken to evaluate the comparative production performances of Napier cultivars (Zara, Wrokuna and Pakchong) at different plant heights and cutting intervals under on-station condition. Firstly, a 3×7 (Variety× Cutting Interval) factorial arrangement was followed to compare the performances of Napier cultivars (Zara, Wrokuna and Pakchong) at different cutting intervals (20, 25, 30, 35, 40, 50 and 60 days). Secondly, a 3×4 (Variety× Plant Height) factorial arrangement was followed to compare the performances of Napier cultivars (Zara, Wrokuna and Pakchong) at different plant heights (50, 75, 100 and 200 cm). Cutting (stem) plantations were initiated and completed during the first week of December 2023 and the first harvest was made after 80 days of planting in order to level the plot and begin the experiment. Similar agronomic practices such as irrigation, fertilization, weeding etc. were followed for all cutting interval and plant height treatments. Fresh biomass yield ($p<0.001$), DM yield ($p<0.001$) and CP yield ($p<0.0001$) ton/cut/ha differ significantly at different cutting intervals; DM ($p<0.001$), ADF ($p<0.001$), CP ($p<0.001$), OM ($p<0.001$) and NDF ($p<0.001$) contents of fodder also differ significantly at different cutting intervals. Fresh biomass yield ($p<0.001$), DM yield ($p<0.001$) and CP yield ($p<0.0001$) ton/cut/ha differ significantly among the different varieties of Napier, whereas the DM and ADF percentage did not differ significantly. Yield characteristics is more prominent for Zara (41.20 ton/cut/ha) and Pakchong (41.67 ton/cut/ha) than Wrokuna (28.0 ton/cut/ha). Fresh biomass yield ($p<0.001$), DM yield ($p<0.001$) and CP yield ($p<0.0001$) ton/cut/ha; DM ($p<0.001$), ADF ($p<0.001$), CP ($p<0.001$), OM ($p<0.001$) and NDF ($p<0.001$) contents of Napier cultivar differ significantly at different plant heights. In conclusion it can be said that, as plant height (cm) and cutting interval (days) increased the yield characteristics of Napier cultivar increased but nutritional quality decreased. Without compromising nutritional quality and biomass yield Napier grass can harvested at 25-30 days interval when plant height is between 75 to 100 cm for dairy cattle production and it can harvested at 30-35 days interval when plant height is almost 100 cm (±10) for beef cattle enterprise. According to production performance it can be said that, Zara cultivar can be validated to boost livestock production.

| Zara Grass | Rokona Grass | Pakchong Grass |

Field validation of stress tolerant mutant lines of fodder developed by BLRI

Production and productivity of farm animals in the country will rise with the improvement of new or improved stress-tolerant fodder germplasms. As for the reason a series of experiment was conducted at BLRI fodder research field using seven Napier cultivars, water logged perennial fodder, winter fodder crops Oat and Barley and a tree fodder, Moringa. The cuttings of each cultivar of Napier were irradiated with ten different doses of Gamma rays as 10 Gy, 20 Gy, 30 Gy, 40 Gy, 50 Gy, 60 Gy, 70 Gy, 80 Gy, 90 Gy and 100 Gy from 60Co source from BINA, Mymensingh. Similarly, the seeds Oat were irradiated with seven doses of Gamma rays as 100 Gy, 150 Gy, 200 Gy, 250 Gy, 300 Gy, 350 Gy and 400 Gy. After the experiment salt tolerant Napier (BLRI grass -5) showed good performance in saline prone region. In relation to that, nurseries were established for distribution and front-line extension of salt tolerant Napier grass at Shyamnagar, Tala, and Kaliganj upazila of Satkhira district. A total of 50 dcm size salt tolerant Napier (BLRI grass -5) nursery was maintained at BLRI as part of on-farm and on-station activities. In order to assess the impact of harvesting ages or cutting intervals (days) on the nutritional content and production performance of salt-tolerant Napier (BLRI grass -5) grass under on farm conditions, five (5) cutting ages (20, 30, 40, 50, and 60 days) were taken into consideration as treatments. Fresh biomass yield ($p<0.001$), DM yield ($p<0.001$) and CP yield ($p<0.0001$) ton/cut/ha of salt tolerant Napier (BLRI grass -5) grass at different cutting intervals differ significantly and it evident that all types of biomass yield increased with accordance of harvesting interval increased. Nutritional compositions as DM, CP, ash, ADF, NDF, silica and lignin contents (%) were differ significantly ($p<0.0001$) at different cutting intervals. DM, ADF and NDF contents (%) were increased as harvesting interval increased but CP, ash contents (%) were decreased as harvesting interval increased. Establishment of nurseries enables distribution of salt-tolerant Napier (BLRI Grass-5) cuttings to business owners and

farmers. The study's findings made it evident that the defoliation height and harvesting age of fodder affect the nutritional value of Salt Tolerant Napier (BLRI grass -5) grass; biomass yield increased as harvesting interval increased but CP contents (%) was decreased as harvesting interval increased.

Fig: Salt Tolerant Napier (BLRI grass-5) and Cutting Distribution Record

Fig: Cutting Distribution to the Farmer

Production and utilization of Gelatin from bovine hides

Sub-title: Production of Gelatin from bovine hides

Gelatin is a natural substance obtained from partial hydrolysis of collagen-rich sources found in animal skin, bones, and connective tissues. This study aimed to determine the yield and physicochemical properties of Gelatin extracted from cattle hides and goat skin pretreated with different levels of CH_3COOH and NaOH. In this study, cattle hides treated with 1%, 3%, 5%, 7% CH_3COOH were categorized as HCT1, HCT2, HCT3 and HCT4 treatment groups and hides treated with 0.3M, O.5M, 0.7M NaOH were categorized as HNT1, HNT2 and HNT3 treatment groups respectively with three replicates in each group or treatment. Goat skin treated with 1%, 3%, 5%, CH_3COOH were categorized as SCT1, SCT2 and SCT3 treatment groups and skin treated with 0.3M 0.5M, 0.7M NaOH categorized as SNT1, SNT2 and SNT3 treatment groups respectively with three replicates in each group or treatment. A completely randomized design was used to analyze the data. Hides curing with different concentrations of CH_3COOH and NaOH was significantly affected ($p<0.001$) the Gelatin yield that ranged from 8.99% to 20.60% and 8.67% to 10.39% respectively. Bloom, viscosity and pH also differ significantly among the treatment groups. Highest bloom was found for HCT3 treatment group (268.28g). In case of CH_3COOH treated hides chemical composition didn't differ among the treatment groups but NaOH treated hides CP, OM and ash content differ significantly among the treatment groups. Skin curing with different concentrations of CH_3COOH and NaOH was significantly affected ($p<0.001$) the Gelatin yield, bloom, viscosity and pH. Gelatin yield ranged from 5.29% to 7.34% and 2.81% to 4.46% respectively. In case of acid treatment highest bloom was found for SCT3 (225.33g) group and for

alkali treated highest bloom for SNT1 (250.07g) group. Considering yield, bloom and cost of production, it can be concluded that hides with 5% CH3COOH and skin treated with 3% CH3COOH was a cost-effective and efficient Gelatin extraction procedure from which more bloom, CP yield and considerable amount of Gelatin can be produced.

Estimation of Greenhouse Gas (GHG) Emission Factors and adopting Tier-2 method of IPCC for GHG emission inventory in Cattle in Barind and drought-prone region of Bangladesh

Bangladesh is currently accounting GHG emission inventory for the livestock sector following the Tier-1 method of the IPCC Guidelines (2006). Uplifting the national inventory methodology from Tier 1 to Tier 2 requires improved activity data and country-specific emission factors (EF). This research aimed to upgrade GHG inventory approaches from Tier 1 to Tier 2 and country-specific EF for Bangladesh. To fulfill the purpose, this year, data were collected from 390 farms from selected 13 districts of the Barind and drought-prone regions. The GHG emissions were estimated using mathematical models provided in IPCC Guidelines (2019) for Tier-2. The calculated emission factor (EF) for local versus crossbred dairy cows, heifers, mature males, growing cattle, and calves were 39 vs 71, 19 vs 23, 27 vs 29, 21 vs 24, and 9 vs 12, respectively. The total enteric and manure methane emission were accounted as 9974.66 and 239.23 Gg CO_2 eq./year, giving a total of 10213.89 Gg CO_2 eq./year. It was found that the indigenous cattle (33%) emitted 23%, and crossbred cattle (67%) emitted 77% of total methane emissions. On the other hand, dairy cattle irrespective of genotypes, emitted 72%, and all other cattle together emitted 28% of total methane emission. The total N_2O emission from cattle of the region was estimated 42.57 Gg of CO_2 eq./year. Similar to methane, local cattle contributed 26% compared to 74% of total N_2O by the crossbreds. On the other hand, dairy cows contributed 57%, while all other categories contributed 43% manure N_2O emission. With the current cattle population data in the region, the enteric methane emission was estimated 15338 Gg of CO_2 eq./year following the

Tier-1 method of IPCC guidelines (2019), while according to Tier-2, it was 9975 Gg of CO_2 eq./year. This result indicated that improving the accounting system of GHG inventory for the livestock sector is inevitable.

Need assessment, technology intervention and livestock advisory development for increasing climate resilience in livestock production system

The present research was designed to assess the baseline status, and knowledge, service and technology needs of flood, drought and saline and cyclone-affected livestock farmers in selected regions. The said objectives were fulfilled in the previous two years, and based on the findings, this year it was planned to demonstrate small-scale silage as climate resilient technology for flood affected farmers; and development of livestock advisory for different climatic hazards. Twenty selected farmers from Madarganj, Jamalpur were demonstrated drum silage preparation; 80% of them adopted the technology and reported greater resilience against food-shortage during flood. An expert-consulted advisory texts were developed for heat, cold and extreme rainfall stress. In addition, one fodder germplasm having the potential of saline and flood tolerance characteristics was collected from Dacope, Khulna for further study. The Bangladesh National Herbarium primarily identified this fodder as either *Pennisetum purpureum* (Napier) or *Echinochloa polystachya* (German) both under the *Poaceae* family. Comparison of physical properties of root system, stem, leaves (length & breadth) and inner matrix of the stem of the unidentified fodder with Napier and German has revealed distinct differences among those three fodders (Plate 1). Nutritional study showed that the grass contained 18.8, 10.2, 35.7, 73.5, 6.82% of DM, CP, ADF, NDF and acid detergent lignin, respectively and 4084.0 Kcal/Kg GE. It was observed that the nutritional composition of the chopped whole plant is similar to Napier and German grass. However, the leafy top of the unknown grass contained higher DM (24.5%) and CP (16.2%) levels. In conclusion, it could be identified as a new species/variety of local grass having the potential to be a tolerant fodder against inundation and salinity. Research is needed to confirm its botanical characterization, salinity and inundation tolerance, yield and chemical characteristics in diverse agronomical practices and nutritional characterization in the future.
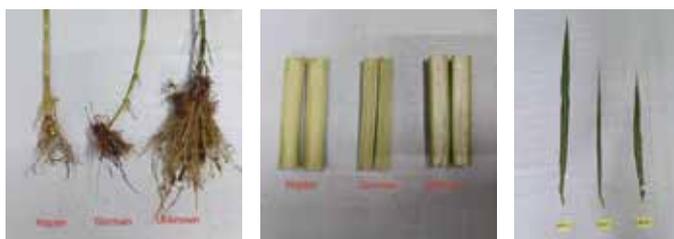

Fig: Comparison of the root systems, inner matrix of stem and leaves of Napier, German and the unidentified grass (from left to right)

Strategic development of beef breed(s) in Bangladesh

Bangladesh faces a rising demand for beef, one of the major sources of animal protein, while the supply remains insufficient due to low carcass yield of native cattle and absence of recognized beef breeds. To solve this problem, a research program was initiated at BLRI (Bangladesh Livestock Research Institute) to identify suitable beef sires for crossbreeding with native cows, targeting a minimum carcass yield of 150 kg within two years under on-farm conditions. Cows of the BLRI Cattle Breed-1 were inseminated with imported frozen semen from four exotic beef breeds: Simmental, Charolais, Limousin, and Brahman. From 2015 to 2024, a total of 104 F1, F2, and F3 crossbred progeny were produced and evaluated for growth, carcass traits, disease resistance, mortality, milk yield, and semen quality. Semen analysis revealed significant variation among genotypes in terms of motility and morphology, with Limousin crosses showing the highest progressive motility and Brahman crosses showing the best morphology. Growth data indicated that F1 progeny showed the highest body weight and average daily gain (ADG), likely due to hybrid vigor. Because of their better overall performance, Simmental crosses were selected for further breeding into the F3 generation. But, both Simmental and Charolais crosses also exhibited high milk yield, averaging over 5 kg/day even as beef crosses. Currently, 44 crossbred animals are maintained at the BLRI research farm, with semen from F1 crossbred bulls stored for further studies. Future plans include field trials using these semen and development of beef progeny with 75%, 50%, and 25% exotic genetic levels to evaluate performance more precisely. This research provides a foundation for establishing a sustainable beef production system in Bangladesh by introducing high-yielding beef genotypes.

Present status and performance evaluation of Jersey and their crosses available in Bangladesh

Milk is a key source of animal protein in Bangladesh. However, the country currently faces a shortage of 17.82 lakh metric tons of milk compared to its total demand of 158.50 lakh metric tons per year (BBS, 2022-23). To bridge this gap, farmers and stakeholders are turning to high-yielding exotic dairy breeds, particularly Holstein Friesian and Jersey crosses. While Holstein crosses are already popular, interest in Jersey crosses is growing due to their adaptability and efficiency. Despite the introduction of Jersey bulls by Bangladesh Milk Producer's Cooperative Union Limited, there is a lack of scientific data to support future breeding programs. Therefore, this study was undertaken to assess the distribution, population, and production performance of Jersey and Jersey crossbred cattle in selected districts named Sirajganj, Pabna, Chittagong, Dhaka, and Mymensingh through structured questionnaires and focus group discussion. A total of 453 Jersey crossbred cattle of

varying genetic levels were recorded from 115 farmers and 5 commercial farms. Results showed that Jersey crosses had better reproductive efficiency than Holstein crosses, with significantly lower ages at puberty, first artificial insemination, and first calving. Additionally, Jersey crosses had shorter calving interval. Milk yield data revealed that although Holstein crosses produced more milk per day, Jersey crosses had significantly longer peak and total lactation periods. Moreover, disease incidence was found to be lower in Jersey crosses, and farmers reported fewer cases of repeat breeding. Jersey cattle also showed advantages such as lower feed requirements, greater adaptability, smaller body size, and better suitability in local environment. In conclusion, Jersey and its crossbreds showed tremendous potential as a climate-resilient dairy breed in Bangladesh. Hence, further large-scale and in-depth research is recommended to support the development of a structured breeding program for Jersey cattle.

Conservation and improvement of native cattle

The four pure or improved Indigenous cattle, such as Munshiganj (MC), North bengal grey (NBG), Netrokona black (NBC), and Hill black (HBC) cattle are restricted to specific regions of the country. Evaluate the productive and reproductive performance of MC. Parameters were considered such as total lactation length (TLL), total milk yield (TMY), daily milk yield (DMY), age at first heat (AFH), age at first conception (AFCon), age at first calving (AFC), number of services per conception (NSPC), gestation length (GL), post-partum heat period (PPHP), calving interval (CI), and days open (DO), and recorded 3 Generation (G0- foundation, G1-Generation 1 and G2-Generation two) data of the BLRI nucleus herd using SPSS 25.0. PPHP, DO, and CI of MC for G0, G1, and G2 were 87.1±5.7, 62±9.1, and 54±21d; 119.1±6.5, 78.2±10, and 54±24, 403.8±6, 358.3±10, and 336±30days; PPHP ($p< 0.05$), DO ($p< 0.01$), GL ($p< 0.05$), and CI ($p< 0.01$), respectively. TMY with TLL ($r = 0.71$) and DMY ($r = 0.73$). AFH with AFCon and AFC were r= 0.82 and 0.78 at $p< 0.01$, respectively. AFCon correlates with AFC ($r = 0.93$, $p< 0.01$), and PPHP (r= 0.13), DO (r= 0.04) and CI ($r = 0.11$). This year, four NBG cows (3) and bull (1) were procured from their habitat. All cows had given calves. On-farm average TLL, DMY, AFH, AFC, PPHP, CI, and SPC of NBG and NBC were 227d, 1.4Kg, 2.3Y, 3Y, 64d, 13M, 1.0 nos.; 200 d, 1.1Kg, 2.3Y, 3Y, 64 d, 13M, 1nos., respectively. From the survey, it was revealed that NBC and HBC found 251 out of 691 in Netrokona, Sunamganj, and Kishorganj; 41 out of 99 in Chakaria (Lama) upazila. Coat, skin, muzzle, eye, eyelid, hoof and tail switch color in male and female were black in most of the cases. Proportion (%) of NBC and HBC were 36.32 and 41.41, respectively. MC was improved through successive generation by selective breeding. The relative information of pure or improved varieties of NBG, NBC, and HBC cattle may help in improvement of breed characteristics and conservation aspect.

Biotechnology Division

Production of oxalate free napier grass through gene editing and tissue culture technique

Sub-title: Identification of the best harvesting time with a tolerable level of oxalate content (<2%) without minimizing the quality and quantity.

Limited information is available on the impact of leaf number on oxalate content, without compromising yield and quality. This experiment investigated the impact of leaf growth stages on oxalate content. Treatments included three Napier cultivars of Pakchong, Zara and BLRI Napier-5 and their 5 different leaf stages (3, 6, 9, 12 and 15 leaves), which were arranged in a 3 × 5 factorial arrangement with 3 replications, totalling 45 plots and 2m × 2m of each. Plant-to-plant and line-to-line distances were 25 and 50 cm. Standard agronomical

Fig: Determination of Oxalate content of Napier grass through HPLC

practices were followed. The survival rate of Pakchong Napier grass was the highest (92%), followed by BLRI Napier-5 (80.7%) and Zara (74.2%). Pakchong and Zara both had acceptable amounts of soluble, insoluble, and total oxalate at the 9-leaf stage (45 days old) (1.30%, 0.80%, 2.10% and 1.40%, 0.80%, 2.20%, respectively) with optimal levels of CP (15.6% and 15.4%) and ADF (38.1% and 41.8%), with maximum biomass yield (7.25 and 7.50 ton/ha/cut). Increasing the number of leaves from 9 to 15 reduced the CP content for both cultivars. In the case of BLRI Napier-5, the levels of soluble, insoluble, and total oxalate at the 9 leaves stage were 1.33%, 0.36%, and 1.70%, respectively; however, CP content was lower by 13.4% compared to other treatments. The six leaves stage of BLRI Napier-5 indicated that the optimal level of CP (18%) was present at 35 to 40 days of age, with minimal total and soluble oxalate (3.2% and 2.0%), which were not observed in other Napier cultivars. But less biomass yield (3.62 ton/ha/cut) compared to 9 leave stage. Our findings indicate that to achieve high quality, quantity, and acceptable levels of soluble oxalate (below 2%), Pakchong and Zara must be harvested at the 9-leaf stage and BLRI Napier-5 may be viable at the 6-leaf stage.

Conservation, improvement and multiplication of Red Chittagong Cattle

The Red Chittagong Cattle (RCC) is a valuable indigenous breed of Bangladesh known for its adaptability to local farming conditions, resistance to tropical diseases, and superior milk and meat quality. However, the genetic purity of RCC is under threat due to widespread crossbreeding and urbanization. In response, the Bangladesh Livestock Research Institute (BLRI) has been implementing a conservation and improvement

program since 2001–2002. The recently completed ADP Project RCC (Phase II) aimed to conserve and improve pure RCC herds both at BLRI and in rural communities. During the reporting year, community-based breeding initiatives were conducted across 16 upazilas in 10 districts, engaging 200 farmers. Artificial insemination (AI) was carried out using semen from six genetically superior RCC bulls, resulting in the birth of 279 pure and 386 graded RCC calves. Farmers from Chattogram and Rajshahi

Fig: Distribution of deworming medicine at Hasimpur, Chattogram

districts were selected based on cattle ownership and willingness to participate. Data were recorded in herd books and analyzed using SPSS software. The study found significant differences (p<0.001) in body weight and growth rates among pure RCC, graded RCC, and local cattle. Pure RCC calves showed superior growth performance, with an average daily gain (ADG) of 323 g/day, compared to 282 g/day in graded RCC and 250 g/day in local cattle, which was significant. Therefore, these findings will support the establishment of a pure RCC hub in different locations across the country.

Establishment of a semen bank for cryopreservation of BLRI improved germplasm (Cattle, Buffalo, Gayal, Goat, Sheep and Chicken)

Sub-title: Development of cost-effective semen cryopreservation technique for indigenous Sheep and Gayal semen.

This project was carried out to determine the most suitable diluter for the preservation of sheep and gayal semen, as well as to preserve the semen of those species. Three (03) breeding gayal from BLRI regional station, Naikhongchhori, Bandarban and six (06) breeding rams (two in each type) from three different types of sheep (Barinda, Coastal, and Jamuna River Basin) were selected and trained them for adjusting the process of semen collection. Semen was collected by artificial vagina method and diluted using different diluters. The frozen semen straws were cryopreserved at -196°C and frozen semen quality was assessed using CASA whereas fresh semen was considered as control. Data were analyzed using one-way analysis of variance (ANOVA) using the SPSS program (version 20.0, SPSS). It was found that, different local sheep

Fig: Semen collection of Sheep

varieties (Barinda, Coastal and JRB) has a significant effect on motility of fresh semen. The cryopreserved semen motility of three sheep varieties (Barinda, Coastal and JRB) was higher (69.75%, 78.16% and 76.16%, respectively) at triladyl diluter (p<0.05) compared to tris diluter. A total of 2930 doses (RCC-2024, BCB- 602, MC-304) of cattle, 1115 doses of buffalo, 1373 doses of goat and 1100 doses of sheep semen had been conserved during current year project period.

Buffalo Production Research Division

Impact of heat stress on buffalo productivity in Bangladesh

Intense environmental conditions have a devastating impact on livestock's reproduction and productivity. Inspite of this fact, there was a little known about heat stress on buffaloes across our country. Therefore, the aim of the study was to quantify and evaluate the responses of buffalo in heat stress as well as to develop strategies for reduction of heat stress. This research executed with 37 buffalo bulls (3-4 years' ages) housed in open shed in BLRI Buffalo research farm, Savar. In the study, heat stress indicatory physiological parameters (heart rate-HR, skin temperature-ST, scrotal temperature-SCT, respiration rate-RR and rectal temperature -RT), hematological responses (Hemoglobin-Hb, Red Blood Cell-RBC, and Packed Cell Volume-PCV) as well as semen quality assessing parameters (static sperm, mass motility, progressive motility, and normal sperm ratio) were recorded. These measurements were taken at various period of the day based on the temperature humidity index (THI), which was categorized into 3 THI groups- i) comfort zone (THI-74 to78), ii) moderate heat stress (THI-79 to 86), and iii) severe heat stress (THI 87 and above). The findings showed that heat stress increased (P<0.001) thermoregulatory responses such as HR, ST, SCT, and RR at increased THI. The HR, ST, SCT and RR were 57.04, 32.30C, 30.60C and 18.1 at THI 74±4 and 59.01, 33.210C, 31.170C and 21.4 at THI 86 and 63.25, 35.240C, 31.960C and 27.8 at THI 90, respectively. The core body temperature, RT were 37.57a±0.02, 37.99b±0.01 and 38.15c±0.03 0C, respectively at THI <73-78, 79-86 and >87. Notably, RT was elevated by 0.420C and 0.580C from the comfort zone. Again, the hematological parameters Hb, PCV and RBC were (11.94±0.32 and 10.17±0.35 vs 13.48±0.15 gm/dl), (18.85±1.31 and 14.02±0.59 vs 39.42±0.34%) and (3.86±0.23 and 2.87±0.24 vs 8.38±0.21 million/ cumm) at moderate and severe heat stress then comfort zone. Additionally, it was observed that buffalo semen quality drastically deteriorated (P<0.001) due to the consequences of heat stress. This study concludes by highlighting that heat stress adversely affects the physiological, hematological, and reproductive performance of buffalo bulls.

Fig: Semen quality assessment

Fig: Semen quality assessment

Fig: Hematological test

Director (Research) Office

Potential use of available feed resources in six different climatic hotspots in Bangladesh

The livestock sector in Bangladesh faces critical challenges due to the shortage of quality feed and poor feeding practices among smallholder farmers. A field-based investigation was conducted in six upazilas of Sirajganj district-*Sirajgonj Sadar, Belkuchi, Kamarkhanda, Shahjadpur, Tarash, and Ullahpara*-to assess available feed resources and propose cost-effective, roughage-based feeding strategies. Data were collected from 180 farmers managing 676 cattle, including both local and crossbred breeds, using structured surveys and consultations with the Department of Livestock Services (DLS) and Department of Agricultural Extension (DAE). A key finding was the widespread cultivation of Napier grass, with the highest number of farmers engaged in fodder production in *Ullahpara,* specifically 23 out of 30 surveyed. Belkuchi upazila reported the highest total fodder cultivation area at 1,171 decimals. The dominant roughages used were rice straw, Napier, local grasses, and Jambo, with dry matter (DM) consumption ranging from 1.27 to 7.46 kg/day/cattle. The chemical analysis of locally grown fodder crops highlighted several high-nutrient options. Khesari grass and Moringa hay showed high crude protein (CP) contents of 23.36% and 17.92%, respectively. Napier grass, while widely used, had a lower CP content (9.21%) but remains popular due to its high biomass yield and adaptability. An economic evaluation of Maskalai *(Vigna unguiculata)* showed hay production to be more profitable than traditional pulse cultivation. The hay group achieved a gross margin of BDT 70,737.35/ha and a benefit-cost ratio (BCR) of 1.31, surpassing the grain group's BCR of 1.02. Additionally, the cost of hay production was substantially lower (15.12 Tk/kg vs. 53.90 Tk/kg). Three region-specific Complete Balanced Diet (CBD) formulations were developed, and a shelf-life study indicated that these diets should be consumed within 65 days to maintain nutritional integrity. The findings suggest a promising avenue for enhancing livestock productivity through improved fodder management and cost-effective feeding strategies.

Development of feeds and fodder database for an efficient feeding system for livestock production

Livestock production is a key pillar of Bangladesh's agriculture and is expected to remain so in the foreseeable future. With feed costs accounting for 60–70% of total livestock production expenses, the efficient use of local feed resources is critical for ensuring sustainability. Since crop residues form the primary feed source, any improvement in feeding systems must begin with a region-specific feed inventory and nutrient profiling. This research was undertaken with two major objectives: (1) to

develop a national feed inventory and database for livestock feed resources, and (2) to create an online-based knowledge hub for feed information. A baseline survey was conducted using structured questionnaires in 12 upazilas across six divisions: Manikgonj and Munshigonj (Dhaka), Jeshore Sadar and Jhikorgacha (Khulna), Patiya and Naikhongchori (Chattogram), Patuakhali and Charfashion (Barishal), Madarganj (Mymensingh), and Godagari and Ishwardi (Rajshahi). Thirty farmers from each location were interviewed. Additionally, Kalapara, Nachole, Sahzatpur, Bhanga, and Saltha upazilas were included in recent surveys. A wide variety of local grasses were identified and collected, including bottle grass, paccha, chauchra, unknown hybrids, Jangra, Kolmi, Maskalai, Shama, Motha, Durba, Bashpata, Dhal grass, Fuler grass, and Binnah. Both local and commercial feed and fodder samples were analyzed for their proximate composition (DM, Ash, CP, EE, NFE, CF, ADF, NDF, lignin), energy content (GE, ME), and mineral levels (Ca, P). Analysis was conducted at the Animal Nutrition Laboratory of BLRI, the Quality Control Laboratory of DLS, and the SRDI. All data were cross-verified by expert animal nutritionists and compiled in Excel and a dedicated online portal. To meet the second objective, an ICT company, Softcell System, developed the **BLRI Feeds and Fodder Data Bank,** an interactive online platform that includes feed classification, region-based feedstuffs, and nutrient composition. Data from six upazilas have already been uploaded, while analysis from the remaining ten is ongoing. Upon project completion, the database will include a least-cost ration formulation tool to support farmers, researchers, policymakers, and other stakeholders.

Fig: Demo version of online based web portal

Conservation and improving yield and nutritional quality of forage crops at BLRI

Bangladesh, a densely populated country with limited cultivable land, faces an acute shortage of green grasses for its ruminant livestock population. High yielding varieties (HYV) of fodder are essential but not easily available at the field level. The Bangladesh Livestock Research Institute (BLRI), mandated to conserve and

distribute fodder germplasm, has undertaken a significant initiative to address this gap. Germplasm conservation helps safeguard the genetic traits of endangered and economically valuable species and serves as a genetic reservoir for future breeding and research. This program has two core objectives: (1) to conserve valuable fodder germplasms for seed and cutting distribution to livestock-keeping farmers, and (2) to evaluate the biomass yield and nutritional quality of different fodder cultivars under varied management conditions. For this purpose, 0.44 hectares of land were used to cultivate 55 diverse fodder cultivars—including perennial, seasonal, leguminous, non-leguminous, salt-tolerant, drought-tolerant, highland, and wetland species—across 190 plots (each 4×4 meters). All plots were properly maintained with standard agronomic practices such as land preparation, fencing, weeding, irrigation, and fertilization. In addition to the original 55 cultivars, nine new fodder varieties were collected from various regions of Bangladesh and cultivated for future screening based on their biomass productivity and nutritional content. Each plot was clearly labeled with signboards indicating line and plot number, fodder name, scientific name, dry matter (DM) yield, and crude protein (CP) yield per hectare.

Fig: Land preparation for germplasm establishment   **Fig:** Cutting Distribution

Fig: Established Germplasm

Furthermore, three highly demanded fodder varieties-Pakchong, Zara, and Smart Napier-were cultivated on a larger scale (0.23 ha, 0.15 ha, and 0.07 ha respectively), resulting in over 6 lakh cuttings preserved for distribution. Already, 80,000 cuttings have been distributed in southern Bangladesh, especially in Patuakhali. This germplasm bank will support future breeding and nutritional improvement programs, ultimately contributing to enhanced livestock productivity in the country.

Good livestock practices and development of herd immunity package in cattle farm

In Livestock sector, Good Livestock Practices (GLP) are essential for producing safe and healthy livestock products through measures like vaccination, deworming, and biosecurity. In Bangladesh, interest in cattle farming and herd immunity is growing. This project was conducted during the period of 2023-2024 for aiming to (1) identify the parasitic infestation level of cattle by evaluating pre and post deworming status and (2) to develop herd immunity and health management packages at cattle farms. Pre-developed questionnaire (face-to-face contact), Calf health management (colostrum milk @ (8-10) % of their body weight), twenty (20) repeat breeding cows management (anthelmintic with vitamin AD3E-mineral supplementation), faeces-90 samples examined by under microscope and antibody detection of blood sera (randomly) was done by cELISA kit (ID.Vet, France). Before experiment, the parasitic loads were counted but after 21 days of drug implementation, 85.7% (18 cattle out of 21 cattle) reduced the parasitic loads compared to control group (n=13). The pre and post vaccinated cattle serum evaluation was done for the detection of antibody level against LSD (Lumpyvac, Komipharma International Co., Ltd, South Korea). In cattle, the seropositivity of Capripox virus at pre (0 day) 10.64% (5 out of 72) and after 3 months of post vaccination 75% (54 out of 72) by cELISA method (Figure-2). Reduced morbidity and mortality of calves, the growth rate and health status of calf was improved in treatment group (n=10 calf, age: 0 day to 3 months) than control group (n=5 calf, age: 0 day to 3 months). The repeat breeding result shown that, the conception rate was 78.58% (11 cows out of 14 cows) in treated group and 16.67% (1 cow out of 6 cows). Finally, the research objectives will be helpful to increase more productivity of farm animals and reducing the disease incidence of animal health.

Goat Production Research Division

Artificial insemination in Black Bengal Goat

Goat production is one of the major and important livestock sectors of Bangladesh because of easy adaptability of this animal species in adverse climatic and nutritional conditions. Acute buck shortage in the community level due to socio-cultural barrier now became a burning issue for goat breeding. Moreover, the available goat breeds are being diluted by unwanted crossing all over the country. Considering this fact, the project has been designed with the objectives: i) To develop an economic Artificial Insemination (AI) protocol of goat and ii) To validate the Artificial Insemination (AI) at field level. Semen was collected from the superior BB bucks based on their pedigree records. Frozen semen was produced after evaluating fresh semen by the computer assisted semen analysis (CASA). Furthermore, frozen semen was used to inseminate in heated does with different pre-scheduled single doses viz. 24, 30 and 36 hours after showing heat, both for on-station (BLRI goat research farm Savar, Dhaka and BLRI RS, Rajshahi goat research farm) and on-field (Rajshahi and Dhamrai community area) conditions. All the recorded data were organised and analyzed using Microsoft excel 2019. A total of 220 goat were inseminated after confirming heat both on-station (154 doses AI) and on-field (66 doses AI) conditions. Among different areas, the highest conception rate was found in Rajshahi community in all the pre-determined AI schedule. Among different doses, AI performed at 24 hours after showing heat, all areas had highest conception rate (100%) and 30 hours after showing heat, the highest conception rate was found in Rajshahi community (95%) followed by Dhamrai community (88.46%), BLRI RS, Rajshahigoat research farm (85.71%) and BLRI goat research farm (83.33%) respectively. In case of AI performed at 36 hours after showing heat, the highest conception rate was in Dhamrai community (100%) followed by Rajshahi community area (93.75%) and BLRI RS, Rajshahi goat research farm (92.85), BLRI goat research farm, Savar, Dhaka (90.91%) respectively. Conception rate was in increasing trend with the progressive parity. Higher conception rate was found in goat with more than 2.5 years old in all area except BLRI goat research farm. Higher conception rate was found in semi-intensive management system at field level. As the number of observations was uneven among the research area, further research is needed for better understanding in single dose AI and to conclude a concrete result.

Development of entrepreneurship for commercial production of complete pellet feed

In Bangladesh, about 26.9 million goat population are distributed over the country (DLS, 2023) and most of the animals are reared by grazing on common lands, fallow

or harvested agricultural land. In the context of Bangladesh, feeds and fodder scarcity are the major problems for better livestock production due to rapid decline of grazing land. Straw-based pelleted TMR is an innovative technology that minimizes the scarcity of feed and reduces the wastage of feed ingredients and improve digestibility of animal. Recently, BLRI has developed a complete pellet feed for commercial goat production and our previous study (Ahmed et. al., 2020) demonstrated that straw based complete pellet feeding is a cost-effective feeding system for commercial goat production. But this feed is not available in the farmer's hand. Considering this fact, this project is designed to develop an entrepreneur for commercialization of this pellet feed. A probable entrepreneur was selected from the Dhamrai Upazila under Dhaka district to whom a pellet machine was supplied and installed. He was trained properly regarding the machine and pellet preparation procedure. A complete pellet feed was manufactured with 40% roughage (rice straw) and 60% concentrate. Total 1000 kg of complete pellet feed was produced till the time of report writing. Proximate component (DM, CP, Ash, ADF and NDF) was analysed at Animal Nutrition laboratory, BLRI. Beside this, a survey was conducted through a structured questionnaire among listed farmer of control and pellet group to know the impact of pellet feed & its business case analysis. An economic calculation was conducted to define the actual production cost with an aim of analyzing the scenario of marketing and profitability. The production cost of per kg pellet feed was 40.64 tk. From the economic analysis it can be noted that, if the procurement of rice straw could be done at the production season then pellet production cost could be lessen more. This enterprise is profitable, but to sustain this business it is necessary to create an assured chain of proper marketing of the produced product.

Conservation and improvement of Black Bengal Goat at Bangladesh Livestock Research Institute and community level

Black Bengal goat (BBG) is the most widely recognized legacy goat breed in Bangladesh but the decline of this pure breed from their native place is now becoming an issue worldwide, which leads to disappearance of the pure germplasm line. Considering this fact, the project has been designed with the objectives: i) To conserve and improve Black Bengal goat through selective breeding at BLRI ii) To evaluate the performance of different coat color variants of Black Bengal goat (Solid Black, White Bengal, Dutch belt, Toggenburg and Brown Bengal) and iii) To conserve and improve Black Bengal goat at community level. An open nucleus breeding system (ONBS) was practiced to improve the genetic and phenotypic traits of existing breeding goat stock. The selection objectives of the study were to improve the prolificacy, milk production, and growth rate of the breed. The selection criteria of the aforesaid breeding objectives were minimum 2 kids per kidding; 0.5 litter milk /day/doe, and 12 kg at 6 months of age. To conserve and improve Black Bengal goat

at community level, the research activity was conducted at four villages named as Pachpai, Borochala, Shirirchala and Paragong under Bhaluka, Mymensingh. Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 20.0. The average litter size (no.), milk production (ml/d), birth weight, body weight at 3 and 6 months of age were found as 2.12±0.03, 354.84±9.84, 1.27±0.03, 5.8±0.08 and 9.43±0.13, respectively. The highest litter size and milk production was found in White Bengal coat color compare to others. Furthermore, in case of body weight gain at different age, Dutch belt coat color performed better among the 5 coat color genotype. In valuka community, the average litter size (no.), birth weight, body weight at 3, 6, 9 and 12 months of age were found as 2.03±0.04, 1.19±0.01, 6.12±0.06, 11.07±0.08, 14.09±0.17 and 19.24±2.10, respectively. It can be concluded that, white Bengal genotype may be developed as milk type black Bengal goat. Superior bucks and does will be selected from every genotype by the individual performance score. Therefore, the research program should continue for the coming years to achieve the targeted breeding goals.

Identification and screening of tree leaves for goat feeding

Goat rearing of Bangladesh is mainly dependent on grazing and tree leaf supplementation. Suppose an ideal ration could be prepared considering the nutritional value of different locally and seasonally available tree leaves with other readily available and affordable ingredients. In that case, it will be possible for field farmers to raise goats sustainably. From this perspective the present study was designed to screen the mostly used tree leaves by farmers in accordance to their nutritional, ant-nutritional and utilization value. A survey was conducted on the normal feeding management of goats in six different Upazilla. A pre-prepared questionnaire was used in the survey, where 30 respondents from each Upazilla were interviewed. A representative amount of widely used tree leaf samples were brought to the laboratory for analysis. The nutritional and anti-nutritional (tannin) value of the collected leaves were evaluated along with their mineral content (Ca and P) & their digestibility and metabolizable energy were calculated from in vitro gas volume measurement. Then, VFA content was estimated using GC-MS machine and potential methane production was calculated. The leaf order of highest CP was ipil-ipil (23.42%) whereas the lowest was in mahogany (10.5%) on DM basis. Similarly, the maximum mineral content (Ca) was observed in dumur (13%) compared to banana, bot and neem (12%) and jackfruit (11%) with highest phosphorus in bot and neem (3%). The highest tannin was present in mango leaf (1.69%) whereas the lowest was in dumur (0.01%) respectively. In in vitro gas fermentation process the highest digestibility of collected tree leaves at 48 hours of incubation was hilinchi (70%) & lowest in gol (61%).The maximum ME (MJ/kg DM) was found in ipil-ipil (11.5) followed by hilinchi (8.5), dumur (9.2), gol (9.0), neem

(8.5) and koroi (9.0) in respect. This study also analyzed volatile fatty acid production and data revealed that each of the leaves tended to produce higher acetic acid compared to propionic acid. This is why the value of methane production was slightly higher and methane production of dumurs was at its peak at 48 hours of ingestion. Therefore, further research on tree leaves needs to be arranged to make the potential locally sourced tree leaves available for nationwide use.

Title: Investigation of new emerging diseases of goat in Bangladesh

Sub-Title: Seroprevalence and Identification of Bluetongue Virus in Goats of Bangladesh

Bluetongue (BT) is a non-contagious, arthropod-borne viral disease of domestic and wild ruminants caused by the bluetongue virus (BTV), a member of the genus Orbivirus, family Sedoreoviridae. Although several Indian states bordering Bangladesh have reported BTV cases, there's very little information about the situation in Bangladesh. This study aimed to estimate the seroprevalence of BTV, identify associated risk factors, and confirm the virus molecularly in goats in Bangladesh. A total of 460 blood samples were randomly collected from goats across ten districts between July 2023 and June 2024. Goat owners were interviewed using a structured questionnaire to assess risk factors. Serum samples were screened for anti-BTV antibodies using a commercial competitive ELISA (IDvet, France). Seropositive samples underwent RNA extraction followed by conventional PCR targeting the VP7 and NS1 genes for molecular confirmation. Overall, 63.04% (290/460) of the goats were seropositive for BTV. Risk factor analysis using univariate logistic regression revealed that higher BTV seropositivity was significantly associated with Jamunapari breed, female sex, goats older than two years, poor biosecurity, household farms, lack of awareness about BTV, and absence of vector control measures. Geographically, higher seroprevalence was observed in districts such as Jashore, Sylhet, Chuadanga, and Kustia. PCR amplification of the VP7 and NS1 genes confirmed the presence of BTV RNA in ELISA-positive samples, marking the molecular evidence of the virus in goats in Bangladesh. This is the first comprehensive study confirming both serological and molecular presence of BTV in Bangladeshi goats. The findings highlight the urgent need for enhanced surveillance, targeted awareness programs, and vector control strategies to prevent further spread of bluetongue disease in small ruminants.

Sheep Production Research Division

Investigation of pneumonic pasteurellosis in sheep and its mitigation to develop a model sheep health management package for ideal farming

Pneumonia in sheep is a prevalent and economically significant disease in Bangladesh. Identification of primary cause is very difficult due to coinfection of various microorganisms. If risk factors of pneumonia are identified, the disease can be tackled by taking preventive measures well ahead of the course of disease. Hence, an observational cross-sectional study was undertaken across 246 sheep farms in the sheep-producing regions (Meherpur, Noakhali, Khulna, Rajshahi, Rangpur, Sylhet, and Faridpur) to identify risk factors of pneumonia irrespective of causation. Data were collected using a structured questionnaire and analyzed via Microsoft Excel 2021 LTSC. The overall flock-level prevalence of pneumonia was found to be 75.64%, with backyard farms (60.26%) showing significantly higher incidence than semi-intensive farms (15.38%). Smaller farms (≤20 sheep) had the highest pneumonia prevalence (58.97%). Seasonally, the disease was more frequent in the rainy season (38.46%) compared to winter (29.49%). Among 25 variables assessed, 16 showed significant association with pneumonia (P<0.2), with six exhibiting very strong correlation (Cramer's V = 0.88–0.97). From univariate logistic regression, only grazing with other animals, flooring material, smell of the shed, height of the floor to roof were highly correlated with pneumonia in sheep (p<0.05). Multivariate logistic regression identified two key factors significantly reducing pneumonia risk: flooring material (brick/bamboo) and floor-to-roof height (6–10 ft), which lowered pneumonia odds by 82.32% and 79.14%, respectively. ROC curve analysis yielded an AUC value of 0.744, indicating acceptable predictive power of the model. This work lays the groundwork for a model sheep health package against pneumonic pasteurellosis adaptable to Bangladesh's farming contexts. The regression equation was found to be:

Log (probability of pneumonia) =2.49−1.73X1 – 0.2 X2 – 1.57X3

(Constant = 2.49; X1= Flooring material: Brick or Bamboo; X2= Height of the floor to roof: 10≤ ft; X3= Height of the floor to roof: 6-10 ft)

Evaluation of exotic pure and their crossbred sheep in Bangladesh

In Bangladesh's meat revolution, sheep are one of the most promising livestock species after cattle and goats, with the highest potential for profitable lamb production. Though native sheep having many superior traits, but the growth rate of the species is slow. Therefore, for enhancing meat quality and meat production of native sheep in Bangladesh, crossbreeding of indigenous sheep with the high

yielding exotic sheep could be one of the most possible way. Thus, the present study was undertaken to evaluate the productive and reproductive performance of different crossbreds and also to evaluate the adaptability of different crossbreds in hot and humid climatic condition. The breeding program was conducted at sheep research farm, Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka. In this breeding program high yielding exotic sheep (Dorper, Perendale, and Suffolk) used as sire and superior native sheep with 20-25 kg body weight and have passed at least one parity were selected as dam line. The breeding program was designed to maintain 50% exotic blood in F1 generation. Then, inter-se mating within all the crossbreds was practiced. The selection criteria for crossbred production were birth weight 3 kg, 6 months body weight 20 kg and 12 months body weight 30 kg. Subsequent data on productive and reproductive performance were recorded regularly. The recorded data were analyzed by General Linear Model (GLM) procedure of Statistical Package for the Social Sciences (SPSS) version 20.0. Duncan's multiple range test (DMRT) was performed to see the significant differences among the mean values. The average litter size, birth weight (kg), body weight (kg) at 6 and 12 months of Dorper, Perendale, and Suffolk crossbred were 1.30 ±0.07, 2.23±0.07, 13.34±0.78 and 21.90±1.44; 1.93±0.13, 2.11±0.12, 14.18±1.07 and 21.66±1.36; 1.33±0.13, 2.33±0.14, 14.82±1.24 and 22.6±1.52, respectively. In case of average litter size, Perendale crossbred performed significantly better (p=0.000) followed by Suffolk and Dorper crossbred, respectively. Among the crossbreds, birth weight and live weight were found non-significant (p>0.05). In conclusion, superior rams and ewes will be selected by the individual performance. These findings give us more attention for continuing further research program to produce a suitable meat type crossbred sheep in our country.

Conservation and improvement of native sheep germplasm at Bangladesh Livestock Research Institute

Sheep is a potential livestock species in Bangladesh. They are hardy animals, known for their adaptability to hot and humid climates, resistance to local diseases, and efficient foraging on low-quality feed resources. The project was designed to select superior native sheep germplasm and also to study the productive and reproductive performances of native sheep at the Bangladesh Livestock Research Institute (BLRI). The breeding program was conducted at Sheep Research Farm, BLRI with four different types of native sheep namely Coastal, Jamuna River Basin, Barind, and Garole. The sheep were housed in a high slated-floor permanent house, providing enough comfortable space. They were given a concentrate diet (17% CP, 11 MJ ME/kg DM) twice a day at a rate of 1.5% of their body weight, along with ad-libitum basis green grass. The targeted litter size, birth weight, and 6 months body weight were 2 lambs per lambing, 1.5 kg, and 14 kg respectively. Data on productive

and reproductive performances along with records of medications, vaccinations, and disease incidences were meticulously maintained. The experiment was conducted under a Completely Randomized Design (CRD) and data were analyzed using R version 4.4.0. To determine the differences between means, the Least Significant Difference (LSD) test was performed and the significant differences were declared when $p<0.05$. The average litter size, birth weight (kg), and body weights (kg) at 3 and 6 months for Coastal, Jamuna River Basin, Barind, and Garole sheep were 1.50±0.04, 1.53±0.02, 7.16±0.10, and 11.86±0.18; 1.57±0.07, 1.36±0.03, 6.94±0.19, and 10.95±0.27; 1.86±0.09, 1.44±0.04, 6.98±0.14, and 11.18±0.23; and 1.45±0.05, 1.20±0.02, 6.35±0.15, and 9.88±0.17, respectively. Significant differences ($p<0.001$) were observed among genotypes in litter size, birth weight, and body weights at 3 and 6 months. In case of, Coastal sheep showing the highest birth weight, and body weight at 3 and 6 months while Barind sheep having the largest litter size. Based on these findings, rams and ewes with superior individual performance will be selected for breeding purposes to enhance the genetic potentiality of the flock. The study emphasizes the necessity of ongoing research until significant improvements in native sheep productivity and performance at BLRI are achieved.

Poultry Production Research Division

Conservation and improvement of tropically adapted indigenous chicken variety in Bangladesh

This study aimed to evaluate the performance of three indigenous chicken genotypes—Non-descript Deshi (ND-456), Hilly (HI-406), and Naked Neck (NN-497)—under intensive management and to implement assortative mating for developing the twelfth generation (G12). The experiment was conducted at the Bangladesh Livestock Research Institute, where birds were initially selected at 8 weeks based on body weight and again at 40 weeks based on an index combining performance traits. Selected males and females (1:5 ratio) were mated using artificial insemination. Performance parameters, including chick weight, body weight at various ages, feed intake, feed conversion ratio (FCR), egg production (number and hen-day egg production, HDEP), age at sexual maturity (ASM), fertility, and hatchability, were recorded and analyzed. Chick weight was highest in ND (30.32±0.16 g), but HI showed superior 8-week body weights in both sexes (771.90±4.76 g for males and 601.21±4.07 g for females; $p<0.001$). NN exhibited significantly better FCR at 8 weeks (2.01±0.01 for males and 2.62±0.02 for females; $p<0.001$). Egg production from 20–60 weeks was highest in NN (146.82±1.43), followed by ND (137.35±1.43) and HI (116.95±1.43; $p<0.001$). Fertility was highest in NN (76.96±2.60%; $p<0.001$), while HI had the highest hatchability (79.89±2.49%; $p<0.001$). Expected genetic gains in egg production were 1.97% (ND), 0.86% (HI), and 1.82% (NN), with a minimal inbreeding rate (ΔF = 0.6%). These findings demonstrate genotype-specific strengths in production, fertility, and efficiency traits, supporting their strategic use in conservation and genetic improvement programs for tropically adapted indigenous chickens.

Development of suitable semen cryopreservation protocol for BLRI improved indigenous chickens

This study was carried out at the Bangladesh Livestock Research Institute (BLRI), Savar, with the objectives of (i) characterizing the phenotypic traits of three indigenous chicken varieties, (ii) evaluating semen quality at different ages, (iii) assessing the efficacy of semen diluents, and (iv) developing a cryopreservation protocol for Indigenous chicken semen. Ninety healthy cocks—Non-descript Deshi (ND), Hilly (HI), and Naked Neck (NN)—were selected (30 per genotype). Semen was collected via abdominal massage and evaluated for volume, color, consistency, pH, and concentration. Three extenders—Ringer's Acetate Egg Yolk (RAEY), Tris Egg Yolk Citrate (TEYC), and a commercial poultry semen extender (Ovodyl)—were

tested at dilution ratios of 1:1, 1:2, and 1:3. Semen quality was analyzed using a Computer-Assisted Semen Analyzer (CASA), assessing motility, progressive motility, static sperm, bent and coiled tails, and sperm concentration. Sperm concentration was highest at a 1:3 ratio (121.79±69.86 M/ml), followed by 1:1 and 1:2. Extender type and dilution ratio had no significant effect on CASA motility parameters, except for sperm concentration. Ovodyl exhibited superior fertility performance (87.55%) and the highest average hatchability (94.38±2.03%) across dilution ratios. RAEY yielded the highest fertility at a 1:1 ratio (91.19±4.37%). Interaction effects between extender type and dilution ratio were significant for fertility outcomes. Overall, Ovodyl was identified as the most stable and effective extender across various dilutions, suggesting its suitability for indigenous chicken semen cryopreservation protocols in Bangladesh.

Development of meat type quail through pure breeding

The present study was conducted at Bangladesh Livestock Research Institute, Savar, Dhaka, and four genotypes of quail such as Black (Bl), Brown (Br), Dhakai (D), and White (W), with the objectives (i) to increase the sixth-week body weight of Dhakai and BB-white quail through selective breeding (ii) to select parental birds (males and females) and breed them using best to best mating plan for the production of 13th generation birds. This study uses 6th-week body weight (BW) as a selection criterion to maintain the precise pedigree records in each generation for developing meat-type quail. All birds from 0 to 4 weeks (starter feed: 24% CP, ME 3000 Kcal/kg DM), 4 to 5 weeks (grower feed: 21% CP, ME 2800 Kcal/kg DM), and 6 weeks to laying period (layer feed: 18% CP, ME 2600 Kcal/kg DM) of age, respectively. A total of 1476 (Bl-353, Br-368, D-401, and W-354) day-old chicks were hatched to produce the thirteenth generation. Ten (10) birds from each genotype of quail were slaughtered to evaluate carcass characteristics and nutrient content of meat. Day-old chick weight and 5th-week body weight were higher in D (7.27±0.05g & 138.86±1.17g) compared to other genotypes. Egg production (No) (8-25 weeks) was significantly higher in D (109.02±0.52) than in different genotypes. Dressing percentage and FCR were higher in D (64.54% & 3.06) compared to other genotypes. The lowest cholesterol value was observed in D (221 mg/dl) compared to the other three genotypes. 6th week BW of male quails of Bl, Br, D, and W were expected to increase by 3.31, 2.89, 5.68, and 3.97 g, respectively, whereas female quails were 3.36, 5.93, 7.83, and 4.41g for Bl, Br, D, and W, respectively. Finally, it is concluded that Dhakai quail is superior based on body weight, dressing percentage, FCR, and cholesterol.

Genetic improvement of egg production performance of BLRI-1 and BLRI-2 duck breeds for rural duck farming in Bangladesh

This study aimed to assess the genetic progress in egg production traits of two native duck genotypes—BLRI-1 and BLRI-2—developed through nine generations of selective breeding at the Bangladesh Livestock Research Institute (BLRI). Key performance parameters evaluated included age at sexual maturity, body weight at first lay, daily egg mass, egg weight, and feed conversion ratio (FCR), along with field-level validation against the local Jending duck. Results revealed significant genetic improvement in both genotypes. BLRI-1 ducklings had a significantly higher day-old weight (41.66 g) compared to BLRI-2 (37.47 g). Although body weights at 8, 12, and 16 weeks were comparable, BLRI-1 outperformed BLRI-2 in egg mass (41.22 vs. 39.15 g/day) and FCR (2.75 vs. 3.53). Egg weight was also higher in BLRI-1 (64.63 g) than in BLRI-2 (62.60 g). In on-farm trials in Sirajgonj, BLRI-1 ducks matured later (204 days) than BLRI-2 (193 days) and Jending ducks (189 days), but exhibited superior first egg weight (53.66 g) and body weight at lay (1666.68 g), significantly surpassing both comparison groups. Despite no significant difference in egg quality traits, the overall results indicate that selective breeding has enhanced production traits in both genotypes, with BLRI-1 being particularly promising for rural duck farming due to its improved egg and body weight characteristics.

Determination of nutrient requirements for the development of feeding and management guidelines for BLRI improved native chicken: performance, carcass characteristics and meat chemical composition of BLRI improved non descriptive desi (ND) and naked neck (NN) chickens fed graded levels of dietary energy and protein concentration

This study aimed to establish optimal dietary energy and protein levels for BLRI-improved native chickens to enhance growth, egg production, and meat quality. Two experiments were conducted: Experiment 1 involved 540-day-old Naked Neck (NN) chickens fed diets with three metabolizable energy (ME) levels (2700, 2900, and 3100 kcal/kg) and three crude protein (CP) levels (18%, 20%, and 22%) in a 3×3 factorial design. Results indicated that a 22% CP diet significantly improved body weight and gain by week 8, albeit with a higher feed conversion ratio (FCR). Lower energy diets increased feed intake, but no significant interaction was observed between energy and protein levels for performance traits. Meat quality parameters (pH, drip loss, and cooking loss) remained unaffected. Lower CP and energy levels enhanced wing muscle and liver proportions. Experiment 2 used 135 non-descriptive Desi (ND) chickens aged 20–55 weeks to test three energy (2500, 2700, and 2900 kcal/kg) and three protein (15.5%, 17.5%, and 19.5%) levels. Egg production peaked with 17.5% CP (57.96% hen-day production), and the

combination of 17.5% CP and 2500 kcal/kg energy yielded the highest egg production (58.72%). These results suggest that a 22% CP diet is optimal for growth in NN chickens, while a 17.5% CP and 2500 kcal/kg energy diet is optimal for egg production in ND chickens. The findings provide science-based feeding strategies to maximize the productivity of improved native poultry breeds in Bangladesh.

Keywords: Native chicken, nutrient requirement, protein level, energy level, feed conversion, egg production, carcass traits.

Conservation and utilization of exotic meat and egg type chicken

This study was conducted to conserve, improve, and utilize four exotic chicken genotypes—White Leghorn (WLH), White Rock (WR), Rhode Island Red (RIR), and Barred Plymouth Rock (BPR)—maintained at the BLRI research farm. The objectives included maintaining genetic purity, enhancing productive performance through selective breeding, and evaluating the suitability of these lines and their crossbreeds with native germplasm for egg and meat production. Parent stocks were reared under standard management in individual open-housed cages, and selective breeding was applied to produce successive generations. Daily records of egg production and feed intake were maintained, with monthly measurements of body weight and egg weight. For the 19th generation, selection was performed at 38 weeks based on a composite selection index incorporating age at first egg, body weight, egg production percentage (168–280 days), and egg weight. The selection index was calculated using the formula: $I = b_1x_1 + b_2x_2 + ... + b~x~$, where x represents trait values and b denotes their respective weights. Among genotypes, RIR exhibited the highest egg production percentage (77.81±2.4%), significantly outperforming WLH (71.17±3.12%), WR (72.82±1.61%), and BPR (64.28±2.7%) (P<0.001). These findings affirm the superior laying performance of RIR and reinforce the importance of continued conservation and selective breeding of exotic germplasm to support sustainable poultry development in Bangladesh.

Socio-Economic Research Division

Socioeconomic analysis of antibiotic use in dairy production in Bangladesh

Bangladeshi dairy farmers use antibiotics for disease treatment, control, and prevention, a global practice. However, the matter of rigorous concern is that farmers do not follow the proper antibiotic guidelines. And even farmers do not maintain a drug withdrawal period. Milk consumption contaminated with antibiotic residues beyond the maximum residue limit causes toxicity to humans and the failure of antibiotic therapy. Considering the above issues, the study investigated the present scenario of antibiotic use in dairy production. This study collected primary data from 192 smallholder commercial dairy farmers nationwide. We also conducted 20 key informant interviews(KII). Results showed that, on average, approximately 12 cattle and seven milking cows per farm were in a maximum herd size of 80 and a minimum of 1 (irrespective of cattle age and sex). In the study areas, around 26% of dairy farms were small in category (having ≤ 5 cattle heads), 55% were medium farms (6 ~15 cattle heads), and 19% were large farms (≥16 cattle heads) this indiates dairy farm category was significantly (p≤0.00) diverse across the areas. Results showed that around 58% of farmers said mastitis outbroken in their farm followed by LSD (55%), milk fever (42%), FMD (41%), metritis (22%), shipping fever (21%), others (anthrax, anaplasmosis, theileriosis, etc.) (13%), and brucellosis (4%) over the last two years. The per-cattle average treatment cost (doctors' consultation fees, medicine costs, and vaccine costs) was around US$ 50, and the antibiotic cost was around US$ 18 per year. The highest antibiotic application was found in the Barishal division (US$20.25/year/cattle), whereas the lowest was in the Dhaka and the Rajshahi divisions (US$ 6.48/year/cattle). From the KII, farmers use antibiotics widely and do not maintain the withdrawal period of antibiotics. We recommend hands-on training and strict application of government policy guidelines regarding the use of animal drugs.

Fig: Data collection from cattle farm

Cost and return analysis of chicken meat & eggs and their market prices in Bangladesh

Chicken meat is an affordable, high-quality protein source critical for household nutrition and food security. This study analyzes the cost and return of broiler, sonali, native chicken, and layer farming. Data were collected from 345 poultry farms (140 broiler, 75 Sonali, 80 native chicken, and 50 layer) and 40 middlemen across eight divisions, alongside 20 Key Informant Interviews and 05 Focus Group Discussions conducted from March to June 2024. Results showed the total costs of raising 1000 broilers for 32.25 days, 1000 sonali for 56.32 days, 10 native chickens for 230 days, and 1000 layers for 715 days were BDT 2,67,370; BDT 2,05,155; BDT 2,022; and BDT 45,93,502, respectively. The net returns were calculated at BDT 27,957 for broiler, BDT 39,602 for sonali, BDT 2,239 for native chicken, and BDT 4,51,269 for layer. The benefit-cost ratio (BCR) was found to be 1.10 for broilers, 1.19 for sonali, 2.11 for native chickens, and 1.10 for layers, which indicated that chicken production was profitable. The per kilogram production cost was found as BDT 158, BDT 239, and BDT 124, whereas the farmgate price was BDT 175, BDT 285, and BDT 485, respectively, for broiler, sonali, and native chicken. The retail prices were BDT 194, BDT 330, and BDT 571, respectively, for broiler, sonali, and native chicken. The per egg production cost was estimated at BDT 9.21, whereas the farmgate price was BDT 10.26 and the retail price was BDT 11.20. Chicken and egg production is a profitable business. However, fluctuations in market price (input & output) threaten the poultry farmers. Strong government monitoring to curb price volatility is crucial.

Fig: Some pictorial views of data collection

Economic loss assessment of lumpy skin disease outbreak in cattle of Bangladesh

Lumpy skin disease (LSD) represents a significant economic threat to cattle in Bangladesh. For this, the present investigation evaluated the financial impacts linked to LSD outbreaks across eight divisions, emphasizing both direct and indirect expenses. Data collection involved 430 farmers and encompassed 2,541 cattle, which were subsequently analyzed through epidemiological and economic models. Crossbred cattle represented 73.4% of the sample and exhibited higher morbidity rates at 32%, along with greater milk loss amounting to BDT 2,754 per cattle. In contrast, native breeds had a morbidity rate of 25.5% and a milk loss of BDT 1,870. The overall mortality rates stood at 4.96%, with native breeds showing a marginally elevated rate of 5.78% compared to crossbred cattle, which had a rate of 4.66%. The total direct economic losses per cattle amounted to BDT 12,020 for crossbred cattle and BDT 8,892 for native cattle, encompassing milk production and weight loss. The average indirect costs, including isolation and extra management, were BDT 2,204 for crossbred cattle and BDT 507 for native breeds. The overall economic loss was assessed at BDT 8,203.22 crore on a national scale, with local cattle accounting for 76% of the losses attributed to their population size. Farmers encountered significant obstacles such as diminished productivity, rising veterinary expenses, and heightened emotional strain. The findings emphasize the unequal economic strain on crossbred cattle and reveal regional variations in the effects of disease. The investigation highlights the necessity for improved veterinary services, education for farmers, and biosecurity protocols to alleviate the economic and psychological impacts of LSD. Focused strategies can enhance cattle well-being, protect economic stability, and strengthen the robustness of the livestock industry in Bangladesh.

Fig: LSD affected calf (Left side) & data collection from affected farm (Right side)

Farming System Research Division

Establishment of "BLRI technology village" at BLRI regional station

The Technology-based Model Village idea was implemented to disseminate BLRI developed livestock-based technologies and services to the farmer's doorsteps; to identify the region-based problems and level of technology adoption at farm communities. A community approach livestock disease control model was utilized and awareness rallies were organized (two times a year). A total of 4512 cattle and buffalo, 3344 goats and sheep were vaccinated and deworming was performed before vaccination, whereas a total of 12500 chickens and 1016 ducks were also vaccinated against ND and DP. Results from the Sero-monitoring of PPR of the competitive ELISA found that before vaccination, the overall prevalence of PPRV-specific antibodies in goat was 69.56%. Twenty-one days post-vaccination, 100% of the goats were seropositive, indicating a successful immunological response and protective antibody levels. Following two rounds of vaccination against ND, the presence of positive antibodies was observed at 84.0% and 93.7% of chickens in Dhamrai, 80% and 100% in Rajshahi technology village. Moreover, naked neck and common deshi chickens (640-female and 160-male) were distributed among 40 farmers across four technology villages, whereas pure hilly chickens (male-40, female-170) were specifically distributed in the Naikhongchhari (10 farmers). Native chickens in Jashore showed the earlier age at first laying (22.89±0.42weeks), while the average age at first laying was maximum (26.50±0.21weeks) in Faridpur. However, the average Hen-day egg production upto 40weeks (56.36%) was maximum in Rajshahi and minimum in Jashore (42.25%). Results revealed from the fattening program that the average daily gain was 751.85±43.92gm in the UMS group, 951.85±38.43gm in the silage group, and 879.63±68.93gm in the TMR group, with corresponding control gains of 500.00±24.25gm, 605±38.89gm, and 714.81±25.92gm for Desi, Friesian cross and Sahiwal crossbred cattle, respectively. Therefore, the implemented technologies have had a positive impact on the community farmers, which will likely encourage others to adopt them as well.

Fig: Pictorial view of BLRI Technology Village

Fig: Pictorial views of community approach diseases control model, technology demonstration and research input distribution

Reinforcement of regional livestock research at Naikhongchhari

This research aimed to conserve and improve livestock, poultry and fodder germplasm suitable for hilly regions; to promote the various High Yielding Fodders (HYFs) and to develop livestock and poultry production, rearing and disease control packages. A total of 42 does and 7 bucks of Hilly Brown Bengal (HBB) goat were utilized in the selective breeding program whereas 06 months body weight and average daily gain up to 06 months of first generation (G1) males and females were found to 8.90±0.84kg, 7.80±0.43kg, 40.25±4.62gm, 37.68±3.95gm. The age at first heat and conception rate of HBB does (G1) were 330days and 87%. The average egg weight, hatchability and fertility rate of Hilly chickens at first generation (G1) were 45.7gm, 75% and 74.1%, respectively. The average body weight of male and female Hilly chickens (G2) at 14 weeks was 1590.87gm and 1325.6gm. Results revealed from the field survey that 60% of farmers used Black Bengal buck and only 30% of farmers had the facility to breed their does from the research farm and 82.35% of Sheep farmers followed the natural mating by the ram of their household. The Benefit-Cost Ratio of Goat and Sheep farmers were 1.82 and 1.14. A total of 14700sq ft. land (12 plots) was cultivated for inter-cropping pattern-based fodder production in the hill slopes including- 54 Mango, 54 Moringa, 968 Napier (Rokona), 1600 cuttings of Splendida and Guinea grass. Therefore, a minimum cost of BDT. 3950 was needed for practicing three times of treatment protocol to control ticks up to 120.56 days which was cost-effective than the usual practice of dipping (BDT. 9000). Therefore, it can be concluded that Hilly chicken, Goat and Sheep farming as well as the High Yielding Fodders (HYFs) production could be enhanced at the community level through utilizing these promising livestock and fodder germplasms.

Fig: Research Activities

Fig: Pictorial views of HBB Goat, Hilly chicken, field survey, HYFVs and inter-cropping pattern-based fodder plot and Tick sample collection at the Naikhongchhari, Bandarban

Identification of the research gap of native duck in some selected areas of Bangladesh

This research was carried out to identify the research gap of native ducks in selected areas of Bangladesh; to evaluate the current scenario of native ducks and to formulate a feasibility study report for inclusion in the prepared development project proposal. A total of 180 data were collected from 6 selected districts of the Coastal and Haor areas through a baseline survey. About 56.67% of Native duck-rearing farmers in Haor and 37.78% in coastal areas were engaged in agriculture and their rearing experience varied from 11 to 12 years. Approximately, 68.89% and 31.11% of farmers reared Native and Khaki Campbell ducks in Haor, 37.78% and 41.11% of farmers reared Native and Khaki Campbell along with Jinding ducks in the Haor area. Scavenging was the common rearing system in coastal areas 81.11% of which was practiced by 41.11% of farmers in Haor areas. The age of 1st laying of khaki Campbell, Native, and Jinding ducks was 170.36±1.98, 176.75±2.53 and 175.77±2.64days, respectively in Haor areas. In the coastal area, the observed age at 1st laying was 173.92±2.14days in khaki Campbell and 161.70±2.43days in Native ducks. The average egg production/year of Khaki Campbell was 211, Native ducks 205 and Jinding 238nos. in Haor areas whereas Khaki Campbell and Native ducks laid 206 and 185nos. eggs in coastal areas. Duck plague was the most prevalent disease in Haor (83.33%) and Coastal farms (90.00%). Vaccination was practiced by 60.00% and 40.00% of farmers in Haor and coastal areas. Women of coastal areas were mainly involved in duck rearing at 76.67% and the Benefit-Cost-Ratio of duck farmers was 2.24 in Haor areas was higher than 1.33 in coastal areas. In conclusion, although some constraints and knowledge gaps among the farmers there is a lot of scope and prospects in Duck rearing in the Haor and coastal areas.

Fig: Pictorial Views of Survey and KIIs in Different Locations

Fig: Pictorial views of farming scenario and egg Production of duck in different locations

Other activities (Collaborative works) in the fiscal year (2023-2024)

In FY 2023-24, the Farming System Research Division (FSRD) conducted some collaborative research and activities with the Association of Land Reform and Development (ALRD) and Multiple health Pharma Ltd. In the initial phase, the FSRD organized a three-day training program for 25 representatives from ALRD for the development of Local Service Provider (LSP). Then refresher three-day training was provided to an equal no. of representatives (25) from that organization. All these LSPs are working at the field level in 11 districts of the country with popular technologies developed by BLRI. Additionally, research work was also conducted with Multiple Health at Kamalapur Technology Village, Godagari, Rajshahi and Shorifbag Dhamrai, Dhaka to determine the efficacy of Virus Zero solution in LSD, FMD and Mastitis infected cattle which showed an excellent result with healing and recovery of infected cattle from LSD within 5-10 days and 15 days was required for recovering from FMD was the quicker and easiest way of administration in virus zero solution.

Fig: Meeting with the honorable Director General of BLRI and training program with the representatives from ALRD

Fig: Virus zero solution, efficacy evaluation of virus zero in FMD and LSD-infected cattle

Training, Planning and Technology Testing Division

Rearing prospects, potentiality and dissemination of BLRI improved indigenous chicken at North-Bengal areas

The poultry sector is one of the promising sectors in Bangladesh which provides animal protein for human consumption that generates income and contributes to the gross domestic product. Backyard poultry can be a major source of cash income of the rural households by selling eggs and birds. However, there is a great considerable scope for improving the production performance of back yard poultry with low-cost intervention and practicing improving management tools. Thus, the present study was undertaken to overlook the current status of the indigenous chicken production in the three villages of Saidpur upazila, Nilphamari under northern part of Bangladesh. A total of 150 farmers were interviewed directly from kamarpukur and Badairpara, Saidpur; and Paglarpir, Rangpur to know the farmers socio-economic condition, and overall production and husbandry practices regarding indigenous poultry farming and assess future outlook. A pretested, structured questionnaire was used to collect data. Collected data were inserted into the MS Excel software, organized and analyzed for mean, standard deviation, range etc. A total of 1281 indigenous non-descript deshi chicken are found of which (cock 8.11%), laying hen (22.71%), broody hen (10.22%), cockerel (9.91%), pullet (11.39%) and chick (37.62%). Average chicken flock size (10.01±1.47) and the percentage of chick (8.30±7.71) number was 37.62% and 22.71% laying hen (2.70±1.69) followed by 11.39% pullet (3.15±3.20). The average egg production of indigenous chicken identified (17.85±0.91) and annual clutch number also found in chicken (2.80± 0.64). The hatchability percentage of indigenous chicken is (70.5±1.76).The interviewed farmers were mostly illiterate (44%). Poultry species usually kept inside the living room in coop (38.66%) while very limited was found outside the dwelling (18%). Natural and uncontrolled breeding observed for all poultry species in the surveyed area. Newcastle (58%) and fowl pox (44%) diseases identified dominantly in chicken population. Limited vaccination practice recorded in surveyed area for poultry (3.33%). The rearing system of chicken including feeding, housing, breeding, prevention and control are not satisfactory at the study area but, this traditional animal husbandry practices could be switched to modern affordable techniques through training on specific technology. By implementing the modern husbandry practices we can ensure better contribution to poultry sector of Bangladesh.

Assessment of the impact of dairy cattle rearing and management training on livelihoods and productivity in rural Bangladesh

The present study aimed to assess the impact of training on the livelihood and livestock management practices of small and medium-scale dairy farmers in Bangladesh. A total of 160 farmers were randomly selected from four Upazilas—Jashore Sadar (Jashore), Vanga (Faridpur), Baghabari (Sirajganj), and Godagari (Rajshahi). Among them, 120 farmers received a three-day specialized training on "Dairy Cattle Rearing and Management," while 40 farmers served as a control group without any such intervention. Data were collected using a pre-tested questionnaire before and after the training, and analyzed using paired sample t-tests with SPSS 25.0. Demographic data indicated that 54.4% of respondents were female, with an average age of 39.01 years, 6.12 years of formal education, and an average household size of 5.38 members. Farming was the primary occupation for 70.6% of the participants. Following the training, technology adoption among farmers increased significantly from 34.4% to 60.6%. Fodder cultivation showed a significant improvement ($p<0.05$) in Godagari and Vanga Upazilas among trained farmers, although no significant changes were observed in the other regions. Cattle holdings did not significantly differ between trained and non-trained groups. However, sheep and goat holdings increased significantly ($p<0.001$) among trained farmers in Baghabari and Jashore Sadar, and among non-trained farmers in Godagari, Jashore Sadar, and Vanga. Notably, total income from livestock increased by 102.67%, with the highest gain in Jashore Sadar (153.95%) and the lowest in Baghabari (30.75%). Income from milk sales rose by 67.88%, and income from beef fattening increased by 56.24%, with Vanga showing the most significant improvement (98.23%). Additionally, the Benefit-Cost Ratio (BCR) improved by up to 62.72%, notably highest in Godagari (108.48%). These findings underscore the efficacy of targeted training in enhancing livestock productivity and farmers' livelihoods.

1. Short term training programs

Short term training programs have been arranging for farmers/entrepreneurs on technologies and techniques developed by BLRI and for scientists/officers/staff on skill development. During the last financial year (2023-24) this division arranged 08 short courses for farmers and entrepreneurs and 16 courses for scientists/officers/staff of BLRI on different categories. Total participants were 946 numbers (Male-640 and Female-306).

1.1 Short term (Farmers) training programs for the year 2023-24

During the financial year 2023-24, this division provided training to a total of 350 farmers and entrepreneurs (196 males and 154 females) across 8 different courses (Table 1).

Table 1: Short term (Farmers) training programs of BLRI for the financial year 2023-24

SL No.	Name of the Training	Duration (Days)	Budget (TK)	No. of Participants		Total Participants	Location
				Male	Female		
01.	Training on "Dairy cattle nutrition and high yielding grass cultivation technology and management" developed by BLRI	11-13 Feb. 2024	2,54,838/-	42	08	50	BLRI, Savar, Dhaka
02.	Training on "Dairy cattle nutrition and high yielding grass cultivation technology and management" developed by BLRI	18-20 Feb. 2024	2,44,220/-	10	30	40	BLRIRS, Baghabari, Sirajganj
03.	Training on "Goat and sheep rearing and management through BLRI developed technologies"	02-04 Mar. 2024	2,67,150/-	16	24	40	BLRIRS, Godagari, Rajshahi
04.	Training on "Dairy cattle rearing and management through BLRI developed modern technologies"	05-07 Mar. 2024	2,34,635/-	38	12	50	BLRI, Savar, Dhaka
05.	Training on "Goat and Sheep rearing and management through intensive and semi-intensive systems" developed by BLRI.	10-12 Mar. 2024	2,36,345/-	35	15	50	BLRI, Savar, Dhaka
06.	Training on "Dairy cattle rearing and advanced grass cultivation techniques developed by BLRI"	20-22 Apr. 2024	2,46,542/-	21	19	40	BLRIRS, Vanga, Faridpur
07.	Training on "Dairy cattle nutrition and advanced grass cultivation techniques" developed by BLRI	23-25 Apr. 2024	2,54,852/-	18	22	40	BLRIRS, Jashore
SL No.	Name of the Training	Duration (Days)	Budget (TK)	Male	Female	Total Participants	Location
08.	Training on "Cattle fattening and improved grass cultivation technology" developed by BLRI	06-08 June 2024	2,70,798/-	16	24	40	BLRIRS, Bandarban
Total				**196**	**154**	**350**	

1.2 Short term (Officer's and Stuff) training programs for the year 2023-24

During the financial year 2023-24, this division provided training to a total of 596 officers and stuffs (444 males and 152 females) across 16 different courses on skill development (Table 2).

Table 2: Short term (Officer's and Stuff) training programs of BLRI for the financial year 2023-24

SL No.	Name of the Training	Duration (Days)	Budget (TK)	No. of Participants		Total Participants	Location
				Male	Female		
1.	Day long training on "PL-A/C (Personal Ledger) to manage accounts properly"	19/08/2023	70,180/-	39	12	51	BLRI, Savar, Dhaka
2.	Training on "Capacity building on implementing sanitation strategies".	05/09/2023	1,02,100/-	44	6	50	BLRI, Savar, Dhaka
3.	Training on "Right to Information Act, Rules, Regulations, Self-proclaimed Information Disclosure Guidelines and Related Matters".	11/09/2023	94,500/-	21	09	30	BLRI, Savar, Dhaka
4.	Training on "Grievance Redressal Mechanism and GRS Software Issues"	25/09/2023	94,500/-	19	11	30	BLRI, Savar, Dhaka
5.	Training on "Capacity building on implementing sanitation strategies"	03/10/2023	1,30,100/-	31	19	50	BLRI, Savar, Dhaka
6.	Training on "Good farm management and record keeping in animal and poultry research farms".	20-21 Nov. 2023	1,87,400/-	37	03	40	BLRI, Savar, Dhaka
7.	Training on "Basic Laboratory operation, Instrument Handling, Sample preparation and analysis"	09-11 Jan. 2024	1,98,050/-	26	4	30	BLRI, Savar, Dhaka
8.	Training on "Grievance Redress System (GRS) Software Issues"	04/03/2024	1,06,895/-	23	7	30	BLRI, Savar, Dhaka

SL No.	Name of the Training	Duration (Days)	Budget (TK)	No. of Participants		Total Participants	Location
				Male	Female		
9.	Training on "Responsibilities and duties of government officials and employees in filing Annual Confidential Report (ACR)"	27/01/2024	1,22,175/-	24	06	30	BLRI, Savar, Dhaka
10.	Training on "(Citizen Charter)	05/03/2024	1,06,350/-	19	11	30	BLRI, Savar, Dhaka
11.	Training on "Right to Information Act, Rules, Regulations, Self-proclaimed Information Disclosure Guidelines and Related Matters".	06/03/2024	1,05,790/-	23	7	30	BLRI, Savar, Dhaka
12.	Training on "Digital Nothi (D-Nothi) management"	24/03/2024	1,94,615/-	61	21	82	BLRI, Savar, Dhaka
13.	Training on "Advanced lab protocol, sample preparation, instrument handling, analysis, result preparation, safety and hygiene"	01-03 Apr. 2024	3,08,806/-	27	13	40	BLRI, Savar, Dhaka
14.	Preparation and submission of APA reports in APAMS software	18/05/2024	66,490/-	9	4	13	BLRI, Savar, Dhaka
15.	Training on "Experimental design and data analysis"	19-20 May 2024	1,89,200/-	21	9	30	BLRI, Savar, Dhaka
16.	Training on "Research Methodology"	26-30 May 2024	4,39,759/-	20	10	30	BLRI, Savar, Dhaka
Total				**444**	**152**	**596**	

2.1 Long term training programs

Different PhD (Foreign and In-Country) programs are included in long term training programs. During the financial year 2023-24 a total of 02 (Two) scientists of BLRI have started their PhD programs and 01 (One) scientist has completed his PhD program.

2.2 Long term training programs for the year 2023-24

During the financial year 2023-24, 2 (Two) scientists of BLRI have started their PhD and 1 (One) scientist has completed his PhD degree from University of Reading, United Kingdom (Table 3).

Table 3: Information about long term training programs (Foreign and Local) of BLRI for the financial year 2023-24

SL No.	Name and Designation	Title of the Training	University and Country	Duration	Remarks
01.	Dr. Md. Nuruzzaman Munshi Senior Scientific Officer	"The relationship between dietary iron and zinc, and the gut microbiota: Can dietary iron and zinc regime be exploited to improve health"	University of Reading, United Kingdom	28/11/2018 - 27/08/2023	Completed
02.	Shahrina Akter Scientific Officer	Identification of novel factor for improving bovine in-vitro oocyte maturation rate	Hiroshima University, Japan	04/10/2023 - 03/10/2026	On-going
03.	Dr: Md. Zakir Hassan Senior Scientific Officer	Selection of potential probiotics strain and its effect to inhibit the adhesion of multidrug resistance bacteria	Ural Federal University, Russia	08/02/2024 - 07/02/2027	On-going

3. Foreign training programs

During the year 2023-24, 6 (Six) scientists of BLRI have attended 5 different training/meeting/events.

3.1 Foreign training programs for the year 2023-24

During the financial year 2023-2024, 05 (Five) scientists of BLRI participated in 05 (Five) different foreign training, meeting and events (Table 4).

Table 4: Foreign Training Programs for the fiscal year 2023-24

SL No.	Name of the Participants	Type of Program	Title of the Training Programs	Location	Duration
01.	Dr. Nasrin Sultana Director (Research) (R. C.) BLRI, Savar, Dhaka	Event	"6th International Rice Congress"	Philippine International Convention, Manila, Philippine	15-20 Oct. 2023
02.	Dr. Mohammed Abdus Samad, PSO & Head BLRI, Savar, Dhaka	Meeting	"Final Hub Meeting"	Jaypee Vasant Continental Hotel, Vasant Vihar, New Delhi 110057	06-09 Feb. 2024
03.	Dr. Sardar Muhammad Amanullah, PSO BLRI, Savar, Dhaka	Meeting	"ACASA Livestock Risk and Adaptation"	Delhi, India	21-23 May 2024

SL No.	Name of the Participants	Type of Program	Title of the Training Programs	Location	Duration
04.	Dr. Sardar Muhammad Amanullah, PSO BLRI, Savar, Dhaka	Training	"Human Centered Design for Agricultural Climate Services"	Hanoi, Vietnam	28 May 2024 to 01 June 2024
05.	Dr. Md. Zillur Rahman PSO and Head BLRI, Savar, Dhaka	Event	PSI (Pre-Shipment Inspection)	Singapore Science Park 1, Singapore 118264	25-29 June 2024
06.	Dr. Md. Sazedul Karim Sarker PSO and Head (R.C.) BLRI, savar, Dhaka	Event	PSI (Pre-Shipment Inspection)	Singapore Science Park 1, Singapore 118264	25-29 June 2024

4. Career development programs/courses

Scientists, officer and staffs of BLRI participate in different career developed courses arranged by different research organization, council, national and international organizations etc.

4.1 Career development programs/courses for the year 2023-24

During the financial year 2023-2024, a total 161 scientists, officers and stuffs attended in almost 78 different types of career development courses (Table 5).

Table 5: Career development programs/courses for the fiscal year 2023-24

Sl. No.	Name of Participant & Designation	Title of the Programs/Courses	Date/Duration	Venue
01.	1. Dr. Mohammed Abdus Samad, PSO and Head 2. Mst. Mahfuja Khatun, STO	Regional training on "Next Generation Sequencing (NGS) using Illumina Platform	10-14/09/2023	Embassy & Permanent Mission of the People's Republic of Bangladesh
02.	Dr. Sardar Muhammad Amanullah, PSO and Head	"Training on Building Capacity for loss and Damage Assessment"	14-15/06/2023	Department of Environment
03.	Md. Ashadul Alam, SSO	Training on "Climate Change, Carbon Sequestration and Adaptation Strategies"	18-20/06/2023	BARC

Sl. No.	Name of Participant & Designation	Title of the Programs/Courses	Date/Duration	Venue
04.	1. Md. Shamim Hasan , SO 2. Md. Hossen Ali, SO 3. DR. Md. Ashraful Islam, SO 4. Md Tarequl Islam, SO 5. Mohammad Nizamul Hoque Touhid, SO 6. Sharmin Sultana, SO	"Training on questionnaire setting into KoBo collect"	15/06/2023	BLRI
05.	1. Md. Redoan Akond Sumon SSO and Station Incharge 2. Dr: Sonia Akther, SSO 3. Md. Shamim Hasan, SO 4. Shahrina Akter, SO 5. Md. Tasmirul Islam, SO 6. Manik Miah, SO 7. Md. Mostain Billah, SO 8. DR. Syidul Islam, SO 9. Anowar Hosen, SO 10. Eshtiak Ahamed Pehan, SO 11. Md. Razibul Hassan, SO 12. Md Tarequl Islam, SO 13. Sharmin Sultana, SO 14. Ahnaf Anjum Dara, SO 15. Md. Rasel Miah, SO	Training on "Improved Fodder/Forage Quality through Regenerative Forage Management and Targeted Research for Bangladesh"	24-27 July 2023	BLRI
06.	Dr. Md. Rezaul Karim, SSO	Training on "Risk analysis for foodborne antimicrobial resistance (AMR)"	18-20/07/2023	Department of Livestock Services (DLS)
07.	Dr. Razia Khatun, PSO and Head	Workshop on Women & child Right	22/08/2023	Regional Public Administration Training Center (RPATC), Dhaka
08.	Dr. Md. Rakibul Hassan PSO and Head	Workshop on Localization of Sustainable Development Goals (SDGs)	25/10/2023	RPATC, Dhaka
09.	Dr. Md. Rakibul Hassan PSO and Head	Workshop on perspective plan 2021-2041	11/11/2023	RPATC, Dhaka
10.	Dr. Md. Masud Rana, SSO	Workshop on National Integrity Strategy (NIS)	05/09/2023	RPATC, Dhaka
11.	Dr. Md. Humayun Kabir, SSO	Financial Management Course	10-20/09/2023	RPATC, Dhaka
12.	Md. Razibul Hassan, SO	Conduct & Discipline Course	03-07/12/2023	RPATC, Dhaka

Sl. No.	Name of Participant & Designation	Title of the Programs/Courses	Date/Duration	Venue
13.	Md. Farid Miah, PO	Workshop on Public Procurement Emphasizing on e-GP	22/11/2023	RPATC, Dhaka
14.	Md. Ahsan Habib Security Officer	Fundamental Training Course	05-30/11/2023	RPATC, Dhaka
15.	Md. Eaqub Ali Sub Asst. Engineer (Civil)	Fundamental Training Course	06-31/08/2023	RPATC, Dhaka
16.	Md. Imran Hossain Photographer	Financial Management Course	15-26/08/2023	RPATC, Dhaka
17.	Md. Sabbir Hossein Cashier	Fundamental Training Course	27/08/2023 to 14/09/2023	RPATC, Dhaka
18.	Md. Robiul Akon Projector Operator	Office management and ICT Course	03-14/09/2023	RPATC, Dhaka
19.	Md. Abu Hayat Mostofa Kamal Lab-Attendant	Fundamental Training Course	01-12/10/2023	RPATC, Dhaka
20.	Md. Liton Ali Computer Operator-Typist	Fundamental Training Course	22/10/2023 to 09/11/2023	RPATC, Dhaka
21.	AKM Rezaul Islam Junior Field Assistant	Financial Management Course	19-30/11/2023	RPATC, Dhaka
22.	Abu Hassan Office Assistant	Fundamental Training Course	10-21/12/2023	RPATC, Dhaka
23.	Eshtiak Ahamed Pehan, SO	Training on "Advanced Remote Sensing and GIS"	30/07/2023-01/08//2023	Jahangirnagar University
24.	1. Dr. Md. Masud Rana, SSO 2. Devjyoti Ghosh, IO	Training on "Online Report Management System (RMS)"	1 Day	MOFL, ICT
25.	1. Dr. Md. Rezaul Karim, SSO 2. Dr: Md. Zulfekar Ali, SSO 3. DR. Md. Mizanur Rahman Manu, SO 4. Dr: Md. Mizanur Rahman Khan, SO 5. DR. Aminul Islam, SO	"Training on Avian Influenza Gene Sequencing and analysis"	05-10/08/2023	BLRI
26.	Md. Al-Mamun Librarian and Assistant Director (Administration) (A.C.)	Training on "E-book preparation training"	1 Day	Online

Sl. No.	Name of Participant & Designation	Title of the Programs/Courses	Date/Duration	Venue
27.	1. Dr. Md. Sazedul Karim Sarker, PSO and Head 2. Dr. Gautam Kumar Deb PSO and Head 4. Dr. Mohammed Abdus Samad, PSO and Head 5. Selina khatun, Accountant 6. Mojahidul islam, Accountant 7. Md. Fysal Alom Outcrossing Worker	Training on "Development Budget Implementation Module" for FY 2023-2024 in BACS & IBAS++"	13/09/2024	Institute of Public Finance Bangladesh
28.	1. Dr. Md. Shahin Alam, SSO 2. Shahanaj Ferdousi Shejuty, SO	"Regional Training Course on Next Generation Sequencing (NGS) using Illumina Platform"	10-14/09/2023	BLRI
29.	Eshtiak Ahamed Pehan, SO	"Hands-on Training on Bangladesh Climate Change MRV System for Agriculture Sector"	25/10/2023	Department of Environment
30.	1. Engr. Mohammad Lutful Haque, System Analyst 2. Dr. Md. Masud Rana, SSO 3. Devjyoti Ghosh, IO	Training on e-Governance and Innovation Module of Good Governance Program Management System	1 Day	Ministry of Fisheries and Livestock
31.	1. Engr. Mohammad Lutful Haque, System Analyst 2. Farzana Yasmin, SO	Training on "How to Use AMS Software" and Online Report Management System (RMS).	1 Day	Ministry of Fisheries and Livestock
32.	1. Md. Enamul Haque Khandaker, Accounts Officer 2. Sabbir Hosen, Cashier	Training on "Data entry in budgeting module of iBAS++"	31/12/2023	Ministry of Fisheries and Livestock
33.	Dr. Md. Rakibul Hassan PSO and Head	Workshop on Delta plan 2100	23/01/2024	RPATC, Dhaka
34.	Dr. Md. Masud Rana, SSO	Workshop on Annual Performance Agreement (APA)	14/02/2024	RPATC, Dhaka
35.	Mst. Mahfuja Khatun, STO	Workshop on Smart Bangladesh Fundamental Training Course	20/03/2024	Regional Public Administration Training Center (RPATC), Dhaka
36.	Farzan Yasmin, SO	Mordern Office Management Course	12-23/05/2024	Regional Public Administration Training Center (RPATC), Dhaka
37.	Sonia Sultana, SO	Workshop on Food Security and food Safety	14/05/2024	Regional Public Administration Training Center (RPATC), Dhaka

Sl. No.	Name of Participant & Designation	Title of the Programs/Courses	Date/Duration	Venue
38.	Iqbal Hossain Sub-Assistant Engineer (Civil)	Fundamental Training Course	04-29/02/2024	
39.	Junnurain Asst. Maintenance Officer	ICT & e-Governance Management Course	21/04/2024-02/05/2024	
40.	Md. Shahidur Rahman Junior Field Assistant	Conduct and Discipline Course	11-15/02/2024	
41.	Abu Hayat Mostofa Kamal Lab Attendance	Fundamental Training Course	25/02/2024-07/03/2024	
42.	Rakibul Islam Graphics Designer	Information and Communication Technology Course	03-14/03/2024	
43.	Md. Razibul Hassan, SO	Language Learning Course	10-21/03/2024	
44.	Md. Mominul Islam Junior Field Assistant	Fundamental Training Course	10-28/03/2024	
45.	Rushan Manzur Assistant Engineer (Civil)	Workshop on Digital Land Management	17/04/2024	
46.	Md. Mamun Ahmmed Ast. Accountant	Language Learning Course Information and Communication Technology (ICT) Course	21/04/2024-02/05/2024	
47.	Mohammad Abdul Jalil Office Assistant cum. Computer Operator	Information Communication Technology (ICT) Course	28/04/2024-09/05/2024	
48.	Md. Sanowar Hossein Junior Training Assistant	Fundamental Training Course	05-16/05/2024	
49.	Md. Ahsan Habib Security Officer	Office Management and ICT Course	19-30/05/2024	
50.	Md, Mostafizar Rahman Field Assistant	Fundamental Training Course	26/05/2024-13/06/2024	
51.	Imam Hoshain Aupo Assistant Accountant	Digital Nothi Management Course	02-06/06/2024	
52.	Md. Rabiul Akon Projector Operator	Digital Nothi Management Course	02-06/06/2024	RPATC, Dhaka
53	Dr. Md. Rakibul Hassan PSO and Head	Workshop on Development of Leadership	1 Day	RPATC, Dhaka
54.	1. Engr. Mohammad Lutful Haque, System Analyst 2. Dr. Md. Masud Rana, SSO	Training on Shuddhachar Action Plan and NIS Online System Software	18/01/2024	Cabinet Division
55.	1. Md. Shamim Hasan, SO 2. Ayesha Shiddika Afsana, SO 3. Md. Razibul Hassan, SO 4. Md. Bakhtiar Kakee, SO	Training on use and implementation of D-Nothi	22-23/01/2024	ICT Tower Agargaon, Sher-e-Bangla Nagar, Dhaka

Sl. No.	Name of Participant & Designation	Title of the Programs/Courses	Date/Duration	Venue
56.	Dr. Md. Masud Rana, SSO	Training on "Technical Report Writing and Editing (26th batch)"	30/01/2024-01/02/2024	BARC
57.	1.Dr: Md. Nuruzzaman Munsi PSO & Head	Training on "Project Development and Management"	04-08/02/2024	BARC
58.	1. Dr. Md. Masud Rana, SSO 2. Farzana Yasmin, SO 3. Devjyoti Ghosh, SO 4. Md. Al-Mamun, Librarian	Refreshers Training on APAMS Software	1 Day	Ministry of Fisheries and Livestock
59.	1. Md. Ashadul Alam, SSO 2. Md. Yousuf Ali, SSO 3. Muhammad Khairul Bashar, SSO 4. Dr. Md. Abu Yousuf, SSO 5. Jobaida Shovna Khanom, SSO 6. Sonia Sultana, SO	Training on "Quality and safety in Livestock source food (milk, meat and egg) production and value adding to facilitate export"	30/01/2023-01/02/2024	BARC
60.	1. Dr. Md. Shahin Alam, SSO 2. Dr. Md. Panir Choudhury, SSO	Training on "Advanced Training on Bioinformatics for Sustainable Development in Agriculture"	11-15/03/2024	BARC
61.	1. Sadia Binte Sadrul, SO 2. Mohammad Nizamul Hoque Touhid, SO 3. Rumana Khatun, SO	Training on "Application of Econometric Model in Socioeconomic Research"	03-07/03/2024	BARC
62.	1. Dr. Halima Khatu, SSO 2. Muhammad Khairul Bashar, SSO	Trainer-Training on Food Based Nutrition (Fali Nutrition)	24-25/02/2024	BIRTAN
63.	1.Md. Redoan Akond Sumon SSO and Station In-Charge 2.Engr. Md. Ashraful Islam Executive Engineer 3. DR. Ovirup Bhushan Paul, SO 4. Md. Enamul Haque Khandaker, AO 5. Md. Farid Miah, PO	Training on use "Audit Management and Monitoring System 2.0 (AMMS 2.0)"	05/03/2024	Online
64.	1. Engr. Mohammad Lutful Haque, System Analyst 2. Engr. Md. Ashraful Islam Executive Engineer	Training on "Cyber security"	1 Day	Information and Communication Technology Division
65.	1. Dr. Md. Masud Rana, SSO 2. Md. Hossen Ali, SO	Trainer-Training on Food Based Nutrition (Fali Nutrition)	31-04/04/2024	BADC, Dhaka

Sl. No.	Name of Participant & Designation	Title of the Programs/Courses	Date/Duration	Venue
66.	1. Md. Yousuf Ali, SSO 2. Dr. Md. Rezaul Karim, SSO 3. Dr. Md. Panir Choudhury, SSO 4. Farzana Yasmin, SO 5. Ayesha Shiddika Afsana, SO 6. Md. Hossen Ali, SO 7. Md. Rasel Miah, SO 8. Sharmin Sultana	Training on "The fourth Industrial Revolution and Potential Application in Livestock Sector"	28-30/04/2024	BARC
67.	DR. Shahana Nazneen, SO	Training on "Communication Skill Development for Professionals" (1st Batch)	12-14/05/2024	BARC
68.	Muhammad Khairul Bashar, SSO	Training on "Climate Change, Carbon Sequestration and Adaptation Strategies"	14-16/05/2024	BARC
69.	Dr. Md. Panir Choudhury, SSO	"Conservation and Management of Plant Genetic Resources"	09-11/06/2024	BARC
70.	1.Dr. Md. Saiful Islam, SSO 2.Mst. Mahfuja Khatun, STO 3.Dr. Md. Hafizur Rahman, SSO 4. Sadia Binte Sadrul, SO 5. Mohammad Nizamul Hoque Touhid, SO 6. Rumana Khatun, SO	Training on "Forecasting Methods for Agricultural Data Analysis"	09-13/06/2024	BARC
71.	Dr. Md. Masud Rana, SSO	Training on "Project Development and Management"	19-23/05/2024	BARC
72.	1. Dr. Md. Panir Choudhury, SSO 2. Dr. Md. Amirul Hasan, SSO 3. Shahanaj Ferdousi Shejuty, SO	Training on "Genome Editing for Sustainable Development in Agriculture"	19-21/05/2024	BARC
73.	Md. Zahidul Islam, PO	Training on "Compiling and Editing Techniques for Professional Publishing"	02-06/06/2024	BARC
74.	1.Engr. Md. Ashraful Islam Executive Engineer 2.Md. Farid Miah, PO 3.Md. Shagor Hossain Asst. Accountant 4.Md. Sabbir Hossein, Cashier	Training on Use "Audit Management Monitoring System 2.0 (AMMS 2.0)"	03/05/2024	Online

Sl. No.	Name of Participant & Designation	Title of the Programs/Courses	Date/Duration	Venue
75.	1.Dr. Shamim Ahmed, SSO 2.Md. Tasmirul Islam, PSO	Training Programme on "Fertilizer Recommendation Guide-2024"	01-03/06/2024 to 09-11/06/2024	BARC
76.	Devjyoti Ghosh, IO	Training on "Right to Information Act, 2009"	10/06/2024	Information Commission
77.	1.Md. Mahmudul Hasan Pasha, SO 2.DR. Md. Ashraful Islam, SO 3. Khadiza-Tut-Tahira, SO 4. Md. Tasmirul Islam, SO 5. Md. Rasel Miah, SO 6. Md. Nazmul Huda, SO 7. Md: Raziul Islam, SO	Training on "Good Livestock Husbandry Practices in Bangladesh"	24-26/06/2024	SAARC Agriculture Centre
78.	Md. Mostain Billah, SO	"Training Programme on Use of Fertilizer Recommendation Guide-2024"	24-26/2024	BARC

5. Internship programs

During the financial year 2023-24, a total of 384 students from 5 renowned universities of Bangladesh have completed their internship at BLRI under the supervision and guidance of this division (Table 6).

SL. No.	Name of University/Institute	Date	No. of Participants
01.	Bangabandhu Sheikh Mujibur Rahman Agricultural University Faculty of Agricultural Economics & Rural Development	13/10/2023 to 01/02/24	12
02.	Gono Bishwabidyalay, Savar, Dhaka Faculty of Veterinary and Animal Sciences (6th Bach)	17/09/2023 to 05/10/2023	35
03.	Sylhet Agricultural University Faculty of Veterinary, Animal and Biomedical Sciences	01/10/2023 to 15/11/2023	95
04.	Hajee Mohammad Danesh Science and Technology University Faculty of Veterinary and Animal Science	11/02/2024 to 04/04/2024	142
05.	Gono Bishwabidyalay, Savar, Dhaka Faculty of Veterinary and Animal Sciences (7th Bach)	31/03/2024 to 04/04/2024	13
06.	Bangladesh Agricultural University Faculty of Animal Husbandry	12/06/2024 to 26/09/2024	04
07.	Sylhet Agricultural University Faculty of Veterinary, Animal and Biomedical Sciences	01/09/2024 to 24/10/2024	83
Total			**384**

6. Study tour programs

Various educational institutes, research institutes, international institutes visit BLRI every year. During the year 2023-24, a total of 629 visitors (International and national guests, teachers, students and officers) have visited BLRI (Table 7) that was arranged and organized by Training, Planning and Technology Testing Division.

Table 7: Study tour/visit programs of BLRI for the 2023-2024

SL. No.	Name of University/Institute/Institution	Date	No. of Participants
1.	Jessore University of Science and Technology, Jessore Department of Genetic Engineering and Biotechnology	29/06/2023	34
2.	Eden Mohila College, Azimpur Dhaka-1205 Department of Zoology	22/07/2023	95
3.	Jahangirnagar University, Savar, Dhaka Department of Botany	10/12/2023	57
4.	BCS Livestock Academy, Savar, Dhaka	13/12/2023	21
5.	Brazilian Livestock Delegation to Bangladesh	29/01/2024	16
6.	USDA Team's visit Research Center of BLRI	12/02/2024	4
7.	University of Dhaka, Department of Zoology	03/02/2024	10
8.	Kumudini Govt. College, Tangail Department of Zoology	28/02/2024	32
9.	BCS Livestock Academy, Savar, Dhaka	13/02/2024	42
10.	Government Brojomohun College, Barishal Department of Zoology	04/03/2024	80
11.	Jahangirnagar University, Savar, Dhaka Department of Biotechnology and Genetic Engineering	03/03/2024	35
12.	Rajbari Govt. College, Rajbari Department of Zoology	07/03/2024	44
13.	BCS Livestock Academy, Savar, Dhaka	03/06/2024	84
14.	Government Saadat College, Karatia, Tangail-1903 Department of Zoology	15/07/2024	75
Total			**629**

7. Workshop and Seminar

This institute regularly organizes an Annual Research Review Workshop every year to evaluate completed and ongoing research programs and plan future research agendas. This workshop is attended by senior executives, policymakers, NARS scientists, academicians, and senior field officials from the Department of Livestock Services, along with representatives from NGOs with relevant professional expertise and interest in livestock research and development.

The progress of research is also reviewed through a day-long workshop within the institute, during which feedback and recommendations are incorporated to address shortcomings and ensure the research remains on the right track. Additionally, the division occasionally conducts specialized workshops and seminars to explore new themes or introduce emerging topics.

During the financial year 2023–24, a total of 265 participants attended the annual research review workshops, comprising 195 males and 70 females.

Scientists from BLRI also attended the research progress workshop organized by the Bangladesh Agricultural Research Council (BARC).

Table 8: Workshop and seminars of BLRI for the year 2023-24

SL No.	Title of the Workshop/Seminar	Duration/ Date	No. of Participants		Total Participants	Location
			Male	Female		
01.	Annual Research Review Workshop 2023	23-24 Dec. 2023	195	70	265	BLRI
02.	"Research progress 2022-23 and Research Programme 2023-24 of BLRI"	03-04 Dec. 2023	17	9	26	BARC

8. Others

The scientists and officers of BLRI also attended in various international and national workshop and seminars arranged by different universities, research institute, Government and Private organizations, NGOs etc.

Other workshops and seminars attended by BLRI officials in the year 2023-24

During the year of 2023-24, a total of 179 BLRI officials were participated in 43 numbers of international and national workshop and seminars arranged by different universities, research institutes, Government and Private organizations, NGOs etc.

Table 9: Other workshops and seminars attended by BLRI officials in the year 2023-24

Sl. No.	Name of Participant & Designation	Title	Date & Duration	Venue
01.	Dr. Razia Khatun, PSO	Thematic Review Workshop based on IFC Assessment Report	16/07/2023	Bangladesh Food Safety Authority
02.	1. Dr. Nasrin Sultana Director (Research) (R.C) 2. Dr. Shakila Faruque PSO and Head 3. Dr. Md. Zillur Rahman, PSO and Head 4. Dr. Biplob Kumer Roy PSO and Head 5. Dr. Sardar Muhammad Amanullah PSO 6. Dr. Razia Khatun, PSO and Head 7. Dr. Md. Rakibul Hassan PSO and Head 8. Dr. Sadek Ahmed, PSO and Head	Workshop on "Expedite fodder/forage technologies and extension services to sustain milk and meat productivity"	19/07/2023	BARC
03.	Dr. Sadek Ahmed, PSO and Head	Workshop on Research Review (2022-2023) of BARTAN	21/08/2023	BIRTAN
04.	Dr. Mohammed Abdus Samad PSO and Head	Review workshop on Section V: Animal Welfare and Antimicrobial use of the IFC Assessment Report	25/07/2023	Bangladesh Food Safety Authority
05.	1. Dr. Shakila Faruque PSO and Head 2. Dr. Mohammad Abdur Rashid, SSO 3. Dr. Halima Khatun, SSO 4. Dr. Md. Saiful Islam, SSO 5. Dr: Md. Zakir Hassan, SO 6. Md. Tareq Hossain, SO 7. DR. Mohammad Mahbub Hasan, SO 9. DR. Md. Mizanur Rahman Manu 10. Mohammad Nizamul Hoque Touhid, SO 11. Sharmin Sultana, SO	Workshop on "Safe Poultry value Chain Development Strategies in Bangladesh"	19/07/2023	BARC

Sl. No.	Name of Participant & Designation	Title	Date & Duration	Venue
06.	Dr. Mohammad Sirajul Islam SSO and Station In-Charge	33rd Annual Planning Conference of Rural Development Academy, Bogra (2023-24)	27-28/07/2023	Rural Development Academy (RDA)
07.	Dr. Shakila Faruque, PSO and Head	Conference "Bard's 56th Annual Planning"	12-13/08/2023	BARD
08.	Dr. Md. Hafizur Rahman, SSO	United Nations Industrial Development Organization (UNIDO)	21-22/08/2023	Hotel Pan Pacific, Sonargaon, Dhaka
09.	1. Dr. Mohammad Abdur Rashid SSO 1. Eshtiak Ahamed Pehan, SO	"Smart Agriculture Data Review Workshop for Standardization and Interoperability"	27-28/08/2023	BARC
10.	1.Engr. Mohammad Lutful Haque System Analyst 1. Devjyoti Ghosh, IO	Workshop on e-Participation in National Data Transmission to be held from September 2023	-	Online
11.	1. Dr. Razia Khatun, PSO and Head 2. Md. Redoan Akond Sumon SSO and Station In-Charge 2. Md. Shamim Hasan, SO	Workshop on "Entitled Hill Livestock: Increasing Livestock Production in the Hills through Better Husbandry, Health Service and Improving Market Access through Value and Supply Chain Management"	13/09/2023	BARC
12.	1.Dr. Md. Saiful Islam, SSO 2.Dr. Md. Abu Yousuf, SSO 3. Md. Mahmudul Hasan Pasha, SO 4. Anowar Hosen, SO 5. DR. Md. Ashraful Islam, SO 6. Md. Ariful Islam, SO 7. DR. Syidul Islam, SO 8. Md. Razibul Hassan, SO 1. Md. Tareq Hossain, SO 2. Ahnaf Anjum Dara, SO	Training Workshop on "The fourth Industrial Revolution and Potential Application in Livestock Sector"	25-27/09/2023	BARC
13.	1. Dr. Md. Masud Rana, SSO 2. Mst. Mahfuja Khatun, STO 3. Jobaida Shovna Khanom, SSO 4. Dr: Md. Zulfekar Ali, SSO	International Symposium on "Nature for Sustainable Development".	07-08/10/2023	National Science and Technology (NST)
14.	Dr. Sadek Ahmed, PSO and Head	Workshop on "Meat value chain in Bangladesh".	03/10/2023	Dhaka

Sl. No.	Name of Participant & Designation	Title	Date & Duration	Venue
15.	Dr. Halima Khatun, SSO	Second National Nutrition Action Plan (2016-2025) 7th Meeting of "Training and Capacity Platform on Nutrition" and Workshop on Module Dissemination on "Journalism Training on Nutrition Governance"	26/09/2023	Bangladesh National Nutrition Council (BNNC) Dhaka
16.	Dr. Biplob Kumer Roy PSO and Head	National Seminar on eBeam/X-ray Technology in Postharvest Loss Reduction	09/10/2023	BARC
17.	1. Mohammad Lutful Haque System Analyst 2. Md. Al-Mamun Librarian and Assistant Director (Administration) (A.C.)	Workshop on "Grievance Redressal Management".	09/10/2023	Cabinet Division
18.	1.Dr. Nasrin Sultana Director (Research) (R.C) 2.Dr. Shakila Faruque, PSO and Head 3. Dr. Md. Zillur Rahman PSO and Head 4.Dr. Biplob Kumer Roy PSO and Head 5.Dr. Md. Sazedul Karim Sarker PSO and Head 6. Dr. Mst. Parvin Mostari PSO and Head 7.Dr. Gautam Kumar Deb PSO and Head 8.Dr. Sardar Muhammad Amanullah PSO and Head of the Office (R.C.) 9.Dr. Razia Khatun, PSO and Head 10.Dr. Kamrun Nahar Monira, PSO 11.Dr. Mohammed Abdus Samad PSO and Head 12.Dr. Shamim Ahmed, SSO 13.Dr. Mohammad Sirajul Islam SSO & In-Charge 14. Most. Farhana Afroz, SSO 15. Md. Ashadul Alam, SSO 16. Md. Kamrul Hasan Mojumdar, SO 17. Md. Ruhul amin, SO 18. Manik Miah, SO	"Annual Scientific Conference, 2023" organized by Bangladesh Buffalo Association	07/10/2023	BLRI

Sl. No.	Name of Participant & Designation	Title	Date & Duration	Venue
	19. Khadiza-Tut-Tahira, SO 20. Md. Iftakher Alam Sarker, SO 21. DR. Ovirup Bhushan Paul, SO 22. Devjyoti Ghosh, IO			
19.	1. Farzana Yasmin, SO 2. Devjyoti Ghosh, IO	Workshop on 2009-2023 Book "2022-2023 Development Activities/Achievements of the Ministry of Fisheries and Livestock to be published Draft Annual Report and Development Progress"	15/10/2023	Ministry of Fisheries and Livestock
20.	1. Dr. Gautam Kumar Deb PSO and Head 1. Dr. Md. Rakibul Hassan PSO and Head	Review workshop "The draft dairy breeding roadmap for Bangladesh"	09/11/2023	BARC
21.	1.Dr. Mohammad Abdur Rashid,SSO 2. Engr. Mohammad Lutful Haque System Analyst 3. Dr. Md. Masud Rana, SSO 4. Dr: Md. Zakir Hassan, SSO 5. Dr. Md. Humayun Kabir, SO 6. Md. Shamim Hasan, SO 7. Md. Mahmudul Hasan Pasha, SO 8. Md. Mostain Billah, SO 9. Eshtiak Ahamed Pehan, SO 10. DR. Md. Mahbub Hasan, SO 1. DR. Md. Ashraful Islam, SO 2. Farzana Yasmin, SO 3. Md. Razibul Hassan, SO 4. Mohammad Nizamul Hoque Touhid, SO 5. Md. Nazmul Huda, SO	Workshop on "problem solution design for data leadership"	12-14/11/2023	BLRI
22.	1.Dr. Razia Khatun PSO and Head 1. Dr: Md. Zakir Hassan, SSO	"Review workshop on Matured Technology Developed by NARS Institutes (2020-21 to 2022-23)"	06-07/11/2023	BARC
23.	1.Dr. Razia Khatun, PSO and Head 2.Dr. Md. Rakibul Hassan PSO and Head	"Workshop to Update Bangladesh one Health Strategic Framework and develop One Health Investment Plan"	27-28/11/2023	BRAC, CDM, Savar
24.	1. Dr. Md. Nuruzzaman Munsi PSO & Head 2. Dr. Mohammed Abdus Samad PSO & Head			

Sl. No.	Name of Participant & Designation	Title	Date & Duration	Venue
	3. Dr. Halima Khatun, SSO 4. Dr. Md. Hafizur Rahman, SSO 5. Dr: Sonia Akther, SSO 6. Farzana Yasmin, SO 7. Sonia Sultana, SO 8. DR. Zamila Bueaza Bupasha, SO 9. Mohammad Nizamul Hoque Touhid, SO 10. DR. Shihab Ahmed, SO	workshop on "Dissemination program on AMR"	22/11/2023	Institute of Epidemiology, Disease Control and Research
25.	1. Dr. Nasrin Sultana Director (Research) (R.C) 2. Dr. Shakila Faruque PSO and Head 3. Dr. Md. Zillur Rahman PSO and Head 4.Dr. Biplob Kumer Roy PSO and Head 5. Dr. Md. Sazedul Karim Sarker PSO and Head 6.Dr. Mst. Parvin Mostari PSO and Head 7. Dr. Gautam Kumar Deb PSO and Head 8.Dr. Sardar Muhammad Amanullah PSO and Head 9. Dr. Razia Khatun, PSO and Head 10. Dr. Kamrun Nahar Monira, PSO 11. Dr. Md. Nuruzzaman Munsi PSO and Head 12. Dr. Md. Rakibul Hassan PSO and Head 13. Dr. Sadek Ahmed, PSO and Head 14. Dr. Mohammed Abdus Samad PSO and Head 15. Dr. Md. Shahin Alam, SSO 16.Dr. Mohammad Abdur Rashid SSO 17. Md. Ashadul Alam, SSO 18. Jobaida Shovna Khanom, SSO 19. Dr. Md. Saiful Islam, SSO 20. Md. Mahmudul Hasan Pasha, SO 21. Md. Tareq Hossain, SO 22. Shahanaj Ferdousi Shejuty, SO 23. Md. Asief Hossain Zihadi, SO 24. Farzana Yasmin, SO 25. Ayesha Shiddika Afsana, SO 26. Md. Mostain Billah, SO	"Research progress 2022-23 and Research Programme 2023-24 of BLRI"	3-4/12/2023	BARC

Sl. No.	Name of Participant & Designation	Title	Date & Duration	Venue
26.	Dr. Sadek Ahmed, PSO and Head	In-house Research Workshop of Bangladesh Applied Nutrition Research and Training Institute (BARTAN).	21/12/2023	BIRTAN
27.	1. Sharmin Akter Tule, SO 2. Md Tarequl Islam, SO	Trainer-Training on Food Based Nutrition (Applied Nutrition).	17-21/02/2024	BIRTAN
28.	1.Dr. Md. Masud Rana, SSO 2.Farzana Yasmin, SO	Workshop to review the implementation progress of the Ministry of Agriculture related targets of the Sustainable Development Goals (SDG)	31/03/2024	BARC
29.	Dr. Razia Khatun, PSO and Head	"Knowledge Sharing Workshop on Data in Emergencies"	02/04/2024	BARC
30.	1. Muhammad Khairul Bashar, SSO 2. Jobaida Shovna Khanom, SSO	"Stakeholder Workshop on Setting National Targets to Contribute to Kunming-Montreal Global Biodiversity Framework (KM-GBF)"	20/04/2024	Department of Environment
31.	1.Dr. Md. Zillur Rahman PSO and Head 2.Dr. Md. Nuruzzaman Munsi PSO and Head	"Canada's Plant and Livestock Inspection and Safety Systems by the Canadian Food Inspection Agency"	28/04/2024	BARC
32.	Farzana Yasmin, SO	Seminars/Conferences on Localization of SDGs	06/05/2024	BBS Auditorium
33.	1. Most. Farhana Afroz, SSO 2. Dr. Md. Panir Choudhury, SSO	Workshop organized on the occasion of "International Biodiversity Day 2024".	08/06/2024	DLS
34.	1.Dr. Nasrin Sultana Director (Research) (R.C) 2. Dr. Sardar Muhammad Amanullah PSO	"Workshop on Quantification of LDDP Intervention Impacts on GHG Emission Reduction in Dairy and Beef Cattle"	14/05/2024	DLS
35.	1. Dr. Shakila Faruque PSO and Head 2. Dr. Md. Zillur Rahman PSO and Head 3.Dr. Biplob Kumer Roy PSO and Head			

Sl. No.	Name of Participant & Designation	Title	Date & Duration	Venue
	4.Dr. Mst. Parvin Mostari PSO and Head 5. Dr. Gautam Kumar Deb PSO and Head 6. Dr. Kamrun Nahar Monira, PSO 7. Dr. Md. Rakibul Hassan PSO and Head 8. Dr. Sadek Ahmed, PSO and Head 9. Dr. Shamim Ahmed, SSO 10. Dr. Md. Panir Choudhury, SSO	"National Workshop of ACASA Project on Livestock Sector"	15/05/2024	BARC
36.	Mst. Mahfuja Khatun, STO	Workshop on "Impact and Status of Training Programmes of SHNIYD"	16/05/2024	Sheikh Hasina National Institute of Youth Development
37.	1.Dr. Gautam Kumar Deb PSO and Head 2.Dr. Kamrun Nahar Monira, PSO 3. Dr. Md. Panir Choudhury, SSO	Workshop on "Advancement of first phase long-term action plan and second phase plan review with time-bound and specific targets for biotechnology in the light of National Biotechnology Policy-2012"	29/05/2024	BARC
38.	Farzana Yasmin, SO	Group-based training workshop with Ministries/Departments / Organizations related to the thematic area of agriculture to address the data gap of SDGs indicators	06/06/2024	Bangladesh Bureau of Statistics (BBS)
39.	Muhammad Khairul Bashar, SSO	Workshop on "Nutritious and safe food for good health; Participant Role"	11/06/2024	BADC
40.	Dr. Md. Panir Choudhury, SSO	"Annual Research Review Workshop 2024 on Plain and Upland Cotton for Season 2023-24"	20-21/06/2024	Cotton Development Board

Sl. No.	Name of Participant & Designation	Title	Date & Duration	Venue
41.	Dr. Md. Panir Choudhury, SSO	Workshop organized under the project "Establishment of National Gene Bank (1st Revised)".	11/06/2024	National Institute of Biotechnology
42	Dr. Razia Khatun, PSO and Head	Workshop on "Result Dissemination Workshop on the Research under SUFAL Innovation Grant"	18/06/2024	Forest Department
43.	1.Dr. Mst. Parvin Mostari PSO and Head 2.Dr. Md. Saiful Islam, SSO 3. Mst. Mahfuja Khatun, STO 4. DR. Md. Ashraful Islam, SO 5. Md. Hafizur Rahman, SO 6. DR. Syidul Islam, SO 7. Sadia Binte Sadrul, SO 8. Sharmin Sultana, SO 9. Mohammad Nizamul Hoque Touhid, SO 10. Rumana Khatun, SO	"Review of Socio-Economic Research Progress (2023-24) and Future Research Program (2024-25) of NARS Institute"	27/06/2024	BARC
44.	Dr. Kamrun Nahar Monira, PSO	Youth Workshop on "Youth Networking in Skill Development and Building Smart Leadership: Issues and Prospects"	27/06/2024	Sheikh Hasina National Institute of Youth Development
45.	1. Dr. Kamrun Nahar Monira, PSO 2. Dr. Md. Panir Choudhury, SSO	Workshop on "Stakeholder Workshop on Setting National Targets to Contribute to Kunming-Montreal Global Biodiversity Framework (KMGBF)"	04/08/2024	BARC

9. Memorandum of Understanding (MoU)

During the year 2023-24, BLRI signed MoU with one (1) organization.

Table 10: List of Memorandum of Understanding (MoU) for the year 2023-24

SL. No.	Country/International Organization	Subject/ Area of cooperation	Date of signing	validity	Progress
1.	Bangladesh Livestock Research Institute (BLRI) and Dhamrai Dairy	All areas of Livestock	27/06/2024	26/06/2027	On going

Dairy Research and Training Centre

Establishment of milk processing facilities for the development of premium dairy products

Sub-title: Determination of probiotic properties and safety assessment of identified isolates from Dahi

Traditional Dahi is a rich source of lactic acid bacteria (LAB), which is crucial in dairy fermentation, enhancing flavor, texture, safety, and inhibiting foodborne pathogens. This study aimed to isolate and identify LAB from locally produced Dahi and evaluate their probiotic and safety properties for potential use as starter cultures. During the 2022–2023 fiscal year, four promising LAB strains, *Lactobacillus casei, Lactobacillus paracasei, Lacticaseibacillus rhamnosus, and Limosilactobacillus fermentum,* were isolated and assessed for probiotic potential. These strains were tested for survival under stress conditions such as low pH, bile salts, high salt concentration, and simulated gastric and intestinal fluids. All isolates tolerated a wide temperature range (15–45°C) and acidic environments (pH 2–4), with survival rates between 53.00% and 89.80%. *L. rhamnosus* showed the highest survival (89.80%). Antagonistic activity against *Staphylococcus aureus, Salmonella Typhimurium, Escherichia coli,* and *Pseudomonas aeruginosa* was observed, with inhibition zones ranging from 16.67 to 25.56 mm. *L. casei* and *L. rhamnosus* displayed the strongest antibacterial effects (23.85 mm and 23.16 mm, respectively), with *L. rhamnosus* being particularly effective against *S. Typhimurium* (25.56 mm). Antibiotic susceptibility testing revealed varying responses (17.56–43.43 mm) to five antibiotics (azithromycin, ciprofloxacin, chloramphenicol, gentamicin, and penicillin), while all strains were resistant to norfloxacin. Safety evaluations confirmed the absence of hemolytic and DNase activities. Cell surface properties varied, with *L. rhamnosus* and *L. fermentum* showing the highest auto-aggregation (98.39% and 88.87%) and co-aggregation with *E. coli.* In 2023–2024, 52 Dahi isolates were analyzed, with 33 identified as Lactobacillus spp. (63.46%) and 19 as Lactococcus spp. (36.54%). MALDI-TOF MS profiling confirmed four LAB genera: Lactobacillus, Limosilactobacillus, Pediococcus, and Lactococcus, with *L. fermentum* being the most common. Overall, *L. rhamnosus* and *L. casei* exhibited strong probiotic potential and safety, making them promising candidates for functional dairy applications.

Quality and safety assessments of milk and the development of fortifying dairy products

Sub-title: Development of methods to determine the concentrations of antibiotic residues in cow's milk using LCMS-MS

The study aimed at developing methods to determine the antibiotic residues in milk using liquid chromatography-tandem mass spectrophotometers (LCMS-MS). Two commonly used antibiotics (e.g. amoxicillin and ceftriaxone) for dairy cows were considered for the study. In each antibiotic, 5 cows were considered as antibiotic treated and 5 cows were considered as control. In case of treated cows, milk samples were collected from the cows before (Day-0), during (Day 1-3) and after (Day 4-10, 15) the antibiotic treatment. A total of 84 known samples from antibiotic treated cows, 84 random samples from local markets and 84 samples as control from the same farm were collected (500 mL each) and stored at -80 until analysis. The samples were analyzed using LCMS-MS. After determining the concentrations of the residue of ceftriaxone in milk the same samples were heated at 100 for 10 minutes and again analyzed using LCMS-MS to observe how the concentrations were being reduced. The methods for the determination of the residues of amoxicillin and ceftriaxone antibiotics in milk were developed using LCMS-MS and the correlation coefficients of the calibration curves were found 0.990 and 0.996 respectively. Whereas, the recovery percentage of the standard concentrations for amoxicillin and ceftriaxone ranged from 96.5 - 104.6 and 91.2 – 109.5 respectively. The result showed that during antibiotic treatment (day 1-3), the residue of ceftriaxone antibiotic was found in the milk samples. The mean concentration of the residue of ceftriaxone antibiotic in milk in day 1, day 2 and day 3 were determined as 22.42 ppb, 18.84 ppb and 19.5 ppb respectively which were below the maximum residue level (100 ppb) recommended by European Commission regulation 2377/90/EC. Whereas, before and after the treatment period, no residue of ceftriaxone antibiotic was found in the milk samples. Similarly, no residue was found in the control sample for ceftriaxone. The result also showed that after heating the milk, the ceftriaxone residues were reduced from 92.78 to 94.15%. Further studies are necessary to validate the developed methods and determine the concentrations of the amoxicillin antibiotic residues in milk using LCMS-MS.

Production of beta-cyclodextrin for the development of low cholesterol milk and milk products

Sub-title: Isolation of cyclodextrin glucano-transferase (enzyme) producing bacteria from soil for the production of beta-cyclodextrin

Milk, which contains a smaller amount of cholesterol than cream is nutritionally beneficial for human. However, low-cholesterol (LC) milk would be desirable for those suffering from cardiac diseases such as hypertension and arteriosclerosis. LC milk can also be used as a material for the production of cholesterol-free ghee, cheese, yogurt etc. Cholesterol can be readily absorbed by beta-cyclodextrin (β-CD), a cyclic oligosaccharide made up of seven glucose units, between 4 and 8°C. The β-CD is non-toxic and entirely digested by the intestinal bacteria. Therefore, the

present study was undertaken to produce beta-cyclodextrin from starch materials using microbial enzymes. To achieve the objective, a total of three activities were conducted in 2023-24 including screening of cyclodextrin glucano-transferase (CGTase) enzyme producing bacteria from soil, production of CGTase enzyme from the isolated bacteria and production of beta-cyclodextrin using CGTase enzyme. A total of 15 soil samples were collected and were prepared by tenfold of serial dilution and subjected to heat treatment for 10 minutes in a water bath at 80 . Pure microbial colonies were separated through repeated and successive screening of colonies by using Luria Bertani agar media. The colony and cell morphology, motility, Gram staining and standard biochemical tests were assessed for the isolates. Finally, MALDI-TOF analysis was used to confirm the bacterial isolates. From the collected soil samples, a total of fifteen (15) colonies were isolated and initially identified as *Bacillus sp.* based on their morphology and biochemical tests. The colonies were of small, medium and large in size. Colony appearance was flat, circular or irregular edges, opaque, moist and white or greyish white in color. After Gram staining and microscopic examination, it was observed that the isolates were Gram positive as violet color rods. Biochemical analysis revealed that all the 15 isolates showed positives results for Catalase, Motility, Urease and Oxidase tests. Out of fifteen (15) isolates, two isolates were identified as *Alkalihalobacillus sp* by using MALDI-TOF technique. The isolates are *Alkalihalobacillus pseudofirmus* and *Alkalihalobacillus clausii.* Both of them are Alkaliphilic Gram positive and aerobic endospore forming bacteria and potential to produce β-CD. In MALDI-TOF analysis *Alkalihalobacillus pseudofirmus* showed the highest similarity score and *Alkalihalobacillus clausii* showed medium similarity score (Figure 1).

Fig: 1. Results of MALDI-TOF analysis of two identified isolates

It could be concluded that the identified bacteria are potential for CGTase enzyme production. Therefore the bacteria would be used for the production of CGTase enzyme that further would be used for the production of β-CD from differet starch materials.

Assessment of environmental stresses on different genetic groups of dairy Cattle and development of their mitigation strategies

Dairy farming is significantly impacted by environmental stress and the most important tool for determining the level of environmental stress is the Temperature-Humidity Index (THI). The present study was undertaken to measure the cyclic environmental stresses through THI on high blood percentages (87.5%) of Holstein Friesian (HF) dairy cows, developing effective mitigation strategies to alleviate the negative impacts of these environmental stressors and their effect on milk yield and composition, physiological responses and biochemical blood properties. The research was carried out both in commercial (Eon Dairy Limited, Rangpur) and smallholder farming (Mohammadia dairy, Savar, Dhaka) condition using 87.5% HF dairy cows. In the commercial farming condition (experiment-1) in total of 30 lactating dairy cows were considered and the selected cows were randomly divided into three group with 10 cows in each group, i.e. control=T0 (existing practices), T1=fogging machine (apply fogging when THI≥75) and T2=fogging+osmo-saline (25g/cow/day). In experiment-2 under the small holder farming condition similar number of cows and treatment were considered. A total of 4 Digital thermo Hygrometer were hanged in each corner to record the temperature and relative humidity at the animal height and data were recorded 5 times in a day (6 am; 10 am; 2 pm; 6 pm and 10 pm). Temperature humidity index (THI) was calculated by using the following equation: THI= [1.8×T+32]-[0.55-0.0055×RH] × [1.8×T-26] (Gantner et al. 2010). THI≤68 was considered as comfort, 69≤THI≥74 was considered as thermo-neutral and THI≥75 was considered as stressed. In results, average THI from December to February was found within comfort range (THI≤68), March to May was in thermo-neutral range (69≤THI≥74) and June to September was in stress condition (THI≥75). The results of this study revealed that, cows in T0 exhibited a significant elevation (P<0.01) in rectal temperature (102.580C), pulse rate (67.02 beats/min), and respiration rate (36.07 breaths/min) compared to cows in T1 and T2. The study also demonstrated a significant decrease (P<0.05) in milk yield (31%) and milk composition (27% milk fat, 7.78% milk protein, 5.71% SNF and 5.21% lactose) during heat stress in T0. The study also revealed a significant alteration (P<0.05) in the biochemical blood profiles of HF dairy cows subjected to T0 and variations were observed in glucose, total protein, uric acid, cholesterol, calcium, HDL, SGPT and SGOT levels. However, there was no significant difference were observed in the blood profiles of T1 and T2 groups. In conclusion, this study revealed that, mitigation strategies like fogging system and pure drinking water contacting osmo-saline during stress period can maintain consistency of cow productivity, physiological performance, bio-chemical properties and other performances. To confirm the findings further studies, need to conduct to develop stress mitigation strategies for high yielding dairy cows.

Regional Station Naikhongchari, Bandarban

A. Research Works

Reinforcement of Regional Livestock Research at Naikhongchari

The present research aimed to conserve and improve the livestock, poultry and fodder germplasm in hilly region of Naikhonchari. The objectives were to conserve and improve different livestock, poultry and fodder germplasm suitable for hilly region; to promote the various High Yielding Fodders (HYFs) in hilly areas; to develop production, rearing and disease control packages for livestock and poultry in hilly region. The research found the average litter size of Hilly Brown Bengal goat was 1.8±0.01 (n=37) where the average birth weight of first generation (G1) male and female kids was 1.36±0.06 kg (15) and 1.3±0.03 kg (27) with the average milk production of does was observed 138.33±4.27 ml/day (12). On the other hand, 06 months body weight, average daily gain up to 06 months of male and female HBB goats and the kid survivability rate were found 8.9±0.84 kg (15), 7.8±0.43 kg (23), 40.25±4.62 gm (15), 37.68±3.95 gm (23) and 76.36%, respectively. The age and weight at first heat of G1 HBB doe were 330 days and 11.8 kg (01) whereas the age and weight at first conception were 365 days and 12.24 kg (01) with the service per conception of 1.16 and the conception rate was found to 87%. The average mature body weight of male and female hilly chickens at first generation (G1) was 2947.42±88.61 gm and 1956.37±48.92 gm where the average egg weight, hatchability and fertility rate were observed at 45.7 gm (n=160), 75%, and 74.1%, respectively. The feed conversion ratio was found in G1's hilly chicken of 2.2. Moreover, the average DOC weight in the second generation (G2) was 29.60 gm (n=89).

Current genetic resources with their statistics

SI No	Species	Number	Class based on age and sex
1	Brown bengal goat	275	Buck-62, Doe-114, Wether-8, Kids-91
2	Native sheep	135	Ram-33, Ewe-52, Wether-3, Lamb-91
3	Gayal	12	Male-5, Female-6, calf-1
4	Deer	37	Stag-17, Hind-18, Fawn-2
5	Hilly chicken	390	Cock-108, Hen-188, Chicks-94
6	Jungle fowl chicken	42	Cock-12, Hen-17, Chicks-13
7	Red chittagong cattle	59	Bull-1, Cow-24, Heifer-7, Calves-27

1) Conservation and improvement of Hilly Chicken, Jungle Fowl Chicken

Different types of data on Hilly Chicken and Jungle fowl i.e. body weight, egg weight, hatchability, fertility and daily feed intake were collected and analyzed for the

conservation and improvement of hilly chicken and jungle fowl chicken. Selection and culling method were used. Vaccination, medication, de-worming, de-beaking, artificial insemination and other routine activities were also done regularly.

Fig 1. Hilly chicken and jungle fowl

2) Conservation and Improvement of Red Chittagong Cattle, Goat, Sheep, Gayal and Deer

The productive and reproductive data of RCC cattle, brown bengal goat, native sheep, were recorded and analyzed for characterization. Routine activities such as vaccination, medication, de-worming, dipping, shearing, castration, culling and mating were done in a scientific way for the betterment of farm animals. Conserve the farm animals namely deer and gayal in the hilly areas from extinction.
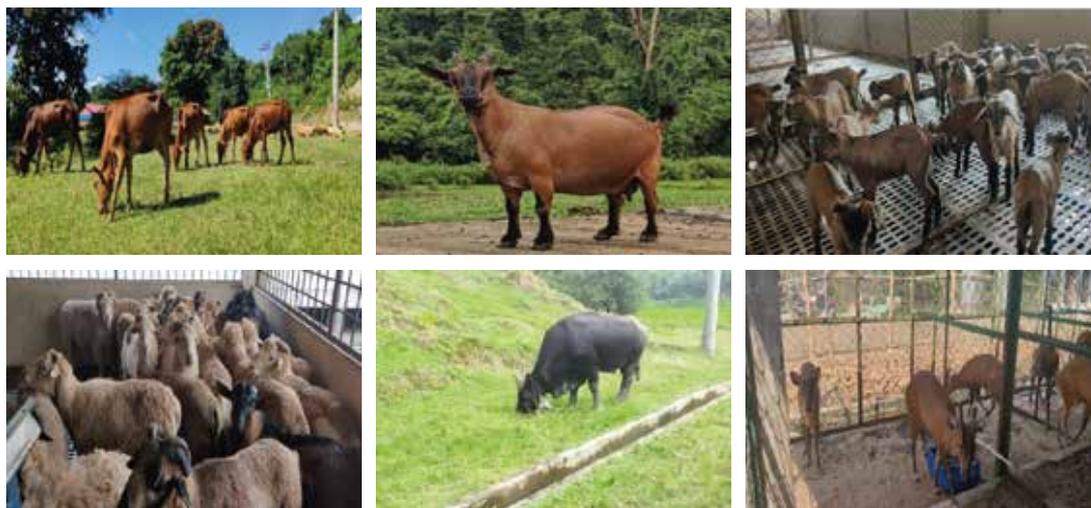
Fig 2. RCC Cattle, Brown Bengal goat, Native Sheep, Gayal and Deer at research farm

3) Conservation of Fodder Germplasm at Research Area

Establishment of fodder germplasm and introduction of various improved fodders at research farm. Production, cultivation and processing of different types perennial HY fodders and seasonal fodders. Fifteen fodders germplasm exists in the germplasm bank. These are: Napier-1, Napier-2, Napier-3, Napier-4, Red Napier, Napier

Packchong, German, Para, Signal, Splendida, Rozi, Andropogon, Cow pea, Maize, Oat etc.

Fig 3. Fodder germplasm at research farm

B. Others Activities

1) Office Laboratory

Collection of samples (animal faeces, blood etc.) from research farm and community. Carefully analyzed and recorded the result of the samples and give suggestions to overcome the problems. Regular post-mortem of animals and birds were done and kept record.

Fig 4. Collection of samples, post-mortem of farm animal and analyses

2) Training Program

Training programs were arranged at Naikhongchari Regional Station during the fiscal year 2023-24 to disseminate ideas about beef fattening, cattle, sheep, goat and poultry rearing and management system. In those training program around 140 beneficiaries were participated.

Fig 5. Training program at BLRI regional station, Naikhongchari, Bandarban

2) Backyard Meeting Program

Twelve backyard meeting were organized at different locations of Naikhongchari, Bandarban to enhance awareness among the farmers about livestock and poultry rearing. In the backyard meeting, farmers get necessary information about feeding, breeding, care, management and disease control of their animal and poultry species.

Fig 6. Backyard meeting at farmer's yard

4) Technical support to Livestock and Poultry Farmers

Technical support was provided to the farmers about modern livestock rearing and health management. In 2023-24 FY, near about 302 farmers had taken suggestion about animal rearing, poultry rearing, animal and poultry health management, fodder cultivation and preservation. Besides, near about 56500 fodder cuttings including HYV Napier, Red Napier, Para, German, Packchong were distributed among the farmers in hilly region. This station also provides vaccination facilities to the farmers in Naikhongchari region. Normally vaccination program was conducted against PPR, sheep and goat pox, BCRDV, RDV, fowl pox and so on under BLRI Technology Village. De-worming drugs were also provided to the selected farmers at a regular interval.

Fig 7. Suggestions to farmer about livestock rearing, distribution of fodder cutting and vaccination

5) Distribution of sheep, goat, hilly chicken, fertile egg

Native sheep, brown Bengal buck, ram, hilly chicken and fertile eggs were distributed among the interesred farmer based on their application. In the last 2023-24 FY year 10146 fertile hilly chicken's eggs were distributed. This regional station also distributes the above mentions inputs through different project work.

Fig 8. Distribution of sheep, goat, hilly chicken among the farmers in Naikhongchari

6) Field visit

Field visit is very important to boost up the activities under community level. Frequent field visit was conducted with a view to identify the problems faced by the farmers and suggest them how to solve the problems in a scientific way. It also helps to exchange ideas with the livestock farmers.

Fig 9. Field visit at different places of Naikhongchari hilly area

7) Celebration to Becoming Developing Country

BLRI, Regional Station, Naikhongchari, Bandarban was organized celebration program such as world egg day, World milk day etc. of becoming developing country from least developed country.

Fig 10. Celebration to becoming developing country

Regional Station, Bhanga, Faridpur

To boost livestock and poultry production in the Faridpur region, the Bangladesh Livestock Research Institute (BLRI) established a regional center Launched in 2019 on three acres of land near Bhanga Upazila. The center focuses on field-level testing and expansion of modern technologies. It supports applied research to reduce rural poverty, create jobs, improve nutrition and food security, and empower women through sustainable livestock development. During the 2023–24 fiscal year, the Faridpur center carried out several key activities, including the establishment and distribution of improved fodder grass germplasm, construction of duck demonstration sheds, low-cost distribution of hatching eggs, farmer training on BLRI technologies, regular courtyard meetings for field-level problem-solving, and continuous technical advisory services both on-site and at the office. Many of these initiatives are still ongoing.

1. Germplasm bank for improved fodder grass: A germplasm bank was established to preserve and distribute high-yielding, climate-resilient grass varieties such as Napier -3&4, Pakchong, Red Pakcong, German, Jara, Smart Napier Managed scientifically, the bank supplied planting materials to meet farmers' demands, enhancing year-round fodder availability and reducing feed shortages.

2. Demonstration sheds for BLRI duck breeds: Demonstration sheds were set up to showcase the productivity and management of two improved BLRI-developed duck breeds (Rupali and Nageshawri). This enabled farmers to gain practical insights and encouraged adoption of improved duck farming.

3. Distribution of hatching eggs: To support duck farming, 555 no. hatching eggs were distributed at low cost to interested nearby farmers during the 2023–24 fiscal year.

4. Farmer training programs: During 2023–24, a total 90 male and female farmers received hands-on training in two batches on popular BLRI technologies such as improved poultry farming and cattle fattening.

5. Courtyard meetings: Regular courtyard meetings facilitated direct engagement with farmers, addressing their challenges and offering immediate advisory support. A total of 171 no. farmers received technical knowledge sharing guidance during the fiscal year.

6. Research project implementation: Two research projects were carried out under the center's 1) Establishing a BLRI Technology Village run by BLRI revenue budget and another on BASS Project funded entitled Creating an agro-business

model via indigenous chicken farming. These two projects aimed to boost rural women's socio-economic status, improve nutrition, and promote income-generating activities. Under BLRI technology village last 2023–24, a total 20 farmers received improved 200 no indigenous chickens, 8 farmers received 55 no. BLRI improved ducks, and a feeding trial was conducted using TMR, silage, and UMS at farmers level. The trial gained strong acceptance among farmers.

In addition to these activities, the Faridpur center is committed to identifying new research areas and introducing innovative technologies based on farmers' needs. With strong determination, the center aims to contribute to the overall development of livestock in the Faridpur region.

Regional Station, Jashore

BLRI Regional Station, Jashore, established in 2019 under the Fodder Development Research Project, possesses only three acres of land. This regional station was established to target the significant potential of the Khulna Division for expanding poultry and livestock production. The main mandate of the BLRI Regional Station, Jashore, is to identify the problems within the livestock sector in the Khulna Division and to find possible solutions by setting specific, goal-oriented, and sustainable research programs for technology development. To achieve this goal and increase livestock production annually, we have undertaken several activities at our regional station. These works are presented under major titles and with pictorial views

1. Different Fodder cutting and Fertile egg distribution

Twelve varieties of fodder are conserved at BLRI regional station, Jashore, and distributed to the farmers to minimize their feed cost. In 2023-24 FYS, we have distributed about 1 lakh fodder cutting to more than 50 farmers. We also distributed more than 80 fertile Gosse eggs among 12 farmers.

Fig: Extension services

2. Conservation and development of native geese production package by determining the feed requirement with supplement forage

The research was conducted with 36 adult geese (Native white & grey varieties) for 90 days using a completely randomized design (CRD). The adult geese were randomly divided into 4 equal groups, with 3 replicates of 3 geese each. All birds were provided with a balanced diet based on their body weight during each rearing period, and different fodder varieties were offered while allowing them to move freely in forage land and a pond. Data such as body weight and feed intake were recorded weekly. Carcass characteristics and external and internal egg quality were also determined.

Fig: Field research activision

3. Laboratory activities

Different types of field samples frequently come to our lab for analysis and diagnosis of parasites, poultry diseases, and proximate analysis of feed samples. In 2023-24 FYS, we have analyzed 60 feces samples, 3 of poultry post mortem, and analysis three feed samples.

Fig: Laboratory activision

4. Farmer's Training

Two farmers' training programs were held at BLRI regional station Jashore to disseminate knowledge about cattle fattening and poultry rearing, and management. 90 farmers were present in those training programs.

Fig: Training program

5. Technical support to livestock and poultry farmers

Technical support was provided to the farmers about modern livestock rearing and housing management. About 100 farmers took suggestions about fodder cultivation, cattle rearing, and poultry rearing. We have conducted the first Deworming, then PPR, FMD, BCRDV, RDV, Duck cholrea and Duck plaque vaccination program in Madhugram, Jashore.

Fig: Field visit & campain

6. Backyard meeting

We have conducted a backyard meeting about Lumpy Skin Disease. Last year, the lumpy skin disease severely attacked our cattle population. This programme was mainly to build awareness among the farmers and share knowledge about the lumpy skin disease vaccination.

Fig: Focal group discussion

Regional Station, Godagari, Rajshahi

Conservation and improvement of Black Bengal Goat (BBG) at BLRI regional station, Rajshahi and community level

Black Bengal goats are reputed for high prolificacy, high fertility, early sexual maturity, adaptability to hot humid conditions and superior quality meat and skin. The purity of this supreme goat breed has been decreasing day by day due to crossbreeding throughout the country. Continuous improvement in genetic selection as well as awareness about BBG and controlled breeding at community level is necessary for the conservation and improvement of the production efficiency of this goat breed. Considering the above facts, the project has designed with the objectives (i) To evaluate the productive and reproductive performance of Black Bengal Goat (BBG) and continue their improvement at BLRI regional station, Rajshahi and (ii) To conserve and improve Black Bengal goat at community level. The study was performed at BLRI Regional station, Rajshahi with selective breeding approach avoiding inbreeding. To develop Black Bengal Goat producing community, six (6) BBG (2 Buck and 4 Doe) were distributed among selected three farmers in Komolapur Village, Godagari, Rajshahi. All the management and data recording regarding breeding, nutrition and health attributes was followed by the approved guidelines of goat research farm, BLRI, Savar, Dhaka. Recorded data were analyzed using Version 20.0 of the Statistical Package for the Social Sciences (SPSS). The average litter size (no.), birth weight (kg), 3, 6, 9 and 12 months body weight (kg) of selected BBG at research farm, BLRI RS Rajshahi were found as 1.73±0.06, 1.17±0.15, 5.19±0.09, 7.99±0.13, 10.49±0.17 and 13.02±0.19, respectively. Out of 30 faecal samples examined, 6 samples were positive for gastrointestinal parasites with an overall prevalence 20% among which Paramphistomum sp. (6.66%), Fasciola sp. (3.33%), Moniezia sp. (3.33%) and nematode infestation (6.66%) were reported respectively. Superior bucks and does will be selected from every genotype by the individual performance score. Therefore, the research program should continue for the coming years to achieve the targeted breeding goals.

Fig: Black Bengal goat distribution, monitoring and different managemantal suggestion providing

Overall activities of BLRI RS Rajshahi

1. Conservation and Improvement of Cattle, Buffalo, Goat, Chicken and Geese

Five animal species viz. Cattle, Buffalo, Goat, Chicken and Geese are being conserved for their improvement at BLRI RS Rajshahi. Among the animal species, 2 cattle breeds like Red Chittagong cattle (RCC) and North Bengal Grey (NBG); 3 types of native chicken (Hilly, Nacked Neck, Non-Descriptive) 5 exotic chicken viz. Rhode Island Red (RIR), Barred Plymouth Rock (BPR), White Rock (WR), White Leghorn (WL) and Tiger and crossbred chicken are available in the research farm.

The productive, reproductive and other relevant data were recorded according to the guideline of BLRI Head office. Routine activities like vaccination, deworming, dipping, culling, castration and mating were performed scientifically for betterment the of livestock.

Fig: Conservation of Cattle, Buffalo, Goat, Chicken and Geese

Conservation of different types of animals at research farm-

SL. No.	Animal	Number	Class based on age and sex
1.	Red Chittagong cattle	17	Male=3, Female=9, calves=5
2.	North Bengal Grey	7	Male=1, Female=3, calves=3
3.	Buffalo	75	Male=2, Female=56, calves=17
4.	BBG	144	Male=26, Female=61, Kids=49, Castrated=8
5.	Total Chicken-	1456	Male=543, Female=850, Growing=63
	i. Native chicken	223	Male=67, Female=156
	ii. Exotic chicken	235	Male=88, Female=147
	iii. Crossbred chicken	998	Male=388, Female=547, Growing=63
6.	Geese	76	Male=27, Female=49

2. Conservation of fodder germplasm and development of fodder plot

Establishment of fodder germplasm bank having various types of hybrid fodder (BLRI Napier-1,2,3 4 & 5, Red Pakchong hybrid, German, Signal, Para, Rozi, Guinea, Splendida, Andropogon, Zara, Dhal etc.) have done and different seasonal (maize, oats, jumbo) and perennial fodder were cultivated for production and distribution cutting to the farmers.

Fig: Fodder germplasm bank and fodder plot

3. Laboratory Activities

Collection of samples (faeces, blood, milk, serum, swab) from both the research farm and community was done according to the respected project activity of both BLRI head office and Regional station. Some samples were examined and diagnosed for the feedback of farmers and rest of the samples were sent to BLRI, Savar, Dhaka for further analysis. Total 1163 number of samples were collected and processed in the last fiscal year. Regular postmortem was performed and data was recorded.

Fig: Different laboratory activities

4. Distribution of animal and fodder cutting

Black Bengal goats (6 in number), common deshi, naked neck and hilly chicken (390 in number) were distributed among selected farmers through different ongoing projects. Furthermore, 30,000 fodder cuttings were distributed among the farmers on the basis of their application.

Fig: Distribution of animal and fodder cutting

5. Technical support to livestock and poultry farmers

Technical support was distributed to the farmers about modern livestock farming. About 201 farmers got technical support from BLRI, RS, Rajshahi about farming, fodder cultivation, deworming and vaccination. This station also provided anthelmintics and vaccines to selected villages and the territory of the regional station.

Fig: Technical support given to farmers

6. Training program

Training program was held at BLRI regional station, Rajshahi to disseminate the scientific knowledge about cattle, buffalo, goat and poultry rearing and management. Total number of 350 beneficiaries were attended those programs in the different sections.

Fig: Training program

7. Backyard meeting program

Eight backyard meeting were performed in each month at the different location of Godagari to create awareness of livestock rearing management and poultry farming.

Fig: Backyard meeting program

8. Field visit

Generally field visit was done twice in each month to share knowledge, new ideas of livestock farming.

Fig: Field visit and instruction

9. Celebration of different national days

Different national days like victory day, international mother language day, independence etc. were celebrated with due respect.

Fig: Different national days celebration

Regional station Baghabari, Sirajganj

Project title: Improvement of indigenous cattle through breeding, feeding, and health managements

Running title: Evaluation of Holstein Friesian crossbred cattle with improving Pabna cattle reared in ex-situ and in-situ conditions

Pabna cattle (PC) are well-adapted dual type indigenous cattle located in Bangladesh. BLRI Regional Station (RS), Baghabari, maintained two nucleus herd of indigenous PC at RS, Baghabari station, Sirajganj and Char Srikanthodia of Pabna district through ex-situ and in-situ situations, respectively. BLRI RS, Baghabari also established a crossbred dairy cattle herd of 50% HF × 50% PC using 100% frozen semen. This study was conducted to evaluate the HF crossbred cattle with improving PC of both herds. Body weight (BW), weight at first heat, daily milk yield, lactation length, lactation yield, age at first heat, age at first conception, calving interval, post-partum heat period etc were recorded in data register book. The SPSS software was used to compare the mean value by a one-way ANOVA. The results revealed that birth weight, 6-month weight, and yearling weight between HF crossbred cattle and improved PC both in-situ and ex-situ conditions were found substantial difference ($P<0.05$). HF crossbred cattle had a mean body weight of 273.04±8.89 kg at 2 years of age, significantly ($P<0.05$) higher than the PC in both ex-situ and in-situ environments. In addition, lactation yield in HF crossbred cattle was three times more than in PC cattle under both rearing circumstances. In comparison to ex-situ rearing of PC and HF crossbred cattle, all reproductive parameters, including calving interval and post-partum heat period, were significantly ($p<0.05$) superior to those of PC reared in-situ environment. Rearing systems and environments may have an impact on the PC's higher reproductive performance when raised in their natural habitat. It may be concluded that Holstein Friesian crossbred cattle are superior to Pabna cattle in body weight, ADG, and milk production characteristics.

Overall activities of BLRI regional station Baghabari, Sirajganj

1. Conservation and improvement of animal genetic resources: Pabna Cattle are a local genetic resource that is available in Pabna and Sirajganj districts. Approximately 114 pure Pabna cattle were conserved at this station, and by using this pure genetic resource with high-yielding exotic (Holstein Friesian), a crossbred (50% HF cattle and 50% Pure Pabna) was developed at this regional station.

SL	Type	Pabna Cattle	HF50%	Total
1	Milking cow	9	8	17
2	Pregnant cow	7	4	11
3	Dry cow	6	3	9
4	Bull	15	18	33
5	Heifer	9	8	17
6	calf(under 1 year)	15	12	27
	Total	61	53	114

Besides, 50 farmers with approximately 200-250 pure Pabna cattle were conserved at the Char land community level of Pabna district.

Pure Pabna Female

Crossbred (50% HF and 50% Pabna) Female

Pure Pabna Male

Crossbred (50% HF and 50% Pabna) Male

Fig 01: Pictorial view of Animal genetic resources at Baghabari regional station

2. Fodder germplasm conservation and fodder cutting distribution: A total of 25 varieties of locally available and high-yielding fodder were conserved at the regional station Baghabari. The production performance and nutritional quality were determined to choose the best fodder for this region. Distributions of cutting the best fodder variety to the farmers based on availability and requirement.

Fig 02: Fodder germplasm and Cutting distribution

3. Consultation service: Our regular activity includes consulting with farmers on animal diseases, biosecurity, and overall management systems. In this 2023-24 FY, we have advised or suggested 425 farmers about their problems regarding the livestock and poultry rearing system.

Fig 03: Farmer consultation service

4. Sample test service: Blood, feces, milk, and urine samples were collected and analyzed regularly at the station. Post-mortem farm animals can also be analyzed.

Fig 04: Sample analysis

5. Backyard meeting: About 6 backyard meetings were held at this regional station, where 30-35 participants were present from different villages (Alokdia, Potrazia, Khamarshanila). The primary objective of this meeting was to raise awareness among farmers about animal health management, production, feeding, breeding, and the production systems of different livestock species.

Fig 05: Backyard Meeting

6. Farmers training: Farmers are regularly trained at this regional center on various aspects of livestock development. In particular, they receive technology-based training developed by BLRI, such as dairy cow rearing, fattening, improved fodder cultivation, disease control and management, duck rearing, broiler farming, biosecurity, and more.

7. Model village program: A number of 11 beneficiary trained at khamarsanila village under sirajganj distrist. They have supplied Nacked neck chicken, vaccine, deworming, and training about sustainable livestock rearing system from this program.

Fig 06: Model village activity

Poultry Strengthening Research & Development Project

Assessing the effect of postbiotics of lactic acid bacteria on improving the quality and safety of broiler meat

This study evaluated the antimicrobial effects of cell-free supernatants (CFS) containing postbiotics from lactic acid bacteria (LAB) on the microbiological quality of broiler meat. The targeted pathogens were *Escherichia coli* ATCC 25922, *Salmonella Typhimurium* ATCC 14028, Pseudomonas aeruginosa ATCC 10145, and Bacillus cereus ATCC 14579. Initially, an in vitro microbial challenge test was conducted for 72 hours using the CFS from *Lactipantibacillus plantarum* NBRC 3070 (LP), *Lactobacillus acidophilus* ATCC 4356 (LA), and *Lacticaseibacillus rhamnosus* GG ATCC 53103 (LR). All three LAB strains demonstrated effective inhibition of the tested pathogens, particularly at a concentration of 30% CFS. Following the in vitro results, a broiler meat model was developed. Postbiotics were applied at two concentrations (300 and 500 µl/mL), and samples were stored at 4°C for 10 days. Microbiological analyses showed that postbiotics significantly reduced bacterial counts, with 500 µl/mL being more effective. Notably, LP, LA, and LR postbiotics at this concentration reduced total aerobic bacteria by 5.64, 5.26, and 3.53 log cycles, respectively. Reductions in E. coli were 5.35, 4.54, and 2.68 log cycles, while Salmonella Typhimurium counts were reduced by 5.27, 4.49, and 2.78 log cycles, respectively. Similar inhibitory effects were observed against P. aeruginosa and B. cereus. Pathogen counts began decreasing from 12 hours post-treatment, with LR postbiotics showing sustained efficacy throughout the storage period. The most notable result was the strong anti-typhoidal activity of LR postbiotics, reducing Salmonella Typhimurium from 7.04 to 2.68 $\log_{10}$ CFU/g by day 10. In contrast, control samples exhibited linear microbial growth. These findings indicate that LAB-derived postbiotics, particularly from LR, have strong potential as bio-preservative agents to enhance meat safety and extend shelf life.

Fig: Use of postbiotics to control foodborne pathogens on broiler breast meat refrigerated stored for 10 days.

Study on the performances, heat stress tolerance and meat quality of meat-type hybrid duck produced through three-way crossing in Bangladesh

This study evaluated the meat production potential of various duck genotypes, included local ducks (commonly referred to as Rupali), Pekin as a fast-growing, meat-type heavy duck, two-way crossbred F1 (50% Ruapli × 50% Pekin), and three-way crossbred H1 (25% Rupali × 25% Pekin × 50% Muscovy). The ducks were reared at the BLRI Duck Research Farm under hot and humid conditions with astandard feeding regime. Ducks were manually slaughtered following halal procedures and meat quality was assessed using proximate composition, physico-chemical properties, texture analysis, serum lipid profiles, fatty acid profiles, and amino acid composition. H1 crossbreds had a leaner meat profile like Muscovy ducks, with low crude fat (1.14%), and high protein content (23.87%). Female ducks displayed higher fat content in breast meat (1.87%) than males (1.36%). Similarly, H1ducks showed intermediate drip and cooking losses, stable color values and pH, contributing to broader consumer acceptability, with improved tenderness and lower shear force values, with males showing higher shear force (36.15 N) in the breast. The H1 ducks also exhibited lower saturated fatty acids (SFA) (28.69%) and higher monounsaturated fatty acids (MUFA) (49.02%) in breast meat compared to their parent lines, indicating leaner and healthier meat. The study found that H1 thigh meat has moderate Polyunsaturated fatty acids (PUFA) content (34.81%), which is associated with cardiovascular health. However, H1 breast meat has less omega-3 content than other genotypes, indicating further improvements. The H1 crossbred had average amounts of essential (EAA) and non-essential (NEAA) amino acids, with more arginine, glycine, glutamine, and cystine contents. There were significant sex-related differences, with males having higher lipid levels than females. The study suggests that H1 duck meat could be an alternative option for consumers, with supportive government policies and optimized crossbreeding strategies.

Rupali   Pekin   F1   Muscovy drake   H1

Development of meat type chicken utilizing native and exotic genetic resources of Bangladesh

That study undertaken to develop a meat type chicken by crossing native with exotic breed which produces comparatively more meat along with tastes similar to native

chicken.The objectives were to select best performing chicken lines based on production performance and meat quality. Three native and three exotic chicken genotypes were selected.Birds were fed with recommended nutrient and identified properly. All data were recorded individually. Four (4) lines were selected among 6 lines according to their performance and reciprocal crossing done in foundation stock for getting F1 generation. Lowest feed intake found in Line 7 (42.07g) whereas highest in Line 5 (45.84g) upto 10 weeks of age, In F1 generation there are almost 11 reciprocal crossing was performed. lowest body weight found in Line 7(31.02 ± 0.56^cg) and and highest in Line 8(37.96 ± 0.64^ag) in doc. In 4th week Lowest was in Line 5(156.57 ± 8^eg) and highest in Line 4(314.22 ± 6.78^ag). Lowest was found in Line 7(621.47 ± 19.59^dg and 707.83 ± 17^dg) and Line 3(950.43 ± 21.3^fg) in at 8th, 10th and 12th week of age. Highest body weight was found in consecutive weeks were Line 1(862.13 ± 11.51^ag) and Line 5(951.64 ± 18.43^ag and 1312.93 ± 29.79^bg). Age at onset of lay fertility and Hatchability were mortality were also analysed for both foundation and F1 generation. General combining ability, specific combining ability and heterosis were calculated for F1 generation for some growth and reproductive traits. We also analysed some meat quality parameters for both foundation stock and F1 generation. This is a ongoing project. After completing analysis we selected the best performed 2 or 3 lines in F1 for further crossing.All productive and reproductive data were recorded individually.We have to record more data both in F1 and F2 generation for make a constructive and valid conclusion.

Collection, conservation and improvement of specialized fowl (Turkey, Guinea fowl and Pigeon) production at BLRI

This study, conducted from July 2023 to June 2024 at the BLRI Research Farm, aimed to assess the carcass traits, physicochemical properties and chemical composition of various turkey, guinea fowl and pigeon varieties to identify the most suitable variety for meat production. The experimental design included four turkey varieties (Black, Bronze, White, and Red), four guinea fowl varieties (White, Pearl, Lavender, and Mixed) and local Golla pigeon. For turkey and guinea fowl, a total of 40 male birds per species (10 from each variety) were selected and slaughtered at 25 weeks of age for detailed carcass and meat quality evaluation. In addition, 20 Golla pigeon squabs (10 males and 10 females) were sampled at 4 weeks of age to assess meat yield and nutritional composition. Data were analyzed using SAS (version 9.4M7, 2020). Among turkey varieties, no statistically significant differences (P>0.05) were observed in carcass characteristics, digestive traits and proximate composition among the evaluated varieties. Meat quality parameters remained largely consistent, with the exception of notably lower drip loss in the Black variety and enhanced water holding capacity in the White variety. Similarly, in guinea fowl, carcass traits, digestive parameters, and most meat quality indicators showed no

significant variation (P>0.05). However, the Pearl variety demonstrated a significantly higher (P<0.05) crude protein content, while the Lavender variety exhibited a significantly lower ether extract and elevated ash content (P<0.05). In the case of pigeons, male Golla squabs yielded a higher dressing percentage and displayed superior crude protein content compared to their female counterparts. In summary, no single turkey variety emerged as distinctly superior in terms of carcass yield or meat quality. Nevertheless, the Pearl guinea fowl showed clear nutritional advantages, with the highest protein concentration and numerically greater dressing performance. Furthermore, the Golla pigeon exhibited no appreciable differences based on gender.

Fig 1: Determination of breast & thigh meat color by Color Reader CR8

Fig 2: Cooking loss determination of breast & thigh meat

Fig 3: pH determination of breast & thigh meat by pH meter (Hach, USA)

Production of value-added poultry meat and egg through dietary manipulation of selected herbal plants

The role of diet in promoting health has led to increasing interest in functional foods, particularly "designer eggs," which offer enhanced nutritional profiles. These modified eggs, enriched with omega-3 fatty acids and lower in cholesterol, are a promising avenue for addressing modern dietary concerns. This study aimed to investigate the effects of incorporating Moringa oleifera leaf (MOL) meal, Linum usitatissimum (flaxseed), and Trigonella foenum-graecum (fenugreek) into layer diets to improve egg quality, yolk fatty acid composition and cholesterol levels. A total of 168 Fayoumi laying hens, 27 weeks old, were randomly assigned to seven dietary treatment groups: T1 (Control), T2 (0.5% Flaxseed + 1% MOL), T3 (1% Flaxseed + 1% MOL), T4 (1.5% Flaxseed + 1% MOL), T5 (0.5% Fenugreek + 1% MOL), T6 (1% Fenugreek + 1% MOL), and T7 (1.5% Fenugreek + 1% MOL). The feeding trial continued until 43 weeks of age. Egg quality parameters were assessed, and yolk cholesterol and fatty acid profiles were analyzed using gas chromatography (GC-8890, Agilent, USA). The results indicated no significant differences in general egg quality traits (weight, length, width, shell thickness, and shape index) among treatment groups. However, birds supplemented with 0.5% flaxseed or fenugreek alongside 1% MOL for a longer period of time (16th week) produced eggs with significantly improved weight, increased omega-3 fatty acid content, and reduced

yolk cholesterol compared to the control group. In conclusion, dietary inclusion of 0.5% flaxseed or fenugreek with 1% Moringa oleifera offers a practical strategy to produce nutritionally enriched eggs without compromising egg quality. These findings suggest potential for developing value-added poultry products targeting health-conscious consumers. Further research using other medicinal plants like jute and bay leaf is warranted to explore their functional properties in modulating lipid metabolism in poultry.

| Fig: Moringa powder | Fig: Fenugreek seed | Fig: Omega 3 egg |

Screening and utilization of edible insect as a protein source in poultry diet

Sub-title: Determination of inclusion level of Black Soldier Fly Larvae (Hermetia illucens) meal as an alternative to protein source in the diet of broiler

Meal from black soldier fly larvae (BSFL) is one of the most promising and widely recognized alternative protein sources in the world. Bangladesh imports almost 68% of the raw materials used in the poultry industry. So, this study was carried out to use black soldier fly as an alternative protein source in broiler chicken diet to mitigate the cost. A total of 360 day old chicks of Arbor Acres were taken into consideration. For five weeks, there were six different treatments (0, 2, 4, 6, 8, 10%) for Black Soldier Fly (Hermetia illucens) (BSFM), each with four replications and fifteen chicks per replication. They were given the recommended amount of nutrients, vaccinated properly. Body weight was taken into record every week. At 35 days birds were slaughtered then carcass characteristics, physio-chemical parameters, TBARS and proximate composition of meat were evaluated. Experimental design was completely randomized design (CRD) and data were analyzed by SPSS 20 version. When compared to other dietary regimens, T3 (6% BSFM) had the highest body weight of broiler chicken ($P<0.05$). The broiler chicken dressing output was considerably higher ($P<0.05\%$) in T3 with breast and thigh meat. Meat color, drip loss (%), cooking loss (%), pH, and water holding capacity (%) were all unaffected ($P>0.05$) by the addition of BSFM for both breast and thigh broiler meat quality characteristics. Following meat preservation at 7,14,21 and 28 days, the T3 group's breast meat has significantly ($P>0.05\%$) less fat and a lower thiobarbituric acid value (TBARS value) than the thigh meat. Crude protein percentage of meat under T4 and T3 are significantly ($P<0.0001$) higher than other treatments. In conclusion, BSFM levels can be utilized up to 6% in broiler chicken diets and can be used as a substitute for protein sources to reduce feed costs.

Fig: DOC Distribution

Fig: Broiler fed BSF meal

Fig: BSF Meal Production

Quality and safety assessments of poultry meat products in Bangladesh

Processed poultry has gained higher acceptance over the other meat, such as pork and beef, owing to high protein content and affordable price. In this study, it has four objectives, those are –To conduct a baseline survey on the availability of poultry meat products in Bangladesh, to evaluate the nutritional quality of poultry meat products, to determine the heavy metals of poultry meat products, to determine spoilage microorganism of poultry meat products. The study was to find out the available chicken meat products in Chattogram town and its consumption to the consumer's level. For fulfilling the objectives, we considered three different areas for data collection. First one was Super Shop, second one was Franchise Outlet and the third one was Fast Food Shop. Weekly sale was 300 kg for Basket, 280 kg for Khulsi Mart, 250 kg for Shwapno and 200 kg for Agora. When, it was compared the data into these four super shops, it was showed highly significant difference ($p<0.001$) for weekly sale. The highest salable product was Chicken Meatball (44.48 ± 6.68) kg per week and the lowest salable product was Chicken Noodles (15.00 ± 0.42) kg per week. In case for Franchise Outlet: it was found no significant difference for weekly consumption. Through comparing the data into these fast food shops, it was also found no significant difference for weekly consumption. Finally, it may be concluded that further study is needed to explore the chicken meat products market in Chattograms town.

Fig: Pictorial view of survey

Ostrich *(Struthio camelus)* chicks management considering the environment of Bangladesh

Ostrich chicks are very sensitive to environment and needs to maintain highly intensive management. First four weeks of age ostrich chicks faced some major problems like slip tendon, hog joint swelling and toe fibrosis etc. Dry environment with adequate movement, temperature and humidity control is very important to prevent diseases and better growth. The successful growth factors of chicks include of exemplary hygiene, proper housing, adequate ventilation and balanced diet with enough forages. Insufficient nutrition and movement of chicks' is commonly the cause of the mentioned diseases and microbial infections, observed between two groups of chicks. The greater variable production cost being feed which calculated around 70% and high-quality protein required for ostrich chicks due to their fast-growing trend. Beside this, prevention of chick mortality is very important to profitability. Twenty-four Ostrich chicks *(Ostruthio camelus)* aged one week were brought for research from South Africa to the Poultry Research Center, Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka, Bangladesh and reared under semi intensive management system. The formulated ostrich ration was supplied along with *ad-libitum* roughages to the control group (T0). While treatment groups T1, T2 and T3 were added methionine 0.3, 0.4, 0.5 and lysine 0.8, 1.0, 1.2 percent in feed respectively. Fresh drinking water was supplied *ad-libitum* to the ostrich chicks. Different physical parameters were measured during the study and treatment group 3 showed better results than others treatment groups. Ostrich chicks in first 4 months of age and counted mortality 12% as of end the experiment. The body measurements at different parameters of ostrich were highly significant ($P< 0.05$). High positive correlations between live weight and other parameters were measured (neck diameter and length, shank diameter and length, wing and feather length, body length, heart girth and bird height) in the experiment.

Conservation and development of native geese production package by determining feed requirement with supplemental forages

The present study was designed to assess the efficacy of Oats (Avena sativa) fodder as a supplementation along with concentrate feed for determining egg quality, meat

color and texture, pH, drip loss, cooking loss, and water holding capacity (WHC) of Bangladeshi White and Gray geese varieties. A total of 60 adult geese from White and Grey varieties were reared in a semi-intensive production system in Bangladesh Livestock Research Institute, Savar. After 3 months of rearing, we collected freshly laid eggs for 4 weeks and 20 eggs /bird and 480 eggs for egg quality analysis. After that, those birds were slaughtered for meat quality analysis at 38 weeks of age. They were randomly divided into 4 groups with 3 replicates having 5 geese in each replication. Maize soya-based diet was considered as Basal diet and marked as T0- 200g concentrated feed, T1= 180 g Basal diet+ 138 g oats fodder, T2= 160 g Basal diet+ 276 g oats fodder, T3= 140 g Basal diet + 415 gm oats fodder daily. The data were statistically analyzed using SPSS software (23 version). Treatment had a remarkable effect on Albumen index, yolk CP % and breast meat cohesiveness value ($p<.05$). For egg quality parameter result showed that those traits were not significantly varied but tended to be higher in T2 group. Yolk and albumen CP% for T2 group was higher than other groups, but Breast meat cohesiveness tended to be lower in that group. However T2 group showed lower drip loss and cooking loss, higher WHC and also higher a* (redness) value but these parameters were not significantly affected by treatments. Supplementation of native Bangladeshi adult geese with 160 gm concentrate feed+ 276 gm oats fodder daily was found to be beneficial for improving egg and meat quality.

Demonstration and validation of BLRI developed native duck through community level at Bhanga, Faridpur

Duck farming appears to be a profitable business for the rural farmer of Bangladesh. Duck are more productive and resistant to the harsh climatic condition than chicken. Duck also supply adequate eggs and meat to family's diet as the cheapest source of animal protein. Indigenous ducks, though small in size, are well adapt to management in rural conditions of Bangladesh and their meat has been reported to be excellent quality. Improved feeding increases the egg production of ducks but not cost effective in comparison of feed cost. Potentiality of breed is one of the most important factors for successful duck rearing, particularly that for egg production. BLRI developed native ducks named as Rupali and Nageswary. Several studies were conducted to evaluate productive, reproductive and phenotypic characteristics of Rupali and Nageswary duck. All those studies were conducted on station under intensive management system. Presumptuous that both Rupali and Nageswary

ducks will perform better under scavenging system of rearing in rural condition, a field trial was conducted to validate the production ability of Rupali and Nageswary ducks compared to locally rear native ducks under farmer's condition. Demonstration and validation of BLRI developed native duck through community level at Bhanga, Faridpur was introduced to know the productive performance and compare the productive and reproductive performance at field level. Demonstration, validation and BLRI technology distribution to the rural women to improve their livelihood by income generating and supply nutrition like egg and meat. Egg of Rupali and Nageshori were distributed to the rural women for hatching. Data from rural farmer and duck shed of BLRI regional station were regularly collected and recorded. The data were based on Egg production, hatachability rate, duckling weight, and weight at 8 week of age, weight at 16 week of age, weight at egg production, and weight at culling.

Community involving economic diseases control model for chicken

Backyard chicken plays a vital role in our national economy, meet-up protein demand, and women empowerment. Newcastle disease (ND) was considered the cause of the highest economic loss in village chickens in most developing countries including Bangladesh.The study was carried out in the first year (2022-2023) to unveil the status of economically important diseases (especially ND) in backyard chickens of a community. For the current year (2023-2024), the study was carried out also to detect the NDV through RT-PCR assay with molecular characterization and to develop a ND controlling guideline. Mass vaccination against ND, farmers training, deworming and technical supports were provided (Figure 1). Total of 35 (nasopharyngeal and cloacal swab) samples were collected from suspected birds from Nowapara village under Bhanga Upazilla, Faridpur for detection with one-step RT-PCR test and molecular characterization. Sero surveillance of ND before and after vaccination were done using Haemagglutination (HI) assay (β method). Among the 35 (nasopharyngeal and cloacal swab) suspected samples, 10 samples were positive with RT-PCR test (Figure 2). Three positive isolates were partial F gene nucleotide sequenced and their phylogenetic analysis showed all are velogenic under class II, VII.2.i sub-genotype (Figure 3). Sero surveillance of ND before and after vaccination of a total of 46 birds (15 serum samples for pre-vaccinated and 31 samples for post-vaccinated) were done using the HI assay. The results of Ab titer level of HI test showed <8 in 50% of pre-vaccinated birds whereas Ab titer level of HI test showed >8 in 80% for post-vaccinated birds. Hence, vaccinated birds of 80% were in protective condition against ND. Therefore, to decrease the mortality in birds it needs to be continued mass vaccines against ND with close monitoring, sero-surveillance, disinfection, deworming, diagnosis, treatment and biosecurity practices for developing the Nowapara village as ND controlling model village.

Fig: Some pictorial views of vaccination, sample collection and distribution of inputs to the farmers

Fig: PCR band of 2, 5, 7, 9, 10 and 12 number samples here in the identification of NDV from
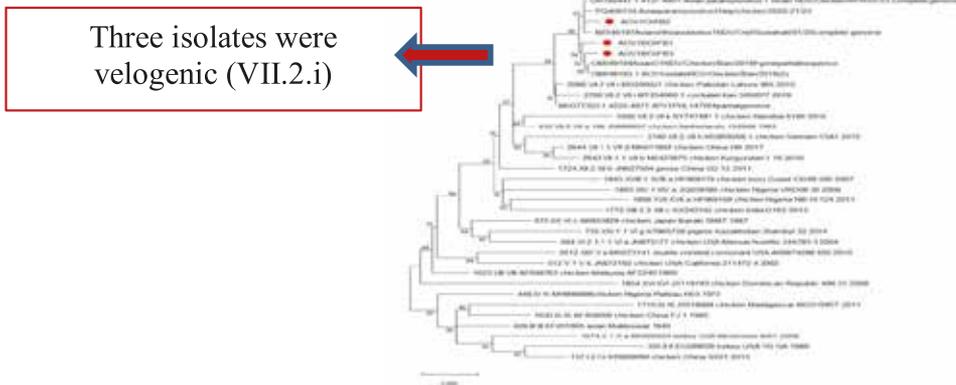
Fig: Phylogenetic tree of NDV based on our isolate's (red marked) partial F gene nucleotide sequence data, with class II different sub-genotypes using MEGA-X software

Recycling of poultry wastes for environment friendly low cost poultry production

The study was conducted during the period of July 2023 to June 2024 to estimate and evaluate the hatchery wastes produced in Bangladesh as well as at PRC, BLRI and, to develop locally made hatchery wastes processor for drying and grinding the wastes mechanically. Hatchery wastes including infertile / candling eggs produced in Bangladesh 50,000MT at the against of 123,76,00000 DOC produced yearly in Bangladesh. On the other hand, hatchery wastes produced at Poultry Research Centre (PRC), BLRI during the study period was estimated as about 1.5MT, respectively. To overcome the major challenges of processing the bulk amount of hatchery wastes commercially a locally made mini processor already been developed and trial given and found suitable to get processed hatchery waste meal for further feeding trial. After processing the processed hatchery waste meal was evaluated by proximate analysis. The dry matter, Crude Protein, Ether Extract, Crude Fiber and Ash content was 78.45, 22.62, 4.1, 14.5 and 19.51 percent, respectively. In conclusion, the study is an ongoing research. There is a major "breakthrough" was done by developing a locally designed waste processing device. The device will directly help to recycle the hatchery waste into poultry and /or other livestock, fish and pet feed thus not only reduce the environmental hazards but also helps to reduce the feed cost and increase the farm profitability as well.

Fig: Locally made hatchery waste processing device   Fig: Mechanically processed hatchery waste

Zoonoses and Transboundary Animal Diseases Prevention and Control Research Project

Development of an NSP ELISA kit for differential diagnosis of FMDV infected from vaccinated animals

Every year globally total impact of Foot and mouth disease (FMD) is US$ 6.5 to 21 billion for endemic countries. In the case of Bangladesh, the financial losses due to FMD virus are about 18856.96 crore taka annually. A range of ELISAs have been developed that utilize NSPs single or a combination of these proteins, generated as recombinant antigens in E. coli or in insect cells via baculovirus expression. The NSPs based ELISA kit is the best tool for sero-surveillance in the identification of antibodies against NSPs of Foot and mouth disease virus (FMDV) in animals for discrimination of infected animals from vaccinated ones. The current research work (2023-2024 fiscal year) aimed to determine the circulating FMDV serotypes from clinically suspected cattle in seven districts of Bangladesh for the development of the local NSP-based ELISA kit. All samples were subjected to RNA extraction and RT-PCR for virus detection using universal primers and then serotyping of FMDV using serotype-specific primers at FMD laboratory in BLRI was performed. A total of 81 clinically suspected samples were collected from 7 different outbreak areas namely as Dhaka, Dinajpur, Kurigram, Rangpur, Shariatpur, Sathkhira and Mymensingh of Bangladesh.

Out of 81 samples, 41.97% (n=34) samples were showed RT-PCR positive for FMDV. Three different serotypes of FMDV i.e. O, A, and Asia 1 were found in the positive samples. Among the positive samples, 46% (n=16), 40% (n=13) and 4% (n=2) were FMD serotype O, Asia 1 and A, respectively. Out of the positive samples, 10% (n=3) were the mixed serotypes like type O plus Asia 1 or O plus A. From the positive samples, FMD serotype O and Asia 1 were isolated and stored for the molecular characterization and to select FMDV strain for NSP based ELISA kit development or development of multivalent FMD vaccine.
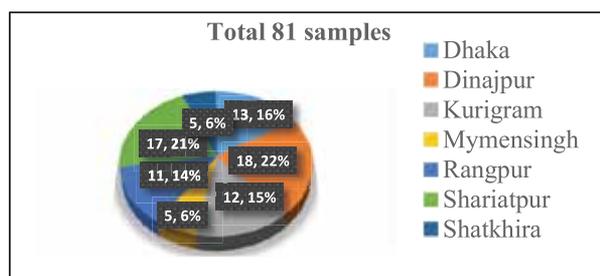

Fig: Sample distribution for FMDV identifications from different areas in Bangladesh

Epidemiology, molecular detection and development of intervention for combating the Inclusion Body Hepatitis in Bangladesh

The global spread of fowl adenovirus (FAdV) cases is related to the varieties of the virus infection. These disease outbreaks cause significant economic loss in the poultry trade. In Bangladesh, many poultry entrepreneurs have prioritized this disease and placed their demand to control and prevent FAdVs in the poultry population. The purposes of this study were to investigate the genotyping of FAdV associated with IBH and its risk factors, and the development of the vaccine. A total of 350 samples comprising cloacal swabs, liver and kidney were collected from 40 broilers farms in 6 districts, including Cumilla, Narsingdhi, Jamalpur, Netrokona, Chittagong, and Gazipur. All the collected cloacal swabs, liver and kidney samples were processed for identification and genotyping of the FAdV virus associated with IBH. In total, 80% (n=280) of processed field samples were found positive for FAdV-associated inclusion body hepatitis (IBH). At the farm level, 90% (n=36) of broiler farms were found positive for IBH. Positive FAdV-associated IBH was detected in the birds that were 2-3 weeks of age and showed clinical symptoms of IBH. The presence of the virus was confirmed by PCR amplification of an 897 bp fragment from the entire samples. The nucleotide sequences of three FAdV strains isolated in broiler farms were 99.37 - 99.87% identical with each other, and all of our FAdVs were classified as FAdV-E serotype 8b. The isolates were cultured in embryonated chicken eggs (ECEs). After harvesting, the cultured FAdV-E serotype 8b was confirmed with PCR test. In conclusion, sequence analysis revealed that serotype FAdV-8b has been the cause of recent field outbreaks of IBH in Bangladesh. IBH needs more attention in Bangladesh, and since there is currently no commercially licensed FAdV vaccine for IBH, this study may provide a starting point for further investigation and development of the vaccine.

Development of Goatpox vaccine seed from circulating local strain

Goatpox (GTP) is a highly infectious disease of goats caused by ds DNA virus of the genus Capripoxvirus under the family *Poxviridae.* The disease causes enormous economic losses due to reduced productivity, trade limitations, and mortality. Although GTP has been prevalent in Bangladesh for more than decades, the property of the prevalent goatpox virus (GTPV) has not yet been characterized. Therefore, the present study aimed to detect, isolate, and characterize field strains of GTPV for the development of a live attenuated vaccine seed. A total of 153 clinically suspected GTP cases were collected from 10 districts. Samples were processed and identified by PCR at the Vaccine and Biologics Laboratory, BLRI. The GTPV were isolated in primary LTC and Subsequently, adapted and attenuated in multiple cell lines. Of the sample cases, 95 (62.09%) cases were found PCR-positive. 8 GTPVs were successfully isolated from various outbreak areas in Bangladesh.

Following isolation, the GTPVs were adapted and attenuated in different cell lines: Vero cell line (passages 1-35) and MDBK cell line (passages 36-60) (Fig. 1 & 2). Viral growth was confirmed by PCR and titrated using $TCID_{50}$ assays at every 5th passage. In addition, whole genome sequencing of GTPV was performed. Sterility and purity tests of the BLRI developed live attenuated GTPV vaccine were done, followed by vaccine safety, efficacy and potency tests in white mice and goats, in accordance with WOAH guidelines. The efficacy tests in goat were performed by Indirect ELISA, and VNT. For the efficacy, GTP vaccine was injected SC in 10 goats and five goats were kept as control. All the vaccinated goats were remained healthy, without any side effect with the exception of fever in ten-times dose vaccinated group. The mean antibody titers of GTP vaccine were 161.33 at 21 dpv where one vaccinated goat was ELISA negative. In VNT, all the vaccinated goats showed antibody titer of 1:16 to 1:256. In the control group, none of the goats showed positive antibodies against GTPV both in indirect ELISA, and VNT. Validation of BLRI developed live attenuated GTP vaccine by the stakeholder in field level is going on.

Fig: (A) Confluent Vero cell line, (B) CPE of 35th passage at 4 dpi (4x), (C) CPE of 35th passage at 4 dpi (10x)

Fig: (A) Confluent MDBK cell line, (B) CPE of 60th passage at 4 dpi (4x), (C) CPE of 60th passage at 4 dpi (10x)

Surveillance and molecular evolution of avian influenza virus in Bangladesh

Avian influenza (AI) is a transboundary zoonotic viral disease caused by Influenza A virus (Orthomyxoviridae), affecting birds and mammals. Bangladesh first reported highly pathogenic avian influenza (HPAI) outbreaks in 2007. From 2007 to 2011, multiple outbreaks caused high poultry mortality and some human infections. The virus spread via domestic poultry, waterfowl, and migratory birds, introducing several HPAI clades. Currently, four H5N1 clades, including 2.2.2, 2.3.2.1a, 2.3.2.1c, and

2.3.4.2, have been detected, with clade 2.3.2.1a still circulating. The aim of this study was to investigate the molecular evolution of avian influenza viruses (AIVs) circulating in Bangladesh. A total of 346 oropharyngeal and cloacal swabs were collected from 58 farms across 10 districts in 7 divisions: Gazipur, Dhamrai, Cumilla, Bogura, Rangpur, Cox's Bazar, Barisal, Chattogram, Narsingdi, and Sylhet. Samples were transported under cold conditions to the NRL-AI and stored at -80°C. Viral RNA was extracted using the MagMAX™-96 AI/ND Viral RNA Isolation Kit on a KingFisher ™ Flex robot. All samples were screened for the AIV matrix gene and subtypes (H5, H9, N1, N2, N6) using RT-qPCR. Among the 346 samples, 14.45% (n=50) were positive for AIV type A. Detection rates varied by region, with the highest prevalence in Sylhet (90%) and Rangpur (50%). Subtype analysis revealed that 43 of 50 AIV-positive samples contained H9N2. Seven samples were co-infected with both H5 and H9. Of the H5-positive samples, six were H5N1 and one was H5N6. These were propagated in SPF embryonated chicken eggs. Whole genome sequencing was performed on ten A/H5N1 isolates from different species, including chicken, duck, quail, turkey, peacock, and ostrich. Phylogenetic analysis showed that all H5 viruses belonged to clade 2.3.2.1a, closely related to strains previously identified in Bangladesh. In conclusion, both H5N1 and H9N2 subtypes are co-circulating among diverse avian species in Bangladesh. Continued surveillance and molecular characterization are crucial to monitor virus evolution and mitigate the risk of zoonotic spillover and future influenza pandemics.

Development of Lumpy Skin Disease Vaccine Seed from Circulating Strain in Bangladesh

Lumpy skin disease (LSD) is an emerging transboundary viral disease of cattle and buffalo, caused by the LSD virus of the family Poxviridae under the genus Capripoxvirus. In Bangladesh, the first outbreak of LSD occurred in 2019 and since then, it has been creating havoc in cattle farming in Bangladesh. Therefore, the project was undertaken for the development of live attenuated LSD vaccine seed from the circulating strain. A total of 165 suspected LSD cases were collected from 20 districts and tested by PCR at the Vaccine and Biologics Laboratory, BLRI. Ten LSDV strains were successfully isolated in primary LTC. After isolation, the LSDV was adapted and attenuated through 60 passages in various cell lines such as primary LTC, Vero and MDBK cell line. The viral growth and quantification were performed by conventional PCR, qPCR, $TCID_{50}$, and plaque assays. Sterility and purity test of BLRI developed LSD vaccine was done followed by vaccine safety, efficacy, and potency tests in xenogeneic animals (mice) and calves as per WOAH guidelines. Finally, validation of the developed LSD vaccine was done by the stakeholder at CCBD Farm, Savar, Dhaka in 96 sero-negative calves randomly divided into 3-groups, where group 1 was vaccinated with the BLRI-developed LSD

vaccine (n=70 calves), group 2 was vaccinated with the commercial vaccine (n=19 calves), and group 3 was kept as a control (n=7 calves). The efficacy tests were performed by Indirect ELISA and VNT at 0 days, 21 days, 60 days, and 180 days of post-vaccination(dpv) in three different laboratories such as Laboratory of Microbiology and Hygiene, BAU, Mymensingh; CDIL, DLS, Dhaka; and the BLRI, Savar, Dhaka. The mean antibody titers were 71.42±1.4, 74.14±2.7 and 91.7±0.8 respectively in group-1, whereas in group-2 were 15.74±0.0, 16.71±1.3 and 47.05±0 respectively at 21 dpv, 60 dpv and 180 dpv (Fig.1 & 2). No immune response was detected in the control group. In VNT, 78%, 85% and 93% calves vaccinated with BLRI-developed LSD vaccine showed antibody titer of ≥1:16 at 21 dpv, 60 dpv and 180 dpv respectively, indicating robust immunogenicity. In addition, whole genome sequencing (WGS) of LSDVs was performed and submitted to the gene bank (Accession number PP746705.1 and PP756497.1). To the best of our knowledge,this is the first complete genome sequencing of the LSDV vaccine isolate in Bangladesh. The vaccine is completely safe, protective against LSD, and ready for use in the field condition.

Buffalo Research and Development (1st Revised) Project

Performance evaluation of crossbred buffalo under on-station and on-farm conditions

The study was undertaken i) to evaluate the productive and reproductive performance of crossbred buffaloes under on-station conditions and ii) to develop a feeding regime for buffalo heifers attaining puberty within 28 months of their age. The research was conducted at BLRI Buffalo Research Farm, Savar, Dhaka. The indigenous buffalo cows were bred with Murrah or Nili-Ravi bulls to produce 50% Murrah x 50% Local and 50% Nilli-Ravi x 50% Local F1 crossbred buffalo calves. Moreover, twenty crossbred heifers were selected for a feeding trial and divided into two groups: group A (>18 months, n=5) and group B (6-18 months, n=15). Group A was reared under routine management, while Group B was reared under intensive management conditions with 10% higher energy in the diet. In another experiment, nineteen crossbreed buffalo bulls were fed a total mixed ration (70% roughage and 30% concentrate) diet for a period of 120 days to identify the more efficient buffaloes by using the residual feed intake (RFI) selection tool. Buffaloes with positive RFI values were low efficient (High RFI group), and buffaloes with negative RFI values were efficient (Low RFI group). A total of 169 crossbred buffalo calves were born at BLRI since 2018. The body weight of buffaloes at different ages are shown in Fig. 1. Buffaloes in Group B attain puberty ($P<0.05$) at an earlier age (25.88 ± 1.3months) than Group A (36.53 ± 1.0 months). Significant variations ($P<0.05$) were observed in RFI among the buffalo bulls (8 bulls in low RFI and 11 bulls in high RFI groups) (Fig. 2). Buffalo bulls with low RFI intake lower DMI (5.24 ± 0.05 kg vs. 5.44 ± 0.04kg) compared to high RFI ($P<0.05$) maintaining similar average daily body weight gains (0.35 ± 0.492kg vs. 0.33 ± 0.38kg). This study summarized that early puberty in buffalo heifers may be attained with 10% higher energy supplied in the diet at an early stage. On the other hand, RFI is a valuable metric for predicting growth efficiency in crossbreed buffalo bulls.

Conservation and improvement of indigenous buffalo for milk production through open nucleus breeding program

Indigenous buffalo for milk production are vital for sustaining livestock diversity and enhancing the livelihoods of smallholder farmers. The study was conducted i) to improve milk production of indigenous river buffalo through selective breeding ONBS in subsistence farming conditions and ii) to conserve indigenous buffalo for maintaining germplasm of indigenous stock as part of maintaining bio-diversity. For this study, 11 Upazilas were selected along with the BLRI buffalo research farm. A baseline survey was conducted in the project areas. From these areas, 1000

indigenous milking buffalo cows were selected considering their daily milk production and parity. Buffalo's milk yield was recorded at the 14th, 42nd, 70th, and so on at 28-day intervals up to 280 days in accordance with ICAR with different calving seasons. A standard genotyping protocol using microsatellites was established for genotyping of lactating buffaloes to select pure indigenous buffalo bull mothers. Forty indigenous buffalo cows were selected for genotyping. From the survey, a total of 1442 buffalo rearing farmers were found and the total population of buffaloes was 48670 heads. Milk yield and its composition were significantly differed among calving season. Milk yield were significantly higher in rainy season. Milk fat was significantly higher in winter season whereas lactose and SNF was higher in rainy season. The dissociation curve (according to melting temperature) of microsatellite (CSSM047) in different buffalo breed were shown in Figure 1. Indigenous × Murrah cross shown dominance in the curve (green) melting Temperature (Tm) was 76.66°C, indigenous (red) (Tm 76.52°C) and Murrah (blue) (Tm 76.34°C). The HRM Tm for these three buffalo breeds were significantly differed.
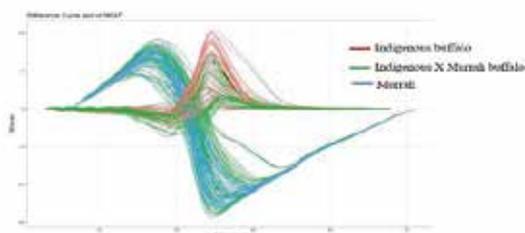
Fig. Genotyping of Buffalo with

This study summarized that indigenous river buffalo had average 2.82kg daily milk yield for 300 lactation period and its milk yield and composition varied by season of calving. It also unveiled that breed difference and origin of purity could by assessed by HRM genotyping method.

Development of buffalo fattening model for quality meat production at community

Buffalo meat is a nutritious alternative to beef, offering lower fat, cholesterol, and calorie content. However, in our country, it's often of poor quality due to sourcing from aged, undernourished animals, resulting in poor meat quality and unappealing appearance. To address this issue, a study was conducted to identify appropriate feeding systems and management practices for effective buffalo fattening. Two experiments were conducted involving ten buffalo bulls, aged approximately 20-24 months, with an average body weight of approximately 244 kg. These bulls were randomly assigned to two dietary groups: a Control group (R1) That Grazed only and a Treatment group (R2) That Fed a diet consisting of 70% roughage and 30% concentrate. The results revealed that while dry matter intake did not differ

significantly between the groups, the R2 group showed significantly higher average daily gain, feed conversion ratio, and total live weight gain. The second experiment focused on community-based buffalo fattening. It involved buffalo bulls from three age groups: Group A (18-22 months), Group B (23-27 months), and Group C (28-32 months). The study was conducted across three locations: Ishwardi, Companyganj, and Anowara. The feeding system differed slightly by location but generally included combinations of roughage and concentrates. The findings indicated that buffaloes in Group C had significantly higher dry matter intake, final body weight, and average daily gain compared to all other locations. However, FCR was lowest in Group C at Companyganj and Ishwardi and in Group A at Anowara, indicating better feed efficiency in these specific cases. Despite superior growth performance, Group C also incurred the highest cost per kilogram of meat produced. From a cost-effectiveness perspective, fattening buffaloes at 18-22 months of age (Group A) proved more economical, yielding lower production costs per kg of meat. Additionally, Ishwardi emerged as the top-performing location in terms of daily weight gain, underscoring the influence of geographical and management factors on fattening efficiency. These results highlight the importance of age selection, location, and diet composition in optimizing buffalo meat production.

Development of feeding and nutritional management practices for optimization of dairy performances in buffalo

About 40% of indigenous buffalo both river and swamp type reared under coastal part showed poor productive and reproductive profiles due to quality feeds, fodder and pastures. This study was aimed to introduce high yielding fodder in coastal land, evaluation of rotational grazing system at community and formulate a least cost ration for dairy buffalo production at community. The results of the experiment-1 revealed that plant height, rising height, crude protein and ash content were significantly ($p < 0.05$) higher in German fodder compared to local Dal grass in all three harvest interval. Additionally, experiment-2 of rotational grazing pakchong fodder showed that significantly ($p < 0.05$) higher fresh biomass yield were found at 45 days (20.75 ± 0.17 t/ha/c) compared to 35 days (16.14 ± 0.41) and 25 days (12.38 ± 0.32). Significantly ($p < 0.05$) higher crude protein was found at 25 days (18.88 ± 0.72) harvest interval (HI) followed by 35 days (14.28 ± 0.33) and 45 days (12.38 ± 0.24). Furthermore, results of experiment-3 exhibited that significantly ($p < 0.05$) higher dry matter intake was found in the T0 group followed by T1, T3 and ¬T2 groups. Milk yield was significantly ($p < 0.05$) higher in the T3 group followed by the T2 and T1 group compared to the control. Net return over feed cost was significantly ($p < 0.05$) higher in the T2 group followed by T3 and T1 compared to the control. Blood metabolites of triglycerides, cholesterol, HDL, LDL, ALT, AST, gGT, and total protein did not differ ($p > 0.05$) with different dietary groups but glucose was

significantly higher in the T3 group (99.33±8.08) followed by T2 (92.00±11.27), T1 (89.3±14.50) and T0 (84.00±3.0) respectively. This study summarized that, German grass adopted with better yield and nutrition in the coastal areas, Pakchong showed higher nutrition at 25days HI at Godagari and dairy buffalo can optimize production with higher economic return at 25% increased ME and CP dietary group compared to others.

Epidemiological investigation of major buffalo diseases and evaluation of effectiveness of deworming against buffalo diseases in Bangladesh

Buffaloes are an important livestock species in tropical and subtropical regions. The buffalo is an important domestic animal that provides milk and meat, dung for fuel and organic fertilizer, draft power for agricultural work, and hides and skins used as raw materials in various industries. Parasitic infestations pose a major threat to profitability in livestock production. Gastrointestinal parasites cause significant economic losses by reducing weight gain, impairing digestion, lowering productivity, and reducing reproductive performance. They can also increase mortality rates, further impact overall herd health, and returns. This study was conducted to estimate the effectiveness of deworming in buffaloes in four areas of Bangladesh (Madarganj, Kaliganj, Godagari, and BLRI Buffalo Farm in Savar) and randomly divided into four age groups: A (<1 year), B (1-3 years), C (3-6 years), and D (>6 years). Faecal samples (n=960) were collected and analysed using the modified McMaster method to quantify EPG at pre- and post-deworming periods. A combination of ivermectin and clorsulon was administered subcutaneously at a dose of 1 ml per 50 kg body weight. The Findings revealed that the most commonly identified parasites were Trichuris spp. (49.11%) and Coccidia spp. (39.22%), followed by Ascaris spp. (5.05%), Fasciola spp. (3.79%), Strongyloides spp. (2.31%), and Toxocara spp. (0.53%). A higher parasitic infestation was observed in the calf group (<1 year), and a high prevalence of Trichuris spp. (49.11%) and Coccidia spp. (39.22%). Dewormed within 10 days showed a reduced faecal egg count (FEC) (1185.71 ± 350.47), whereas untreated calves exhibited a high parasitic infestation (4883.33 ± 651.06) after one month, and severe infestations lead to gastroenteritis. The effectiveness of deworming showed a significant reduction in parasitic infestation. However, parasitic loads increased at three months post-deworming, indicating the need for quarterly deworming to maintain free from parasitic infestation. This study highlights the significance of strategic deworming schedules in mitigating parasitic burdens and enhancing buffalo productivity in Bangladesh.

Impact of Waste Management Practices in Buffalo Farm

Subtitle: Comparative Study on Vermicompost Production Using Different Proportions of Farm Waste with Buffalo Dung.

Vermicomposting is a waste management technique that uses worms to compost and create premium organic fertilizer. It is a sustainable waste management practice that converts organic waste into nutrient-rich compost through the action of earthworms. Using different ratios of farm waste with buffalo dung, the current study introduced improved buffalo waste management practices and increased profitability through improved buffalo waste management techniques. To achieve the above objective, vermicomposting was conducted on-station using different proportions of farm waste with buffalo dung in RCC rings. Raw Buffalo dung (T0), 90% buffalo dung with 10% farm waste (T1), and 80% buffalo dung with 20% farm waste (T2) were the three treatments that were examined; each treatment had three replications. The experiment was carried out in two phases. In the first phase, vermicompost was produced in nine RCC rings with regulated climatic conditions, and moisture levels were maintained at 60–65%. In phase two, chemical composition was examined, considering factors such as pH, organic carbon (OC), nitrogen (TN), phosphorus (P), potassium (K), sulfur (S), the carbon-nitrogen ratio, and heavy metals. SPSS software was used to examine the data. According to the results, T2 had the largest dry matter (DM) and ash content, while T1 had the highest vermicompost production. Although the differences among the treatments were not statistically significant, T1 contained the highest pH. There was substantial variation in the nutrient content (OC, TN, P, K, and S), with T2 exceeding the other groups. The carbon-nitrogen ratio was observed to be the highest in T2, but there was little change in the heavy metals (Zn, Ni, and Cr). Considering the above finding, this study summarized that different proportions of farm waste influence the quality of vermicompost. Vermicompost produced by a combination of 20% farm waste and buffalo dung was found to have a higher nutrient content than vermicompost produced solely from buffalo dung.

Adoption and Economic Analysis of Improved Feeding Technologies of Buffalo Rearing in Some Selected Char Areas of Bangladesh

Subtitle: Effect of Total Mixed Ration on Productivity and profitability of Lactating Indigenous Buffalos: Evidence of Ishwardi Upazila

Livestock is thought to be one of the important resources for improving the living standard of people and ensuring food and nutrition security. In livestock sector, buffalo rearing is holding a significant place in the tropical and sub-tropical region including Bangladesh which is considered to be a valuable species. Despite its prospects, rearing of this species is infested with many problems and one of them is extensive system of rearing and scarcity of good quality feed which reduce buffalo productivity to a great extent and causes disease infection. Considering this drawback, this study was conducted to evaluate the effect of Total Mixed Ration (TMR) technology on productivity of dairy buffalo and to assess the comparative profitability between treatment groups. For this, sixteen dairy buffaloes were selected

(12 buffalos out of 32 buffalos from one farmer and 4 dairy buffalos out of 20 buffalos from another farmer) at Ishwardi upazila under Pabna district for community-based TMR feeding technology adoption in a completely randomized design. All animals were selected from 2nd/ 3rd parity stage and 3rd lactation period. Four buffaloes in each group were categorized into four dietary treatments; Control (T0) –100% Roughage; T1- TMR (50%Roughage + 50%concentrate);T2- TMR (60% Roughage + 40% Concentrate); T3- TMR (70% Roughage + 30% Concentrate) for 120 days. Result shows that dry matter intake was highest in T1 (9.85±0.33 Kg/d/c) group followed by T2 (9.56±0.23 Kg/d/c) group. Milk yield was highest in T1 (3.45 L) group followed by T2 (3.16 L), T3 (2.31 L) and T0 (2.29L) groups. BCR was highest in T2 (1.34±0.18) group and lowest in T0 (1.23±0.18) group which makes T2 group as the most profit earning group. Result suggests that for attaining higher productivity and profitability TMR technology should be adopted by farmers, especially TMR (60% Roughage + 40% Concentrate) is recommended for profitable venture.

In vitro Embryo Production in Buffalo

Reproduction is essential to maintain herd numbers, improve genetics, and ensure economic profitability, all of which are critical to the sustainability and efficiency of livestock operations. The study was conducted i) to improve the efficiency of ovum pick up technology for oocyte collection from elite buffalo donor cows/heifers; ii) to improve the efficiency of in vitro buffalo embryo production; and iii) to transfer OPU-IVP derived embryos into recipient buffalo cows. Ten buffalo cows were selected from BLRI Buffalo farm for OPU technology. Bovine ovaries were collected from slaughter house located in Mohammadpur, Dhaka to produce in vitro embryos. Moreover, to improve the maturation of oocytes, AST (4µM) was supplemented with maturation media in the following treatments: fresh oocytes were submitted to 1) AST treatment group (IVM with AST), and 2) control group (IVM without AST). Present findings showed that AST improved the maturation rate of bovine oocytes which was 89% for AST and 84% for control group. Highest diameter of matured oocyte was 132.04±16.29 µm with the AST group and 123.48±22.66 µm with only control group. A total of 888 cumulus-oocyte complexes (COCs) were aspirated. After grading COCs by using a stereomicroscope, a total of 784 graded COCs were incubated for in vitro maturation. Around 85% of COCs were expanded with cumulus cells. About 636 graded matured COCs were fertilized with capacitated cryopreserved semen. The cleavage rate was 78% (497). After In vitro fertilization, the assumed zygotes were cultured in an in vitro culture-I (IVC-I) medium for 3 days. After 3 days, 8 to 32 cells embryos were transferred into IVC-II medium until day 8 for culturing up to the blastocyst stage. Oocyte maturation was improved by AST supplementation in maturation media shown in figure.
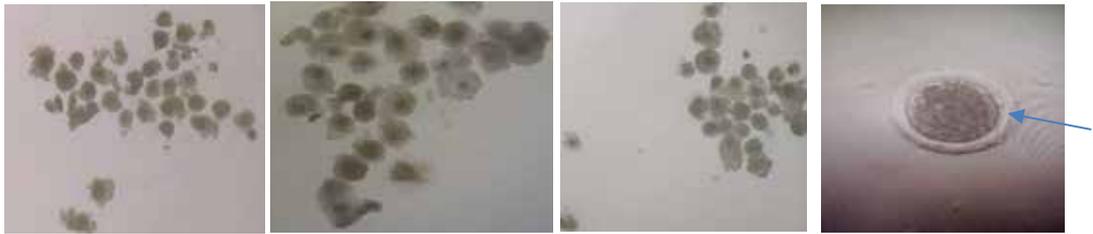
Fig. (i) Oocytes before maturation, (ii-iii) matured in AST & control, (iv) Matured with polar body

This study revealed that oocyte maturation was improved by AST supplementation in maturation media for its antioxidative mechanism.

Development of animal recording and genetic evaluation system to foster indigenous buffalo selection program

Buffaloes serve as an important genetic resource for milk, meat, draft power, and livelihood support especially for smallholder and marginal farmers. The country is home to approximately 1.46 million buffaloes, primarily managed through household subsistence and extensive based systems in coastal saline regions. Despite their significance, buffalo genetic improvement has historically received limited attention. This study aimed to establish a structured on-farm recording system and genetic evaluation platform for indigenous river-type buffaloes in Bangladesh to support breed improvement efforts. A total of 121 Indigenous mature female buffaloes (22 from Jamalpur, 33 from Pabna, 28 from BLRI and 38 from Rajshahi) were selected for this study. Individual animal identification, pedigree, body measurements, growth, reproductive traits, milk yield, milk composition were systematically recorded. The average body condition score of Indigenous buffaloes were 3.50 ±0.03(96), parity ranged from 1-7, horn length 39.68±1.66 (87) inches, heart girth 182.75±0.95 (87) inches, body length 144.37± 0.60 (87) inches, wither height 92.84±2.25 (87) inches, rump height 104.86±1.43 (87) inches, body weight 428.26±10.10(47) kg, birth weight 35.16 ± 1.43 (53) kg, body weight 434.26±11.17 (73) kg, postpartum heat at 85.71±3.43 (57) days, service per conception of 1.45 ± .46 (63), calving interval of 394.13±3.24 (63) days, daily milk yield of 3.37± 0.068 (112) kg, and peak daily yield 4.13±0.087 (37) kg, fat content of 8.63±0.27 (119)%, protein content of 3.84±0.06 (119) % and SNF content of 9.52 ± 0.13 (119) % were observed. The obtained results indicate that Indigenous buffaloes are very promising resource of Bangladesh and have scope for their improvement through breeding. To capitalize on the potential of indigenous buffaloes, Using VCE software, Restricted Maximum Likelihood (REML) analyses will estimate genetic parameters like heritability and genetic correlations. Breeding values (EBVs) will be calculated using BLUP methodology via PEST software to facilitate the selection of superior breeding bulls and cows for sustained genetic improvement.

SNP analysis and gene expression profiling for milk fat and protein-related traits in river buffalo populations of Bangladesh

This study was to evaluate the production potentials of riverine buffalo populations in Bangladesh. Besides, gene expression analysis was performed to elucidate the underlying genes associated with the milk fat and protein content of buffalo milk. A total of 320 buffaloes were selected to establish phenotypic performance database through Herdbook-based record keeping system. Milk composition traits were assessed using a portable Lactoscan. The highest daily milk yield (L) was found in Murrah buffaloes (3.80±0.22). The daily milk yield differed non-significantly between Indigenous and upgraded buffaloes. Lactation length had highly significant difference among the genotypes in Indigenous, Murrah and upgraded buffaloes. Milk fat (%) also varied significantly among the genotypes, the highest value was recorded in Indigenous buffalo while the lowest in upgraded buffalo. Moreover, the highest SNF (%) was found in Murrah buffalo. However, the protein (%) did not vary significantly among the genotypes. Locations had significant difference on different productive and reproductive traits of river type buffalo of Bangladesh except for the trait protein percentage. A total of 22 pairs of primers (20 candidate genes and 2 housekeeping genes) were used in gene expression experiment. A cohort of twelve buffaloes was meticulously selected, and categorized into high-fat (>10.5%), low-fat (<6.5%), high-protein (>3.8%), and low-protein (<2.75%) groups based on milk composition. In buffaloes producing high-fat milk, a significant upregulation was observed in genes associated with fatty acid synthesis (ACACA, FASN), milk protein synthesis (CSN2, LALBA, LGB), hormone receptors (ESR1, PGR), and oxidative stress response (GPX1, SOD1). Conversely, in buffaloes producing high-protein milk, altered expression patterns were observed in genes involved in fatty acid synthesis (FASN), milk protein synthesis (CSN2, LALBA, LGB), hormone receptors (ESR1, PGR), and glucose transport and energy metabolism (PPARGC1A, SLC2A1). This study provides valuable insights into the genetic regulation of milk fat and protein synthesis in riverine buffaloes. The identification of key genes associated with these traits could pave the way for targeted genetic selection and breeding strategies.

Standardization of estrus synchronization techniques for improvement of reproductive efficiency of native buffaloes in Bangladesh

The present study was aimed to know the effects of mineral supplementation in reproductive performance of native buffaloes. A total of 59 female native buffaloes were selected at Madarganj upazilla, Jamalpur district. A total of 21 buffaloes were used for estrus synchronization with ovsynch protocol in which buffaloes were injected with 5 ml Gonadorelin (GnRH) on day 0, 5 ml Reprolyse (PGF2α) on day 7 and again GnRH on day 9 for estrus synchronization and AI was performed with

frozen-thawed semen at 16 hrs after final dose of GnRH injection. Again, 10 gm mineral mixture (DCP plus) was offered to 18 buffalos daily and 20 buffaloes were examined as non-treated control group. Blood was collected after 1 month of treatment to examine blood glucose, total protein, albumin, tryglyceride, cholesterol, calcium and phosphorus. In mineral supplemented group, 83.33% and in estrus synchronized group, 91.67% showed estrus which were significantly (P<0.05) higher than the control group (35%). Again, 83.33% and 70.83% buffaloes conceived in estrus synchronized group in mineral supplemented group respectively which were significantly (P<0.05) higher than control group (30%). Calving rate was 65.83% in mineral supplemented group and 77.78% in estrus synchronized group which were significantly (P<0.05) higher than the conception rate of control group (30%). Calcium and phosphorus levels were significantly higher in mineral supplemented group than the control group. Glucose level was significantly (P<0.05) higher in the mineral supplemented group than estrus synchronized group and control group. Albumin level was significantly (P<0.05) higher in the estrus synchronized group than the mineral and control group. The tryglyceride and cholesterol values was significantly higher in estrus synchronized group (P<0.05) than the mineral and control group. In conclusion, mineral supplementation enhances estrus response, conception and calving rates of native buffaloes.

Increasing efficiency of artificial insemination for improving conception rates in river buffalo

The pregnancy rate is important for profitable dairy farming. The aim of the study to determine the effect of intra-vaginal bio-stimulation with a modified penis-like device (mPLD) and clitoral massage subsequent artificial insemination (AI) to increase the pregnancy rate of water buffaloes. The study was conducted from July 2023 to June 2024 in the selected coastal region of Bangladesh. The AI was performed in 160 buffalo cows after observing their estrous sign. During AI, the buffalo cows were divided into four groups (group A: only AI was conducted; group B: intra-vaginal bio-stimulation with mPLD following AI; group C: massage of the clitoris after AI; group D: both mPLD and the clitoral massage was done following AI). Each group consisted of 40 animals. Age, breed, parity, body condition score, reproductive health status, and previous calving difficulties were recorded at AI. The average pregnancy rate was found 41.3% (66/160). The pregnancy rate in groups A, B, C, and D were 32.5, 42.2, 37.5 and 52.5%, respectively. It is determined that both application of intra-vaginal bio-stimulation with mPLD and massage of the clitoris following AI (group D) showed a significant (P<0.05) effect on pregnancy rate than the control group (group A). The pregnancy rates were influenced (P<0.05) by the parity, reproductive health, and previous records of calving difficulties of buffalo cows. The age between 2.5 to 3.5 was found to significantly (P<0.05) lower chances of

pregnancy than that of other age groups. The age is highly correlated (P<0.01) with breed and parity. It is concluded that the application of mPLD in conjugation with massage of the clitoris enhances the pregnancy rate of buffalo cows. In further study, it is assumed that the injection of GnRH hormone after the application of the technique may increase the pregnancy rate of water buffaloes.

Optimizing the process technology of manufacturing value-added diversified buffalo milk cheese and rasomalai based on their nutritional and physicochemical profile

Milk and milk products are nutritionally rich but lack dietary fiber and are poor sources of Omega-3 (n-3) fatty acids. As modern dairy food consumers prioritize health-oriented food choices, enhancing the nutritional value of dairy products through fiber and n-3 fatty acid enrichment offers significant potential. This study aimed to develop value-added processed cheese and rasomalai from buffalo milk with improved texture, flavor, and nutritional profile. Various fiber sources: carrot (0%, 5%, 10%, 15%), chia seed (0%, 1%, 2%, 3%), inulin (0%, 1%, 3%, 5%), and β-glucan (0%, 0.5%, 1.0%, 1.5%) were added to processed cheese respectively. Omega-3 enrichment was achieved using chia seed, flaxseed, walnut (1-3%), and cod liver oil (1-2%). The base cheese formulation included 65% cheddar cheese, 7% cream, 10% curd, 5% skim milk powder, 10% distilled water, 0.5% salt, and 2.5% tri-sodium citrate. Results indicated that 5% carrot addition improved cheese yield, brightness, dietary fiber, and sensory attributes, while chia seed at 1% optimized protein content and sensory scores. Inulin at 1% enhanced flavor, taste, texture, and nutritional parameters. β-glucan at 0.5% improved fat, total solids, ash, and texture characteristics, showing increased hardness and gumminess. In the case of fatty acid profiles confirmed that Omega-3 fortification significantly increased α-linolenic acid (C18:3 ALA), eicosatetraenoic acid (C20:4), and reduced palmitic acid (C16). Cod liver oil also introduced docosahexaenoic acid (C22:6, DHA). The fatty acid profile and Omega-3 to Omega-6 ratio were optimized in both cheese and rasomalai. Sensory analysis showed the best results for 1% flaxseed and cod liver oil, 2% chia seed, and 3% walnut. In conclusion, fiber fortification with 5% carrot, 1% chia, 1% inulin, and 0.5% β-glucan, along with optimal Omega-3 additions, can significantly enhance the nutritional value of buffalo milk-based cheese and rasomalai. Further study is needed to refine combinations for maximum sensory and health benefits.

Classical, applied, and molecular epidemiological studies to develop disease risk management, treatment, and control model of FMD, anthrax, and hemorrhagic septicemia

Foot and Mouth Disease (FMD), Anthrax, and Hemorrhagic Septicemia (HS) are significant infectious diseases affecting buffalo populations in Bangladesh. However,

existing studies have often lacked the statistical rigor and epidemiological indices necessary for evidence-based disease control. This study aimed to address these gaps using classical, applied, and molecular epidemiological approaches to assess the prevalence and transmission dynamics of these diseases in buffaloes. A total of 600 buffaloes from three upazilas—Fenchuganj, Companiganj, and Godagari—were surveyed. Samples included blood and nasal swabs, and data on animal-level variables were collected using pretested questionnaires. Molecular testing was conducted using PCR and microscopy, following standard protocols. The sero-survey results reveal varying molecular prevalence rates of different diseases across three locations. For the sero-survey of FMD, the prevalence was 0.44 (0.33 - 0.57) in Fenchuganj, 0.45 (0.30 - 0.60) in Godagari, and 0.48 (0.33 - 0.63) in Companiganj. In contrast, the survey for HS showed that Fenchuganj had no cases (0.00), Godagari had a prevalence of 0.53 (0.46 - 0.60), and Companyganj had a significantly lower prevalence of 0.02 (0.01 - 0.05), while Anthrax was nearly absent. Interestingly, 16 cases of mixed infections of FMD and HS [0.29 (0.17 – 0.44)] were identified in Rajshahi. Transmission dynamics modeled using the SIR (Susceptible-Infected-Recovered) framework estimated basic reproduction numbers (R_0) of 4 for FMD and 5 for HS. Based on these R_0 values, achieving herd immunity would require vaccination coverage of 75–80% with a 100% effective vaccine. This requirement increases to 79–94% for vaccines with 85–95% efficacy. The epidemic peaks were projected at 42% and 52% of the population with durations of 90 days and 40 days for FMD and HS, respectively. The study offers a data-driven foundation for future policies and interventions targeting FMD, HS, and Anthrax in Bangladesh.

Exploring a model for the buffalo calf health management through improved therapeutics against pneumonia and diarrheal diseases in selected

Running Title: Shotgun metagenomics for the identification of diarrheal pathogens in the gut microbiota of buffalo calves in Bangladesh

Gut microbiota has been exclusively a topic of metagenomic research. This study aimed to accurate estimates of their prevalence and to better understand the role and ecological dynamics of gut microbiota of buffalo calves using shotgun metagenomics. Several diarrheic fecal samples were collected from buffalo calves of which four buffalo calves with bloody diarrhea, four calves with watery diarrhea, and seven normal calves, and the microbial flora of the samples were analyzed by shotgun metagenomics (DNA sequencing). Protozoal parasites were detected in the metagenome sequences and identified using polymerase chain reaction (PCR). *Cryptosporidium,* Eimeria, Giardia, Blastocystis, and Entamoeba were detected by metagenomic analysis and the identified species were Giardia duodenalis assemblage E, *Cryptosporidium* bovis, Eimeria bovis, Eimeria subspherica,

Entamoeba bovis and Blastocystis ST2 and ST10. Metagenomic analysis showed that the intestinal microbes of calves with diarrhea were disordered, especially in calves with bloody diarrhea. Furthermore, different parasites show distinct relationships with intestinal microecology. *Cryptosporidium,* Eimeria and Giardia were negatively correlated with various intestinal bacteria but positively correlated with some fungi. However, Blastocystis and Entamoeba were positively associated with other gut microbes. Twenty-seven biomarkers not only were significantly enriched in bloody diarrhea, watery diarrhea, and normal calves but were also associated with Eimeria, *Cryptosporidium,* and Giardia. Only Eimeria showed a distinct relationship with seven genera of bacteria, which were significantly enriched in the healthy calves. All 18 genera of fungi were positively correlated with *Cryptosporidium,* Eimeria, and Giardia, which were also significantly enriched in calves with bloody diarrhea. Functional genes related to parasites and diseases were found mainly in fungi. This study revealed the relationship between intestinal protozoan parasites and the other calf gut microbiota. Different intestinal protozoan parasites have diametrically opposite effects on other gut microecology, which not only affects bacteria in the gut but also is significantly related to fungi and archaea.

Development of chitosan-graphene-based nanobiosensor for curving buffalo mortality through early-stage detection of haemorrhagic septicaemia

To develop the livestock sector in Bangladesh, quick, accurate, real-time diagnostic tools for livestock are essential. Hence, this research focused on developing a chitosan-graphene (Chit-GO) based Nanohybrid biosensor with contact-printed graphene electrodes for label-free electrochemical detection of HS. Therefore, this research was undertaken to i) Fabrication of thin layer graphene transferred chitosan-based Nano biosensor; ii) Isolation identification and molecular characterization of P. multocida from the field samples; iii) Characterize electrochemical signal from P. multocida using nano biosensor, and iv) Evaluation of sensing performance of nano biosensor from clinical specimens. The chitosan-graphene-based nano-biosensor was fabricated and characterized by High Magnification Microscopy (HMM) and Scanning Electron Microscopy (SEM) to realize the Chitosan-Graphene-Chit-Go topography. For EC, P. multocida was isolated from 40 nasal swabs of buffalo calves, followed by polymerase chain reaction (PCR) for confirmatory detection of serotype B: 2 P. multocida using kmt1 gene-specific primers. The Cyclic Voltammetry (CV) of the P. multocida serotype B: 2 results revealed that the redox peak potential was found at 0.17V, while the oxidation peak potential was absent. Whereas, the redox current peak was a maximum of 4.1×10^6, and the anodic current was 85mV when applied 10^8 CFU/ml bacteria. In the case of Linear Swipe Voltammetry (LSV), the oxidase peak potential

was at 0.13V, the peak current was 2.3×10-6, and the anodic current was 35mV. The stability of the peak potential was revealed by the redox peak of the bacteria was reproduced at 0.17V voltammetry when an applied scan for 50 cycles. The quantification of bacterial load through electrochemical readout revealed that the redox current peak potential could not have recognized >106 CFU/ml bacteria. After that, the electrochemical detection of field isolates was performed where the Anodic current was 5 mV, the redox peak potential was at 0.18V, and the peak current was 1.2×10-5. The validation of the EC data with conventional methods is in progress.

Unlocking the microbial diversity in artisanal 'Buffalo Milk Curd' to formulate probiotic based bio-functional starter culture towards developing healthy Dahi

Artisanal fermented dairy product, 'Buffalo Milk Curd,' is made from raw buffalo milk at cottage level in coastal areas of Bangladesh. Traditional dairy products like this curd are considered as a potent niche of probiotics and valuable metabolites. Therefore, the proposed study was designed to disclose the microbial communities present in the artisanal product and also to formulate a probiotic based value-added dahi. The genus *Leuconostoc* is known for high EPS producers. Therefore, molecular identification, probiotic potential, safety evaluation and bioactivity (Exopolysaccharide and antioxidant production ability) of thirty-five *Leuconostoc* strains were assessed. Based on the outcomes, three were selected for whole genome sequencing. The whole genome sequence of three strains already received accession from GenBank (JAVUPW000000000, JAVUPX000000000 and JAVUPV000000000) as *Leuconostoc* citreum and *Leuconostoc* falkenbergense. Since *Leuconostoc falkenbergense* has recently (2020) been identified as a novel species of *Leuconostoc,* therefore, *Leuconostoc* falkenbergense BSMRAU-M1L5 strain was selected to prepare functional dahi (exopolysccharide and antioxidant enriched) at laboratory scale. After preparing four types of dahi consisting of commercial skim milk and different combinations of starter culture exopolysaccharide (EPS) content and antioxidant activity of the dahi samples were determined using standard protocol (Fig. 1). The highest DPPH scavenging activity (98.3%) was observed when starter culture (YF) and Leuconostoc falkenbergense *(Lf)* were incorporated in an equal portion. However, *Lf* alone exhibited the lowest scavenging activity (45.7%). The result suggests that a multi-strain starter culture could produce more potent bioactive peptides with antioxidant activity. On the contrary, The EPS concentration is increased with the increment of *Lf* concentration.
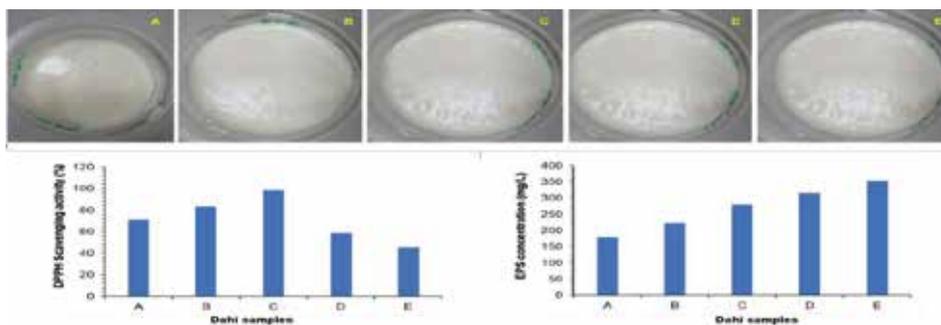
Fig. Representative image of dahi samples with antioxidant (DPPH scavenging activity) and EPS concentration. A: Skim milk+4% commercial starter culture (YF); B: Skim milk+3% YF+1% Leuconostoc falkenbergense (Lf); C: Skim milk+2% YF+2% Lf; D: Skim milk+1% YF+3% Lf; E: 4% Lf.

The highest (352 mg/L) EPS was produced when dahi was prepared by incorporating 4% Lf. The present findings suggest the potential of developing functional fermented dairy products using probiotic strains isolated from traditional 'Buffalo Milk Curd.

Other project activities

• Purchased indigenous buffalo

• Construction of buffalo shed at BLRI savar, Dhaka.

Fig: Purchased indigenous buffalo

Fig: Construction of buffalo shed & installation of electrical lines at BLRI Savar, Dhaka

Cattle and Buffalo Research Farm

Bangladesh Livestock Research Institute
Savar, Dhaka
Annual Report-2023-24

Bangladesh Livestock Research Institute (BLRI), as the apex public research organization in the livestock sector, operates under a national mandate to generate, innovate, and disseminate appropriate technologies for sustainable livestock development in Bangladesh. Its vision is to ensure a vibrant, sustainable, and climate-resilient livestock sector contributing to food security, nutrition, and rural livelihoods and mission is to lead science-based, demand-driven research to enhance productivity, improve animal health, and utilize local resources efficiently while minimizing environmental footprints. Within this broader framework, cattle and buffalo research remains a core focus of BLRI due to their crucial role in milk, meat, and draft power production. BLRI prioritizes genetic improvement, climate-resilient management, and feed and nutrition research to improve productivity and profitability of these species. A key component of this effort is the development and evaluation of fodder germplasm across agro-ecological zones. This includes both indigenous and exotic high-yielding forages such as Napier hybrids, maize fodder, oat, leguminous species, and multipurpose tree fodders like moringa and gliricidia. Preserving and promoting region-specific fodder germplasm is vital to ensuring year-round feed availability, reducing feed costs, and enhancing resilience against seasonal feed scarcity.BLRI conducts feeding trials on cattle, lactating cows, and buffaloes using locally adapted fodder resources. These trials provide critical data on growth rates, milk yield, feed conversion efficiency, and methane emission reduction potential. The research also evaluates economic returns, farmers' adoption behavior, and ecological sustainability, contributing to a more productive and sustainable livestock sector in Bangladesh.

Table: Cattle and Buffalo Population at Research Farm

Category	BCB-1*	RCC*	Munshigonj Cattle	Beef Cattle	Buffalo
Milking/Dry Cows	70	75	24	13	67
Adult bulls	32	40	15	19	33
Growing bulls	5	20	3	3	20
Growing Heifers	4	24	4	5	23
Calf	16	28	8	3	47
Total	**127**	**187**	**54**	**43**	**190**

BCB- BLRI Cattle Breed-1; RCC- Red Chittagong Cattle

| BCB-1 Bull | BCB-1 Cow | RCC Bull | RCC Cow |

| Munshigonj Bull | Munshigonj Cow | Beef Breed Bull |
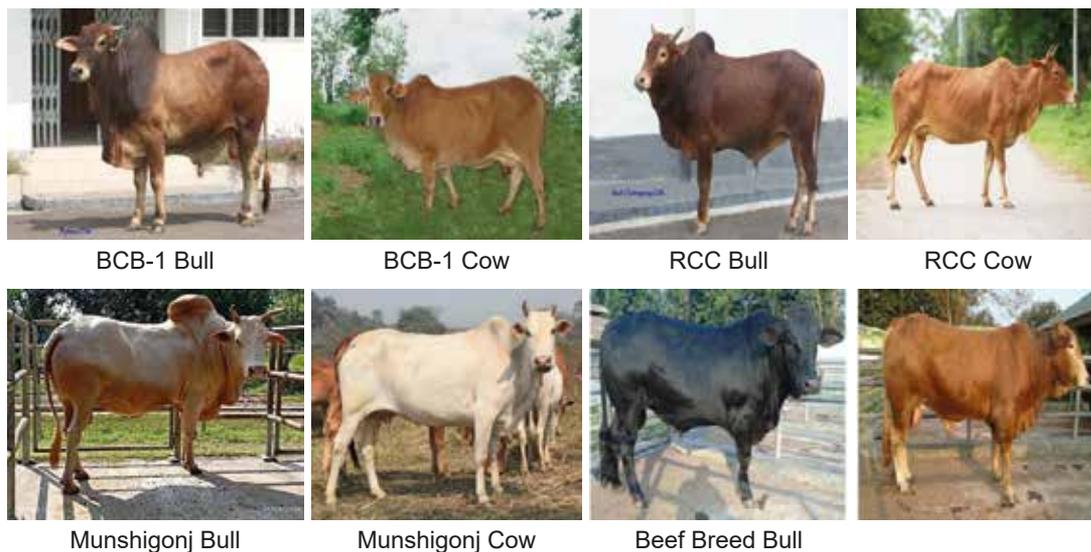
Fig: Animal germplasm of research farm

Table: Fodder Cuttings and Seed Distribution to various stakeholders (farmers and entrepreneur)

SI No.	Name of Germplasm	Cuttings Distribution (No.)
1.	Napier (3&4 variety)	50000
2.	Packchong	147600
3.	German	22000
4.	Para	5000
5.	Oats Seed (kg)	500
6.	Rozi	1000

Fig: Establishment of Fodder Germplasm Bank at BLRI

Conservation and improving yield and nutritional quality of forage crops at BLRI

Bangladesh, a populated country with limited land, faces a shortage of green grasses for ruminant populations. High-yielding varieties (HYV) of fodders are needed but not readily available. The Bangladesh Livestock Research Institute (BLRI) is mandated to conserve fodder germplasm for distribution among livestock keeper farmers. Keeping this in mind, two objectives were set: 1) To conserve valuable fodder germplasms for seed/cutting distribution among livestock keeper farmers and 2) To investigate the quantity and quality of biomass yield of different fodder cultivars in different management practices. To do this, around 0.44-hectare land 55 fodder (Perennial, Seasonal, Leguminous, non-leguminous, salt tolerant, drought tolerant, high land, and water land fodder). The conserved cultivars covering 190 plots (4x4 miter size/plot) have been done and maintained properly (land preparation, planting, fencing, weeding, intercultural practice, irrigation, fertilizer application). Excluding 55 cultivars, 9 (nine) new fodder cultivars were collected from different parts of the country and cultivated in a germplasm bank. The nutritive value regarding DM yield/hectare and CP yield /ha were analysis. On the other hand, the most demandable fodder at the field level, especially Pakchong, Zara, and Smart Napier, was also cultivated in a large-scale area (Pakchong 0.23 ha, 0,07 ha Smart Napier and 0,15 ha for Zara) and propagated for distribution to the farmers and livestock entrepreneurs along with germplasm bank. About 3.50 lac Pakchong cuttings and 2.50 lac Zara cuttings were distribution to the farmers. Smart Napier grass at the age of 60 days DM yields was lowest (10 to 12 tons/ha/yr) compared to Zara (24 ton/ha/yr) and Pakchong (30 ton/ha/yr). Based on morphological traits, biomass output, and nutritional value of Smart Napier suggest that it might provide suitable fodder for small ruminants. For ranking, a thorough and comprehensive evaluation of additional fodder must be carried out.

Engineering Section

Engineering Section under Support Service Division has been working from the beginning of the Institute. The Section is headed by Executive Engineer (Civil) with 1 (one) Assistant Engineer (Civil), 1 (one) Assistant Engineer (Instrument/Electronics), 2 (two) Sub-Assistant Engineer (Civil), 1 (one) Sub-Assistant Engineer (Electronics), 2 (two) Electrician and 1 (one) Mason.

Under mentioned development and repair/ renovation/maintenance works has been implemented by the Engineering Section under revenue budget & development project during financial year (2023-2024).

Table: A. Under revenue budget (Repair and renovation works)

Sl. No.	Name or works	Qty.	Unit	Year	Value of works In Lakh Tk.
1.	Repair of Residential Building	1.00	L.S	2023-2024	45.00
2.	Repair of other Building and Infrastructures	1.00	L.S	2023-2024	45.00
3.	Others Repair & Maintenance (Water, Electricity & Gas)	1.00	L.S	2023-2024	45.00
4.	Repair & Maintenance of Equipments & Furniture.	1.00	L.S	2023-2024	10.97
				Sub –Total Tk.=	145.97

Table: B. Under Development Project

Sl. No.	Name or works	Qty.	Unit	Year	Value of works In Lakh Tk.
1	**Construction of Poultry Layer Shed-1 at BLRI**				
	d. Construction of Poultry Layer Shed-1 at BLRI Regional Station, Saidpur, Nilphamari	1.00	L.S	2023-2024	65.85
	e. Construction of Poultry Grower Shed-1 at BLRI Regional Station, Saidpur, Nilphamari	1.00	L.S	2023-2024	65.88
	f. Construction of Poultry Brooder Shed-2 at BLRI Regional Station, Saidpur, Nilphamari	1.00	L.S	2023-2024	35.00

Sl. No.	Name or works	Qty.	Unit	Year	Value of works In Lakh Tk.
	g. Construction of 150KV Sub-Station, External Electrification works, Solar System & related services at BLRI Regional Station, Saidpur, Nilphamari	1.00	L.S	2023-2024	105.00
	h. Construction of Poultry Brooder Shed-1 at BLRI Regional Station, Saidpur, Nilphamari	1.00	L.S	2023-2024	42.34
	j. Construction of Poultry Grower Shed-2 at BLRI Regional Station, Saidpur, Nilphamari	1.00	L.S	2023-2024	35.00
	I. Construction of Poultry Layer Shed-2 at BLRI Regional Station, Saidpur, Nilphamari.	1.00	L.S	2023-2024	68.82
				Sub-Total Tk. =	**417.89**
2.	**Buffalo Research and Development Project**				
	a. Construction of Buffalo Cow Shed (1&2) with Yard at BLRI H.Q, Savar, Dhaka	1.00	L.S	2023-2024	122.39
				Sub-Total Tk. =	**122.39**
				Grand Total Tk. =	**686.25**

Publication Section

BLRI Publishes Various Publications includes Journal, Annual Report, Proceeding, Newsletter, Scientific monographs, Leaflets, Bulletins, Technical papers, Research reports, Brochure. The Institute also publishes others Publications, Following is the list of Publications:

Table: List of Publication

No.	Journal
1.	Bangladesh Journal of Livestock Research, Vol. 1, No. 1, July-1993
2.	Bangladesh Journal of Livestock Research, Vol. 2, January-1994 to Vol. 5 No.2, January-1998
3.	Bangladesh Journal of Livestock Research, Vol. 6, No. 1 & 2, January-1999. June-2002
4.	Bangladesh Journal of Livestock Research, Vol.7, No. 1 & 2, January-2000 and Vol.8, No. 1 & 2, January-1001, June-2002
5.	Bangladesh Journal of Livestock Research, Vol.9, No.9, No.1 (Jan-June)-2002 and Vol.9, No.2 (July-Dec.) 2004, June-2004
6.	Bangladesh Journal of Livestock Research, Vol. 10, No.10, No.1 (Jan-June)-2003 and Vol. 10, No.2 (July-Dec.)-2003, June-2004
7.	Bangladesh Journal of Livestock Research, Vol. 11, No. 1 (Jan-June) & No.2 (July-Dec.)-2004 November-2005
8.	Bangladesh Journal of Livestock Research, Vol. 12, No.1 & 2, (Jan.-June and July-Dec.)-2005, March-2007
9.	Bangladesh Journal of Livestock Research, Vol. 13, No. 1 & 2, (Jan.-June and July-Dec.)-2006, June-2007
10.	Bangladesh Journal of Livestock Research, Vol. 13, No. 1 & 2, (Jan.-June and July-Dec.)-2007, June-2008
11.	Bangladesh Journal of Livestock Research, Vol. 15, No. 1 & 2, (Jan.-June and July-Dec.)-2008, June-2009
12.	Bangladesh Journal of Livestock Research, Vol. 16, No. 1 & 2, (Jan.-June and July-Dec.)-2009, June-2010
13.	Bangladesh Journal of Livestock Research, Vol.16, No. 1&2, (Jan.-June and July-Dec.)-2010, June-2011
14.	Bangladesh Journal of Livestock Research, Vol. 18, No. 1&2, (Jan.-June and July-Dec.)-2011, June-2010
15.	Bangladesh Journal of Livestock Research, Vol. 19, No.1, (Jan.-June) and No.2 (July-Dec.)-2012, June-2013
16.	Bangladesh Journal of Livestock Research, Vol. 20, No.1, (Jan.-June) and No.2 (July-Dec.)-2013, May -2016
17.	Bangladesh Journal of Livestock Research, Special Vol. 21-25, 2018, June-2019
18.	Bangladesh Journal of Livestock Research, Vol. 26, No.1, (Jan.-June) and No.2 (July-Dec.) 2019, June-2021

No.	
19.	Bangladesh Journal of Livestock Research, Vol. 27, No.1, (Jan.-June) and No.2 (July-Dec.) 2020, June-2021
20.	Bangladesh Journal of Livestock Research, Vol. 28, No.1, (Jan.-June) and No.2 (July-Dec.) 2021, June-2024
21.	Bangladesh Journal of Livestock Research, Vol. 29, No.1, (Jan.-June) and No.2 (July-Dec.) 2022, June-2024
Annual Report	
22.	Annual Report (Progress Report)-1985-91, July-1991
23.	Annual Report(1992-93 to 1997-98, June-2002
24.	Annual Report-1999, December-2002
25.	Annual Report-2000, June-2004
26.	Annual Report-2001, February-2005
27.	Annual Report-2002, December-2005
28.	Annual Report-2003, June-2006
29.	Annual Report-2004, December-2006
30	Annual Report-2005-2006, June-2007
31	Annual Report-2007, June-2008
32	Annual Report-2008, June-2009
33	Annual Report-2009, June-2010
34.	Annual Report-2010, June-2011
35.	Annual Report, 2011, June-2012
36.	Annual Report-2012, June-2013
37.	Annual Report-2013, June-2014
38.	Annual Report-2014, June-2015
39.	Annual Report, 2015, June-2016
40.	Annual Report-2016, August-2017
41.	Annual Report-2017, June-2018
42.	Annual Report-2018, June-2019
43.	Annual Report-2019, June-2023
44.	Annual Report-2021, June-2024
45.	Annual Report-2022, June-2024
46.	Annual Report-2023, January-2025
Proceedings	
47.	First Annual Livestock Research Workshop Proceedings, Bangladesh Livestock Research Institute, Nov. 20,1986
48.	Bangladesh Livestock Research Institute (BLRI), Progress of Research, October-1988
49.	Proceeding of Workshop on Livestock Development in Bangladesh, 16-18 July-1991
50.	Proceedings o0f the Workshop on Livestock Research in Bangladesh, February-2, 1992

No.	
51.	Annual Research Review Workshop- 2003, June,11-12 ,2003
52.	Proceedings of Annual Research Review Workshop-2004, June-28-29,2004
53.	Annual Research Review Workshop-2005, April-25-26,2005
54.	Annual Research Review Workshop-2006, June-15-16,2006
55.	Annual Research Review Workshop-2007, June-13-14,2007
56.	Annual Research Review Workshop-2008, June-17-18,2008
57.	Annual Research Review Workshop-2009, June-15-16,2009
58.	Annual Research Review Workshop-2010, June-22-23,2010
59.	Proceedings of the Annual Research Review Workshop-2009-2010, June-2011
60.	Annual Research Review Workshop-2011, June-28-29,2011
61.	Proceeding of the Annual Research Review Workshop-2010-2011, May-2012
62.	Annual Research Review Workshop-2012, June-2425-2012
63.	Proceeding of the Annual Research Review Workshop-2012-2013, December-2014
64.	Proceeding of the Annual Research Review Workshop-2013-2014, October-2015
65.	Proceeding of the Annual Research Review Workshop-2014-2015, April, 2017
66.	Proceeding of the Annual Research Review Workshop-2015-2016, June -2018
67.	Proceeding of the Annual Research Review Workshop-2016-2017, June -2018
68.	Proceeding of the Annual Research Review Workshop-2017-2018, October -2018
69.	Proceeding of the Annual Research Review Workshop-2018-2019, June -2019
70.	Proceeding of the Annual Research Review Workshop-2019-2020, December -2020
71.	Proceeding of the Annual Research Review Workshop-2020-2021, January - 2022
72.	Proceeding of the Annual Research Review Workshop-2021-2022, December -2022
73.	Proceeding of the Annual Research Review Workshop-2022-2023, December -2023
	Newsletter
74.	BLRI Newsletter Vol. 1 No. 1, December 1989
75.	BLRI Newsletter Vol. 2 No. 1, March 1991
76.	BLRI Newsletter Vol.1 issues No. 1&2, 2010
77.	BLRI Newsletter Vol.2 issues No. 1&2, 2011
78.	BLRI Newsletter Vol.2 issues No. 3&4, 2011

No.	
79.	BLRI Newsletter Vol.3 issues No. 1&2, 2012
80.	BLRI Newsletter Vol.5 issues No. 1&2, 2014
81.	BLRI Newsletter Vol.6 issues No. 1&2, 2014
82.	BLRI Newsletter Vol.7 issues No. 1, 2,3 &4, 2016
83.	BLRI Newsletter Vol.8 issues No. 1,2,3 & 4, 2017
84.	BLRI Newsletter Vol.9 issues No. 1,2,3 & 4, 2018
85.	BLRI Newsletter Vol.10 issues No. 1,2,3 & 4, 2019
86.	BLRI Newsletter Vol.11 issues No. 1,2,3 & 4, 2020
87.	BLRI Newsletter Vol.12 issues No. 1,2,3 & 4, 2021
88.	BLRI Newsletter Vol.13 issues No. 1,2,3 & 4, 2022
89.	BLRI Newsletter Vol.14 issues No. 1,2,3 & 4, 2023
90.	BLRI Newsletter Vol.15 issues No. 1& 2, 2024
	Other Publications
91.	বন্যার পর গবাদি পশু ও হাঁস-মুরগির জন্য চাষী ভাইদের করণীয়
92.	ইপিল ইপিল, পশু উৎপাদন গবেষণা বিভাগ
93.	Black Bengal Goat Under Stall-Fed Condition, APRD
94.	Completed, on-going and Future Studies and project program of Animal Production Research Division, BLRI
95.	Effect of molasses supplementation of roughage based diet on growth performance of cattle
96.	গবাদি পশুর ক্ষুরারোগ ও তার দমন ব্যবস্থা
97.	বাংলাদেশী ভেড়ার জাতসমূহ ও এর বৈশিষ্ট্য শীর্ষক পোস্টার
98.	'পোল্ট্রি খামারে জৈব নিরাপত্তা' শীর্ষক পোস্টার
99.	Laboratory Manual for Homologous Goat pox Vaccine Production, June-2007
100.	আবদ্ধ অবস্থায় ছাগল পালন
101.	ছাগল উৎপাদন বৃদ্ধির মাধ্যমে দারিদ্র্য বিমোচন
102.	Sugarcane utilization as a dual purpose crop for sustainable livestock farming
103.	Development of beef cattle breed using Gayal (*Bos frontalis*)
104.	কর্ন স্ত্র প্যালেট ফিডঃ বিএলআরআই কর্তৃক উদ্ভাবিত একটি পূর্ণাঙ্গ গো-খাদ্য শিল্প প্রযুক্তি
105.	মুরগির রোগ নিয়ন্ত্রণ ব্যবস্থাপনা প্রশিক্ষণ সহায়িকা
106.	লাভজনক দুগ্ধ খামারের জন্য নেপিয়ার (নেপিয়ার বাজরা) ঘাস চাষ
107.	(আরসিসি) চিটাগাং অঞ্চলের একটি অষ্টমুখী লাল গরু
108.	লেয়ার মুরগি পালন নির্দেশিকা
109.	Foot and Mouth Disease
110.	কবুতর পালন
111.	Reproductive Performances of Cows in Savar Dairy Farm
112.	Memorandum of Agreement Between BLRI and DLS on Hand-over of Savar Farm to BLRI
113.	Livestock Sub-sector in Bangladesh: Status and Development Potentials.

No.		
114.	1963-85	Abstracts of Research in Parasitology in Bangladesh. 1963-1985
115.	1986-90	Poultry Production Research Division. Research Report-1986-90
116.	1988-89	Epidemiology of Foot and Mouth Disease in Bangladesh and Selection of Vaccines Virus Strains. Annual Report-19988-89
117.	1988-89	Proceedings of the Workshop on the Achievement of Research Under PL 480 Title-III, 1988-89, February-1990
118.	1989-90	Report on Farming System Research. FSR Report No. 1, 1989-1990
119.	1989-90	Performance of Black Bengal Goat under Stall-fed condition, 1989-1990
120.	1989-90	Development of fodder production Program for BLRI fields, 1989-90
121.	1989-90	Epidemiology of Foot and Mouth Disease in Bangladesh and Selection of Vaccines Virus Strains, Annual Report, 1989-90
122.	1989-90	Development of Straw Based Ration for Feeding Ruminants (1989-1999)
123.	1991-93	Achievement of Research Under PL 480, Title-III, 1991-93, December-1993
124.	1991-96	Farming Systems Research and Development Project, 1991-96
125.	1990-91	Report on Farming System Research. FSR Report no.2, 1990-91
126.	1990-91	Performance of Black Bengal Goat under Stall-fed Condition. Progress Report-1990-91
127.	1990-91	Development of Feedings Regimes for Calves. 3rd Annual Report, 1990-91
128.	1990-91	Evaluation of Artificial Insemination Programs in Bangladesh. Progress Report, 1990-91
129.	1990-91	Fodder Research and Production Program, 2nd Annual Progress Report, 1990-91
130.	1993-94	Poultry Breeding and Rearing in BLRI, Progress Report, April-1993 to June-1994
131.	1986	Check lists of Helminthes of Animals and Birds in Bangladesh. December-1986
132.	1987	Characteristics of two village for farming system research, February-1987
133.	1987	Fattening of Beef Cattle, May-1987
134.	1988	বাংলাদেশ গবাদিপশু গবেষণা ইনস্টিটিউট, ডিসেম্বর, ১৯৮৮
135.	1988	About BLRI (in English) December, 1988

No.		
136.	1988	An Epidemiological Study of Calf Diseases in Bangladesh, Annual Report for 1988
137.	1989	Proceedings of the Meeting of Counterpart Scientists of SAARC Member of Countries on Livestock Improvement, December 18-19, 1989
138.	1989	Survey report on existing farming system at raw Tara village, Baghabari, June-1989
139.	1989	Research abstracts of livestock Activities at Baghabari Farming System Research Site, June-1989
140.	1989	Identification of Problems Affecting the Livestock and Poultry Production and Transfer of Technology to Improve Their Production at Farming System, June-1989
141.	1990	Feeding Pattern of Birds (Chicken and ducks) Under Scavenging Condition and Formulation of Supplementary. Ration Using the Local Ingredients. Second Annual Report, September-1990
142.	1990	Development of feedings Regimes for Calves, Second Annual Progress Report, 9th Oct-1990
143.	1990	Study on Livestock Feeds Fodder and Feeding Practices in Bangladesh and Their Nutritive Evaluation, 9th October, 1990
144.	1991	দল ঘাস, পশু উৎপাদন গবেষণা বিভাগ, মে-১৯৯১
145.	1991	About BLRI, June-1991
146.	1991	Proceeding of the Meeting of Counterpart Scientists of SAARC Member Countries on Animal Genetic Resource Conservation, 11-12 November, 1991
147.	1991	বাংলাদেশ ক্ষুরারোগ ভাইরাসের টাইপ ও সাব-টাইপ, মার্চ-১৯৯১
148.	1992	A Socio-economic Evaluation of the Artificial Insemination Program in Bangladesh, June-1992
149.	1994	Development of straw based ration for feeding ruminants, June-1994
150.	1994	Collaborative Livestock Research and Extension Program Between BLRI and Proshika, June-1994
151.	1995	Status of beef cattle production in Bangladesh, May 1995
152.	1995	Evaluation of Productive and Reproductive Performances of F1, F2 and F3 Progenies of Local x Friesian and Sahiwal x Friesian Cross-bred Cattle in the Savar Dairy farm, Research Report, July-1995
153.	1995	A report on the straw preservation under wet condition and its utilization for the ruminant, August-1995
154.	1995	A report on the Study on Supplementing Effects or Feeding System of Molasses and Urea on Methane and Microbial Nitrogen Production in the Rumen and Growth Performance of Bulls Fed s straw Diet, September-1995

No.		
155.	1997	Socio-economic Impact of Small holder Livestock Development Project in Bangladesh, October-1997
156.	1998	পশু সম্পদ ও হাঁস-মুরগি উন্নয়ন প্রযুক্তি পরিচিতি, জানুয়ারী-১৯৯৮
157.	1998	স্বল্প খরচে উৎকৃষ্ট গো-খাদ্য ইউরিয়া মোলাসেস স্ট্র (ইউ.এম.এস) (Urea Molasses Straw (UMS) for Beef Fattening), জুলাই-১৯৯৮
158.	1998	গরুর জন্য সবুজ ঘাসের বিকল্প হিসাবে এ্যালজির (শেওলা) ব্যবহার, প্রথম সংস্করণ, জুলাই-১৯৯৮
159.	1998	দেশী পদ্ধতিতে স্বল্প ব্যয়ে সবুজ ঘাস সংরক্ষণ, প্রথম সংস্করণ, জুলাই-১৯৯৮
160.	1998	মুরগির বাচ্চা পালন নির্দেশিকা, প্রথম সংস্করণ, জুলাই-১৯৯৮
161.	1998	হাঁস পালন ব্যবস্থাপনা নির্দেশিকা, প্রথম সংস্করণ, জুলাই-১৯৯৮
162.	1998	গিনিফাউল প্রতিপালন প্রথম সংস্করণ, জুলাই-১৯৯৮
163.	1998	কোয়েল পালন ব্যবস্থাপনা নির্দেশিকা, প্রথম সংস্করণ, জুলাই-১৯৯৮
164.	1998	বাড়ন্ত মুরগির বাচ্চা পালন, প্রথম সংস্করণ, জুলাই-১৯৯৮
165.	1998	ছেড়ে পালনের উপযোগী মুরগি ফাওমী, প্রথম সংস্করণ, জুলাই-১৯৯৮
166.	1998	পশু পাখির খাদ্য হিসেবে সমন্বিত খামারের বর্জ্য হতে ডাকউইড উৎপাদন এবং এর ব্যবহার, ১৯৯৮
167.	1998	লাভজনক দুগ্ধ উৎপাদন ও গরু মোটাতাজাকরণে কয়েকটি খাদ্য প্রযুক্তি, জুন-১৯৯৮
168.	1999	Research Achievements and Activities, April-1999
169.	1999	বাছুর ব্যবস্থাপনা, জুন-১৯৯৯
170.	1999	লাভজনক দুগ্ধ খামার স্থাপন, জুন-১৯৯৯
171.	1999	ট্রেনিং ম্যানুয়েল-লাভজনক গবাদিপশু ও হাঁস-মুরগি, জুন-১৯৯৯
172.	1999	মিশ্র ফসল হিসাবে গো খাদ্য ভূট্টার চাষ, প্রথম সংস্করণ, সেপ্টেম্বর-১৯৯৯
173.	1999	ELISA Technique ব্যবহার করে ক্ষুরারোগ নির্ণয়, প্রথম সংস্করণ, সেপ্টেম্বর-১৯৯৯
174.	1999	ছাগল বসন্তের টিকা, প্রথম সংস্করণ, সেপ্টেম্বর-১৯৯৯
175.	1999	পিপিআর রোগের এন্টিসিরাম-এ্যান্টিবায়োটিক সমন্বিত চিকিৎসা পদ্ধতি, প্রথম সংস্করণ, সেপ্টেম্বর-১৯৯৯
176.	1999	পিপিআর রোগের ভ্যাকসিন, প্রথম সংস্করণ, সেপ্টেম্বর-১৯৯৯
177.	1999	দেশীয় মুরগির জাত পরিচিতি, প্রথম সংস্করণ, সেপ্টেম্বর-১৯৯৯
178.	1999	দারিদ্র্য বিমোচনে গ্রামীণ পরিবেশে সংকর প্রজাতির মুরগি পালন পদ্ধতি, প্রথম সংস্করণ, সেপ্টেম্বর-১৯৯৯
179.	1999	Economics and Marketing Research Division, Progress Report, June-1999
180.	2009	A Compendium on Red Chittagong Cattle of Bangladesh, 2009-10
181.	2010	দুগ্ধপণ্য উৎপাদনে দেশী প্রযুক্তি, ২০১০-১১
182.	2000	ট্রেনিং ম্যানুয়েল, প্রথম সংস্করণ, ফেব্রুয়ারী-২০০০
183.	2000	Economics and Marketing Research Division, Progress Report, June-2000

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184.	2000	BLRI: A Brief Acquaintance, January-2000
185.	2000	Paste des petites ruminants (PPR), A brief introduction, its diagnosis and control, February-2000
186.	2001	BLRI An Overview, June-2001
187.	2001	Improvement of Black Bengal Goat through selective breeding, May-2001
188.	2002	বর্ষাকালে ভিজা খড়ের পচন রোধকল্পে স্বল্প খরচে সংরক্ষণ, দ্বিতীয় সংস্করণ, জুন-২০০২
189.	2002	গরু মোটা তাজাকরণ প্যাকেজ প্রযুক্তি, প্রথম সংস্করণ, জুন-২০০২
190.	2002	ছাগল পালন ম্যানুয়েল, এপ্রিল-২০০২
191.	2002	পশু খাদ্য ও জ্বালানি হিসেবে ইপিল ইপিলের চাষ ও ব্যবহার, প্রথম সংস্করণ, জুন-২০০২
192.	2002	খামারের বর্জ্য হতে সারা বছর ডাক উইড উৎপাদন এবং পশুখাদ্য হিসেবে এর ব্যবহার, প্রথম সংস্করণ, জুন-২০০২
193.	2002	ভূট্টা-কাউপি মিশ্র গো-খাদ্য চাষ ও ব্যবহার, প্রথম সংস্করণ, জুন-২০০২
194.	2002	সেমি ইন্টেনসিভ পদ্ধতিতে দেশী ছাগল পালন, প্রথম সংস্করণ, জুন-২০০২
195.	2002	দারিদ্র্য বিমোচনে ছাগল পালন মডেল, প্রথম সংস্করণ, জুন-২০০২
196.	2002	গো-খাদ্য হিসেবে কলাগাছের সংরক্ষণ ও ব্যবহার প্রথম সংস্করণ, জুন-২০০২
197.	2002	আখের উপজাত সংরক্ষণ ও গো খাদ্য হিসেবে ব্যবহার, প্রথম সংস্করণ, জুন-২০০২
198.	2002	লবণাক্ত, বন্যাকবলিত ও মধুপুর গড় এলাকার জন্য ঘাস উৎপাদন, প্রথম সংস্করণ, জুন-২০০২
199.	2002	এনজাইম ইমিউনো স্লাইড এসে পদ্ধতিতে দ্রুত রোগ সনাক্তকরণ, প্রথম সংস্করণ, জুন-২০০২
200.	2002	গবাদিপশুর পরজীবী মুক্তকরণের আদর্শ প্রযুক্তি, প্রথম সংস্করণ, জুন-২০০২
201.	2002	মুরগির মাইকোপ্লাজমা রোগ নির্ণায়ক (ডায়াগনস্টিক এন্টিজেন), জুন-২০০২
202.	2002	পাহাড়ি জমিতে সবুজ ঘাস উৎপাদন ও ব্যবহার, প্রথম সংস্করণ, জুন-২০০২
203.	2002	মুরগির সালমোনেসিস রোগ দমনে ফাউল টাইফয়েড ভ্যাকসিন, প্রথম সংস্করণ, জুন-২০০২
204.	2002	মুরগির সালমোনেসিস রোগ নির্ণয় ও দমনে পুরোরাম এন্টিজেন, প্রথম সংস্করণ, জুন-২০০২
205.	2002	ছাগলের পিপিআর রোগের স্বাস্থ্য ব্যবস্থাপনা, প্রথম সংস্করণ, জুন-২০০২
206.	2002	ভূমিহীনদের জন্য লেয়ার মুরগি উৎপাদন মডেল, প্রথম সংস্করণ, জুন-২০০২
207.	2002	মাঠ পর্যায়ে মুরগির রাণীক্ষেত রোগ দমনে স্থানীয়ভাবে তৈরি টিকা ও অস্ট্রোলিয়ান NDV$_4$ HR, প্রথম সংস্করণ, জুন-২০০২
208.	2002	Proceedings of the Workshop on Poverty Alleviation Through Goat Production: National Programmed (27 April-3 May 2002), December-2002
209.	2003	ট্রেনিং ম্যানুয়াল (পরিমার্জিত, দ্বিতীয় সংস্করণ, ২০০৩
210.	2003	স্টল ফিডিং পদ্ধতিতে ছাগল পালন, প্রথম সংস্করণ, জুন-২০০৩

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211.	2004	Research and Development Strategic Plan (2003-2006), February-2004
212.	2004	হিমোলাইসিন প্রস্তুত প্রণালী, প্রথম সংস্করণ, জুন-২০০৪
213.	2004	মাঠ পর্যায়ে পোল্ট্রি ও পশু খাদ্যের গুণগতমান নির্ণয়, প্রথম সংস্করণ, জুন-২০০৪
214.	2004	মানসম্পন্ন ব্রয়লার ও লেয়ার বাচ্চার বৈশিষ্ট্য, প্রথম সংস্করণ, জুন-২০০৪
215.	2004	হাওড়ে লাভজনকভাবে হাঁস পালনের কৌশল, প্রথম সংস্করণ, জুন-২০০৪
216.	2004	বন্যাকালীন ও বন্যার পর গবাদিপশু ও হাঁস-মুরগির জন্য চাষী ভাইদের করণীয়, জুলাই-২০০৪
217.	2004	কমপ্লিমেন্ট ফিক্সেশন পরীক্ষা (একটি গবেষণাগার ম্যানুয়াল), প্রথম সংস্করণ, আগস্ট-২০০৪
218.	2004	ভেড়া পালন ম্যানুয়েল, ডিসেম্বর-২০০৪
219.	2005	গবাদিপশু, হাঁস-মুরগি এবং মৎস্য খাদ্য ও রোগ চিকিৎসায় উদ্ভিদ ম্যানুয়েল প্রথম সংস্করণ, ফেব্রুয়ারি-২০০৫
220.	2005	এভিয়ান ইনফ্লুয়েঞ্জা ক্লিনিক্যাল ও পোস্ট মর্টেম লক্ষণ এবং দমন ও প্রতিরোধ পদ্ধতি, প্রথম সংস্করণ, ফেব্রুয়ারি- ২০০৫
221.	2005	পশুসম্পদ ও পোল্ট্রি উৎপাদন প্রযুক্তি নির্দেশিকা, জুন-২০০৫
222.	2006	ছাগলের বাচ্চার মৃত্যুর কারণ ও প্রতিকার, প্রথম সংস্করণ, জুন-২০০৬
223.	2006	A Compendium of Livestock Technologies Developed by Bangladesh Livestock Research Institute, First edition, June-2006
224.	2006	ট্রিটিক্যালি উৎপাদন ও ব্যবহার, ২য় প্রকাশকাল, আগস্ট- ২০০৬
225.	2007	মোটাতাজাকরণের জন্য গরু নির্বাচন, ফেব্রুয়ারি-২০০৭
226.	2007	গরুর তড়কা রোগ দমন ব্যবস্থাপনা, ফেব্রুয়ারি-২০০৭
227.	2007	গরুর বাদলা রোগ দমন ব্যবস্থাপনা, ফেব্রুয়ারি-২০০৭
228.	2007	গরুর গলাফোলা রোগ দমন ব্যবস্থাপনা, ফেব্রুয়ারি- ২০০৭
229.	2007	ছাগলের বসন্ত রোগ দমন ব্যবস্থাপনা, মার্চ- ২০০৭
230.	2007	পোল্ট্রি খামারের জীব নিরাপত্তা নিশ্চিত করণের লক্ষ্যে নিম্নের বিষয় গুলির প্রতি সতর্ক থাকা উচিত, মার্চ- ২০০৭
231.	2007	ভেড়ার খাদ্য ব্যবস্থাপনা, ডিসেম্বর- ২০০৭
232.	2007	পিপিআর ভাইরাসের বিরুদ্ধে এন্টিবডি নির্ণয়ে C-DISA পদ্ধতি, জুন- ২০০৭
233.	2007	BLRI-A Brief Acquaintance, June-2007
234.	2007	'বিশ্বে ভেড়ার জাত ও বাংলাদেশে প্রাপ্ত ভেড়াসমূহ' শীর্ষক পোস্টার, জুন- ২০০৭
235.	2007	পশুসম্পদ ও পোল্ট্রি উৎপাদন প্রযুক্তি নির্দেশিকা, পরিমার্জিত সংস্করণ, জুন ২০০৭
236.	2008	উচ্চ ফলনশীল ঘাসের চাষ, দ্বিতীয় সংস্করণ, নভেম্বর-২০০৮
237.	2008	স্টল ফিডিং পদ্ধতিতে ভেড়া পালন, প্রথম সংস্করণ, এপ্রিল-২০০৮
238.	2008	দেশী ভেড়ার প্রজনন পরিকল্পনা ও ব্যবস্থাপনা, প্রথম সংস্করণ, মে-২০০৮
239.	2008	ভেড়ার ফুটরট রোগের চিকিৎসা, প্রথম সংস্করণ, মে-২০০৮
240.	2008	ভেড়ার বহিঃপরজীবীর প্রতিরোধ ও চিকিৎসা, প্রথম সংস্করণ, মে-২০০৮
241.	2008	ভেড়ার প্রজনন ব্যবস্থাপনা, মে-২০০৮

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242.	2008	ক্ষুদ্র খামারীদের জন্য ছাগল পালন পদ্ধতি, প্রথম সংস্করণ, জুন-২০০৮
243.	2008	মহিষ পালন ব্যবস্থাপনা, প্রথম সংস্করণ, জুন-২০০৮
244.	2008	ভেড়া পালন নির্দেশিকা, প্রথম সংস্করণ, জুন-২০০৮
245.	2008	ছাগলের বাচ্চার প্রতি পালন, ২য় সংস্করণ, নভেম্বর-২০০৮
246.	2008	এভিয়ান ইনফ্লুয়েঞ্জা প্রতিরোধে জীব নিরাপত্তা নির্দেশিকা, সেপ্টেম্বর-২০০৮
247.	2008	ব্রয়লার পালন নির্দেশিকা, প্রথম সংস্করণ, সেপ্টেম্বর-২০০৮
248.	2009	মুরগির গামবোরো রোগ নিয়ন্ত্রণের কার্যকর পদ্ধতি, দ্বিতীয় সংস্করণ, নভেম্বর-২০০৯
249.	2009	মুরগির রানীক্ষেত রোগ নিয়ন্ত্রণের কার্যকর পদ্ধতি, দ্বিতীয় সংস্করণ, নভেম্বর-২০০৯
250.	2009	এইচআই (HI) পরীক্ষার জন্য ফিল্টার পেপারের সাহায্যে রক্ত নমুনা সংগ্রহ পদ্ধতি, দ্বিতীয় সংস্করণ, নভেম্বর-২০০৯
251.	2009	বাণিজ্যিক মুরগির খামারে জীব নিরাপত্তা ব্যবস্থাপনা, প্রকাশকালঃ নভেম্বর-২০০৯
252.	2009	মুরগির সালামোনেলা রোগঃ প্রতিরোধ ও নিয়ন্ত্রণ পদ্ধতি, দ্বিতীয় সংস্করণ, নভেম্বর-২০০৯
253.	2009	মুরগির খামারের বর্জ্য ব্যবস্থাপনা ও কম্পোস্টিং, দ্বিতীয় সংস্করণ, নভেম্বর-২০০৯
254.	2009	পশুসম্পদ ও পোল্ট্রি উৎপাদন প্রযুক্তি নির্দেশিকা তৃতীয় সংস্করণ, জুন-২০০৯
255.	2009	দেশী ভেড়ার পশম হতে ঘরে বসে চাদর, শাল ও মাদুর তৈরির সহজ পদ্ধতি, প্রথম সংস্করণ, মার্চ-২০০৯
256.	2009	ভেড়ার বাচ্চার প্রতিপালন, মার্চ-২০০৯
257.	2009	A Study on Highly Pathogenic Avian Influenza in Bangladesh, June-2009
258.	2009	মুরগির কৃত্রিম প্রজননের সহজ পদ্ধতি, প্রথম সংস্করণ, জুন-২০০৯
259.	2009	ফডার থেকে ডিএনএ (DNA) পৃথকীকরণের সহজ পদ্ধতি, প্রথম সংস্করণ, জুন-২০০৯
260.	2009	মাইকোটক্সিন নিয়ন্ত্রণের উপায়, প্রথম সংস্করণ, জুন-২০০৯
261.	2009	রক্তের নমুনা থেকে ডিএনএ নিষ্কাশন, প্রথম সংস্করণ, জুন-২০০৯
262.	2009	ক্ষুদ্র পোল্ট্রি খামারীদের 'খামার ব্যবস্থাপনা' বিষয়ে প্রযুক্তি হস্তান্তর কর্মকর্তার নিকট প্রতিনিয়ত প্রশ্ন ও জবাব, প্রথম সংস্করণ, নভেম্বর-২০০৯
263.	2009	কৃত্রিম গো-প্রজনন ম্যানুয়েল, প্রথম সংস্করণ, জুন-২০০৯
264.	2009	ভেড়ার খামার জীব নিরাপত্তা, প্রথম সংস্করণ, নভেম্বর- ২০০৯
265.	2010	ভেড়াপালন নির্দেশিকা, ২য় সংস্করণ, অক্টোবর- ২০১০
266.	2010	অ্যানথ্রাক্স বা তড়কা রোগ আতঙ্ক নয়, প্রয়োজন সচেতনতা, আগস্ট- ২০১০
267.	2010	পশুসম্পদ ও পোল্ট্রি উৎপাদন প্রযুক্তি নির্দেশিকা, ২য় সংস্করণ, জুন- ২০১০
268.	2010	ভেড়ার খাদ্য ও পুষ্টি ব্যবস্থাপনা, প্রথম সংস্করণ, জুন-২০১০
269.	2011	ভেড়ার ব্যাপক অ্যালোপেসিয়া (লোমউঠা) রোগের কারণ, লক্ষণ ও প্রতিকার, মার্চ-২০১১
270.	2011	ছাগলের ঠান্ডা-সর্দি নিরাময়ে বা নিউমোনিয়া প্রতিরোধে তুলসী পাতার ব্যবহার, মার্চ- ২০১১
271.	2011	শুভ্রা বিএলআরআই কর্তৃক উদ্ভাবিত লেয়ার স্ট্রেইন-১, জুলাই- ২০১১

No.		
272.	2012	MUN: a Modern Diagnostic Tool for Improvement of Dairy Nutrition, September-2012
273.	2012	এক নজরে বিএলআরআই-২০১২
274.	2012	বার্ষিক টিকা প্রদান ও কৃমিনাশক কর্মসূচি-২০১২
275.	2013	আঞ্চলিক প্রাণিস্বাস্থ্য ও পুষ্টি ল্যাবরেটরির কার্যক্রম ও সেবাসমূহ, ২০১৩
276.	2013	বার্ষিক টিকা প্রদান ও কৃমিনাশক কর্মসূচি- ২০১৩
277.	2013	তাপ-সহিষ্ণু পিপিআর ভ্যাকসিন, ২০১৩
278.	2013	বাছুরের জন্য সটি পাউডার ভিত্তিক মিল্ক রিপ্লেসার, ২০১৩
279.	2013	বহুবর্ষজীবী উচ্চফলনশীল ঘাস বিএলআরআই নেপিয়ার- ৪, ২০১৩
280.	2013	ড্রাম সাইলেজ- ২০১৩
281.	2013	বাংলা ল্যাম্ব- ২০১৩
282.	2013	বার্ষিক প্রতিবেদন ২০১২, জুন- ২০১৩
283.	2013	বিএলআরআই নিউজ লেটার- ২০১৩
284.	2013	দেশী ভেড়ার ফিতা কৃমির সংক্রামণ ও প্রতিকারের উপায়, ডিসেম্বর- ২০১৩
285.	2013	ভেড়ার টপ্লোজমোসিস ও প্রতিকার, ডিসেম্বর- ২০১৩
286.	2014	ভেড়ার প্রেগন্যানসি টক্সিমিয়া (একটি বিপাকীয় রোগ) এর কারণ, লক্ষণ ও প্রতিকার, ফেব্রুয়ারী- ২০০৪
287.	2014	ভেড়ার খামারে ডিওয়ামিং ডিপিং ভ্যাকসিনেশন, ফেব্রুয়ারী- ২০১৪
288.	2014	প্রজননের জন্য মহিষ ষাঁড় নির্বাচন ও পালন ব্যবস্থাপনা, ফেব্রুয়ারী- ২০০৪
289.	2014	মহিষের অমত্তঃ পরজীবী বা কৃমি দমন, মে- ২০১৪
290.	2014	ভেড়ীর গর্ভফুল আটকে যাওয়াঃ কারণ, লক্ষণ ও চিকিৎসা, মে- ২০১৪
291.	2014	প্রাণিসম্পদ ও পোল্ট্রি উন্নয়ন প্রযুক্তি ভিত্তিক প্রশিক্ষণ মডিউল, জুন- ২০১৪
292.	2014	দুধের মিনি পাস্তুরিকরণ ও সংরক্ষণ প্রযুক্তি, জুন- ২০১৪
293.	2014	ভেড়ার নিউমোনিয়া প্রতিরোধ ভেষজ উদ্ভিদ তুলসী, আগস্ট- ২০১৪
294.	2014	আর্থ-সামাজিক উন্নয়ন দারিদ্র্য বিমোচনে ভেড়া পালন, সেপ্টেম্বর- ২০১৪
295.	2014	উন্নত ব্যবস্থাপনার মাধ্যমে দেশি ভেড়ার প্রজনন, ডিসেম্বর- ২০১৪
296.	2014	ভেড়ার খাদ্য হিসেবে সাইলেজ ও ইউ এম এস তৈরির পদ্ধতি ও ব্যবহার, ডিসেম্বর- ২০১৪
297.	2015	ডোল পদ্ধতিতে কাঁচা ঘাস সংরক্ষণ প্রযুক্তি, জুন ২০১৫
298.	2016	গবাদি প্রাণীর মারাত্মক সংক্রামক ক্ষুরারোগ ও এর নিয়ন্ত্রণ ব্যবস্থাপনা, জানুয়ারী- ২০১৬
299.	2015	দানাদার খাদ্যের বিকল্প হিসেবে সাজনা পাতা ও কচি ডালপালা ব্যবহার করে বাড়ন্ত ভেড়া মোটাতাজাকরণ, অক্টোবর, ২০১৫
300.	2016	দেশী ভেড়ার পশম, পাট ও তুলার মিশ্রণে তৈরি সুতা থেকে শাল, কম্বল ও স্যুটিং কাপড় তৈরির পদ্ধতি, সেপ্টেম্বর- ২০১৬
301.	2016	সম্ভাবনাময় দেশীয় জাতের মুরগি পালন, মে, ২০১৬
302.	2016	এক নজরে বিএলআরআই আঞ্চলিক কেন্দ্র নাইক্ষ্যংছড়ি, বান্দরবান
303.	2016	ছাগলের পিপিআর রোগ মুক্তকরণে বিএলআরআই মডেল, জুন- ২০১৬
304.	2017	বিএলআরআই এ বিদেশী ভেড়ার সফল কোয়ারেন্টাইন, জানুয়ারী- ২০১৭

No.		
305.	2017	ল্যাম্ব (ভেড়ার মাংস) উৎপাদনে ইউএমএস এর ব্যবহার, এপ্রিল- ২০১৭
306.	2017	ল্যাম্ব উৎপাদনে গর্ভবতী ভেড়ী ও বাচ্চার খাদ্যের পুষ্টি ব্যবস্থাপনা, মে -২০১৭
307.	2017	এক নজরে বিএলআরআই আঞ্চলিক কেন্দ্র বাঘাবাড়ী, শাহাজাদপুর, সিরাজগঞ্জ, মে-২ ০১৭
308.	2017	বাণিজ্যিক ল্যাম্ব (ভেড়ার মাংস) উৎপাদনে স্থানীয় জাতের ভেড়ার উপযোগীতা, জুন-২০১৭
309.	2017	মহিষের ইস্ট্রাস-সিনক্রোনাইজেশন প্রযুক্তি , জুন ২০১৭ খ্রিঃ
310.	2017	নর্থ বেঙ্গল গ্রে জাতের দেশী গরু, আগস্ট- ২০১৭
311.	2017	মুন্সিগঞ্জ জাতের দেশী গরু, জুলাই- ২০১৭
312.	2018	বিএলআরআই ম্যাসটাইটিস টেস্ট (বিএমটি) কিট, জুন-২০১৮
313.	2018	খামারি পর্যায়ে টার্কি পালন ও ব্যবস্থাপনা, জুন- ২০১৮
314.	2019	ডেইরী শিল্পের নিরব ঘাতকঃ অ্যানাপ্লাজমোসিস রোগের কারণ, লক্ষণ ও প্রতিকার, জানুয়ারি- ২০১৯
315.	2019	ডেইরী উন্নয়ন পাবনা জাতের দেশী গরু, জানুয়ারি - ২০১৯
316.	2019	আবদ্ধ আবস্থায় মায়া হরিণ পালন ও ব্যবস্থাপনা, মার্চ- ২০১৯
317.	2019	বাংলাদেশে গবাদি প্রাণীতে রক্ত প্রোটোজোয়ার প্রকোপ ও এর নিয়ন্ত্রণ ব্যবস্থাপনা, জুন- ২০১৯
318.	2019	এক নজরে বায়োটেকনোলজি বিভাগের কার্যক্রম, অক্টোবর- ২০১৯
319.	2021	মহিষের উৎপাদনশীলতা বৃদ্ধিতে সরকারের যুগান্তকারী পদক্ষেপ, মে-২০২১
320.	2021	খামারী পর্যায়ে মহিষের তথ্য সংরক্ষণের হার্ডবুক, মে-২০২১
321.	2021	মহিষ পালন খামারী প্রশিক্ষণ ম্যানুয়াল, জুন-২০২১
322.	2021	লাভজনক খামার ব্যবস্থাপনায় বিএলআরআই ফিডমাস্টার মোবাইল অ্যাপ্লিকেশন এর ব্যবহার, জুন-২০২১
323.	2021	বাংলাদেশ জার্নাল অব লাইভস্টক রিসার্চ ভলিউম-২৬, জুন-২০২১
324.	2021	বাংলাদেশ জার্নাল অব লাইভস্টক রিসার্চ ভলিউম-২৭, জুন-২০২১
325.	2021	প্রসিডিংস অব দ্যা অ্যানুয়াল রিসার্চ রিভিউ ওয়ার্কসপ ২০১৭-১৮, জুন-২০২১
326.	2021	গাভী পালন ও ব্যবস্থাপনায় উন্নত প্রযুক্তির ব্যবহার, ডিসেম্বর, ২০২১
327.	2022	বিএলআরআই প্রযুক্তি পল্লী, ফেব্রুয়ারি ২০২২
328.	2022	বিএলআরআই ব্রিডিং ম্যানেজার মোবাইল অ্যাপস, মার্চ ২০২২
329.	2022	গ্রীনওয়ে বিজনেস অ্যাপস, মার্চ ২০২২
330.	2022	দেশীয় ভেড়াঃ বাংলাদেশ প্রাণিসম্পদ গবেষণা ইনস্টিটিউট এ সংরক্ষণ ও উন্নয়ন, এপ্রিল ২০২২
331.	2022	তথ্য অধিকার আইন ও এর বিধিবিধান, জুন ২০২২
332.	2022	প্রোবায়োটিক দই তৈরিতে বিএলআরআই স্টার্টার কালচার
333.	2022	স্বল্প খরচে এবং সহজে হিমায়িত সিমেন উৎপাদন প্রযুক্তি
334.	2022	বিএলআরআই ঘাস-৫ (লবণ সহিষ্ণু)
335.	2022	বিএলআরআই মিট চিকেন-১ (সুবর্ণ) প্যারেন্ট ব্যবস্থাপনা গাইডলাইন
336.	2023	ক্রসব্রিডিং এর মাধ্যমে দেশীয় জাতের ভেড়ার উন্নয়ন সম্ভাবনা
337.	2024	এলইডি কালার লাইট ব্যবহারের মাধ্যমে নিরাপদ ব্রয়লার পালন কৌশল
338.	2024	বিএলআরআই এর অধিক উৎপাদনশীল ও পুষ্টিসমৃদ্ধ নেপিয়ার ঘাস
339.	2024	হাঁস পালন নির্দেশিকা

Packages and Technologies Developed by BLRI

Table: A. Packages

Sl. No	Name of Package	Year developed
1.	Cattle Fattening	1998
2.	Health management package to control PPR	1999
3.	Quail rearing	2000
4.	Calf rearing	2002
5.	Dairy Farming	2002
6.	Forage production and preservation	2002
7.	Goat rearing model for poverty alleviation	2002
8.	Rearing of Black Bengal goats under semi-intensive management	2002
9.	Commercial layer model for small farmers	2002
10.	FMD control measures	2002
11.	Goat rearing under stall-fed condition	2003
12.	Broiler rearing under model for small farmers	2003
13.	Duck rearing in rural area	2003
14.	Rabbit rearing model for small farmers	2004
15.	Gumboro disease control package	2004
16.	Newcastle disease control package	2004
17.	Cockerel rearing	2005
18.	Management of Sheep Breeding and Genetics	2007
19.	Pigeon Rearing	2009

Table: B. Technologies

Sl. No	Name of Technologies	Year developed
1.	Salmonella vaccine	1995
2.	ELISA- based techniques for the diagnosis	1995
3.	Salmonella antigen for the diagnosis of pullorum disease	1995
4.	Use of coconut, mustard oil cake and ipil-ipil leaf meal in the poultry diet	1997
5.	Urea-Molasses-Straw (UMS)-a basal feed for cattle	1998
6.	Appropriate exotic blood level for crossbreeding program of dairy cattle	1998
7.	Straw preservation under wet condition	1998
8.	Urea-Molasses Block preservation technique	1998

SI. No	Name of Technologies	Year developed
9.	Algae production and its use as an alternative feed for ruminants	1998
10.	Low cost preservation of green grass	1998
11.	Molasses utilization as a feed for cattle	1998
12.	Livestock feed and fuel production from cultivation of ipilipil	1998
13.	Maize and cowpea mixed forage production and utilization	1998
14.	Combined antibiotic hyper immune serum therapy for PPR	1999
15.	Hygienic and improved chick brooder	2001
16.	PPR vaccine	2001
17.	C-EISA method for antibody determination against PPR virus	2001
18.	Enzyme Immuno Slide Assay (ELISA) for diagnosis of PPR and Rinderpest disease	2001
19.	Banana foliage processing and preservation for feeding cattle Sugarcane by-products processing and preservation for feeding cattle	2002
20.	Sugarcane by-products processing and preservation for feeding cattle	2002
21.	Manure-based year-round duckweed production and its utilization for feeding livestock and poultry	2002
22.	Dairy cattle development through artificial insemination and selection techniques	2002
23.	Control model for gastro- intestinal helminth parasites	2002
24.	Mycoplasma antigen	2002
25.	Improved technique for the production of organic chicken	2002
26.	Techniques for selection of best genotypes of Black Bengal goat for farm establishment	2002
27.	Manufacturing process of Astagram Ponir (cheese) and its marketing	2003
28.	Embryo transfer technique use in native cows	2003
29.	Baksa-a native grass production and its use in dairy cattle	2003
30.	Maize stover preservation and its use for feeding cattle	2003
31.	Pruning level of jackfruit leaves and system of feeding to goat	2003
32.	ND antigen for HI test	2003
33.	Bio-security in commercial poultry farms	2003
34.	Filter Paper-strip blood collection method for HI test	2003

Sl. No	Name of Technologies	Year developed
35.	Fodder crop production for saline belt, flood prone and Madhupur tract	2004
36.	Fodder production on the hill slopes for livestock production and to alleviate soil erosion	2004
37.	Hemolysin for complement fixation test	2004
38.	Goat kid management	2006
39.	EISA method for determination of Goat pox disease	2006
40.	Goat pox Vaccine	2007
41.	'Mina Mix' as source of mineral for livestock	2009
42.	Corn straw Pellet Feed	2010
43.	Shuvra-BLRI Layer Strain-I	2011
44.	Non-electric chick brooder	2011
45.	Thermostable PPR Vaccine	2012
46.	Napiar-4 High yielding grass	2012
47.	BLRM DNA Extraction Kit	2012
48.	Milk replacer for calves	2012
49.	Bio-security model for commercial small scale poultry farmer	2012
50.	বিএলআরআই এফএমডি ২০১৬ ত্রিয়োজি ($O, A, Asia-1$) টিকার মাস্টার সীড	2016
51.	ছাগল ও ভেড়ার পিপিআর রোগ দমনে বিএলআরআই মডেল	2016
52.	বিএলআরআই ফিড মাস্টার মোবাইল এপ্লিকেশন	2016
53.	গবেষণাগারে ভ্রুণ উৎপাদন	2016
54.	প্রজননের জন্য মহিষ ষাঁড় নির্বাচন ও পালন ব্যবস্থাপনা	2016
55.	মহিষ খামারে অন্তঃপরজীবী বা কৃমি দমন মডেল	2016
56.	মহিষ খামারে জীব নিরাপত্তা ব্যবস্থাপনা	2017
57.	বিএলআরআই লেয়ার স্ট্রেইন-২ বা ''স্বর্ণা''	2017
58.	ব্রয়লার খাদ্যে এন্টিবায়োটিকের বিকল্প হিসেবে সাজনা পাতার ব্যবহার	2017
59.	মহিষের ইস্ট্রাস-সিনক্রোনাইজেশন প্রযুক্তি	2017
60.	ডোল পদ্ধতিতে কাঁচা ঘাস সংরক্ষণ প্রযুক্তি	2017
61.	উন্নত জাতের দেশি মুরগি উৎপাদনে বিজ্ঞান সম্মত কৌশল	2017
62.	এভিয়ান ইনফ্লুয়েঞ্জা ($H5N1$) এইচআই (HI) পরীক্ষার জন্য (HA) এইচএ এন্টিজেন	2017
63.	সাজনা গাছের চাষ পদ্ধতি এবং গো-খাদ্য হিসেবে এর ব্যবহার	2018
64.	শস্য-উপজাত ভিত্তিক প্রাণী খাদ্য হিসাবে টি.এম.আর প্রযুক্তি	2018
65.	ক্ষুররোগ দমনে বিএলআরআই মডেল	2018
66.	পাহাড়ি অঞ্চলে ভেড়া পালনের কৌশল	2019
67.	নিরাপদ মাংস উৎপাদনে দেশি উপকূলীয় মহিষ হৃষ্টপুষ্টকরণ প্রযুক্তি	2019
68.	দেশি ভেড়া হতে বাণিজ্যিক ভিত্তিতে বাংলা ল্যাম্ব (ভেড়ার মাংস) উৎপাদন	2019

Sl. No	Name of Technologies	Year developed
69.	সবজি বর্জ্য থেকে প্রাণিখাদ্য উৎপাদন প্রযুক্তি	2020
70.	ফডারের বায়োমেট্রিক্যাল র্যাংকিং টুল	2020
71.	স্টল ফিডিং পদ্ধতিতে ছাগল ও ভেড়া পালনে "সাশ্রয়ী কমপ্লিট প্যালেট ফিড" এর ব্যবহার	2021
72.	বিএলআরআই ঘাস-৫ (লবণ সহিষ্ণু)	2022
73.	বিএলআরআই মিট চিকেন-১ (সুবর্ণ)	2022
74.	প্রোবায়োটিক দই তৈরিতে বিএলআরআই স্টার্টার কালচার	2022
75.	স্বল্প খরচে হিমায়িত সিমেন উৎপাদন প্রযুক্তি	2023
76.	স্বল্প খরচে ঘাসভিত্তিক টিএমআর পদ্ধতিতে খাসী হৃষ্টপুষ্টকরণ প্রযুক্তি	2023
77.	বিএলআরআই কর্তৃক উদ্ভাবিত লাম্পি স্কিন ডিজিজ ভ্যাকসিন	2024
78.	বিএলআরআই কর্তৃক উদ্ভাবিত Avian Influenza H9N2 ভ্যাকসিন	2024

Annual Report 2023-24
Public Relations Section, BLRI

Information Service

Public Relations section of BLRI has provided information to 04 (Four) applicants according to the application submitted under the Right to Information Act, 2009. Beside the formal applications, the section also provided information to farmers and interested entrepreneurs about BLRI technologies and ongoing services through face to face communication, phone, massage and various social media.

Publicity on National Days

Public Relations section of BLRI has collaborated in observing different National and International Days and publishing their news in different news media and social platforms. The section also operating the display board of main gate and administration building on various occasions along with important news and documentaries about BLRI.

Fig-1: National Victory Day observing news in BLRI Facebook page

Press and Media

Public Relations section of BLRI is proving assistance to press and media continuously. This section is proving them information and guideline about the technologies and achievements of BLRI as well as providing concepts or ideas of features. Public Relations section also provides press brief and press release to the national daily and online media about different important programs of BLRI.

Fig-2: BLRI news in different media

BLRI Newsletter

Public Relations section of BLRI is publishing BLRI Newsletter quarterly in collaboration with Publication section. Four issues of BLRI Newsletter (Volume-14, Issue- 3, 4 and Volume-15, Issue- 1, 2) has been published on 2023-2024 financial year.

Fig-3: Front page of BLRI Newsletter

Website Management

In collaboration of ICT section, Public Relations section is also contributing in the development of BLRI website and keeping it up to date. The section updates and the recent data and information about BLRI time to time. Beside this, PR section also posts pictures in home slider and news in Recent News section of the website.

Fig-4: Picture published in BLRI website

Social Media

Public Relations section also maintains the social media sites of BLRI. There is an official Facebook page as well as a Facebook group of BLRI. BLRI also has an official YouTube channel. PR section maintains these accounts, keeps them up to date and conducts publicity through these page, group and channel. The section also provide QnA through the accounts also.

Fig-5: FB post published on BLRI page about heat management massage and various BLRI event

APA Managements

Under the Annual Performance Agreement 2022-23 and according to the Right to Information Regarding Work Plan 2022-23, Public Relations section has been performed various activities in 2022-23 financial year. Besides disposing the applications made under the RTI act, the section also updates the Self-Disclosable Information List twice in the year. The section had also published advertisement regarding RTI in the official website of BLRI and national daily. The section had also helped the Training section in arranging 3 (Three) training programs.

Fig-6: Training about RTI act, rules, regulations and self-disclosable information publishing policy

Awareness Programs

Public Relations section of BLRI is playing an important role in increasing awareness about RTI and related subjects among BLRI stakeholders, farmers and general citizens. PR section of BLRI had published advertisement regarding RTI in the official website of BLRI and national daily. The section also published leaflets about the importance of RTI and distributes them among BLRI officials and farmers. Farmers, who come to take trainings, are also made aware of RTI in details. PR section has also arranged 01 (One) stakeholders meeting about RTI with the In-Charges of BLRI sub-stations and other stakeholders.

Fig-7: Public Relations section has published leaflet and advertisements about RTI Act, 2009

Section Activities Report 2023-24
Library Section

BLRI library which functions as a resource center, is constantly being enriched. BLRI maintains the library to support the research, training and disseminate the research findings and activities of the institute's researchers. This support is provided through a variety of activities as stated below. BLRI library has been continued to extend its various facilities to the researchers, including those in the regional stations at various places in the country. Some services were also enjoyed by persons other than the BLRI officer-staff.

Library use: More than 500 users including researchers, research support personnel, administrator and trainees from both within and outside the institute take advantage of the library's major facilities and services. Among the outside reader-visitors, the university students, M.Phil and Ph.D Student, scientists and researchers from various NGO's, Savar Dairy Farm, RV & F Depot and Military Dairy Farm use this library frequently. The library's infrastructure facilities and physical environment is constantly being improved. The reference service, Document delivery, dissemination channels, automated library service and on-line facilities are under-way to further improve with a view to making it a specialized library for livestock research in country and more useful to the users. BLRI library is open from 9:00 a.m. to 5:00 p.m. in every working day except govt. holiday.

Collection development: The authority is always careful to increase the library collection, upgrade its services and improve the information support for the scientists and researchers of the institute. The authority also allocates a regular revenue and project budget in every financial year to purchase reading materials for the library. The library received a remarkable number of journal & workshop proceedings, conventional and non-conventional research reports, annual reports, newsletters and magazines etc. on complimentary or exchange basis. The library always monitored the needs of the scientists of the institute for scientific literature and took special care to procure those in the fastest possible way. Total number of books 8280; among them 39 are e-books, Journals title 200 and reports about 1500 in the BLRI library respectively. Recently as the part of online journal collections BLRI has newly added agriculture based online journal AGORA which is conducted by 'Research for Life' as well as a world prominent e-journal database 'The Essential Electronic Agricultural Library (TEEAL)' newly added with BLRI library services.

Photocopying service: There are photocopy machines in the library to improve the document delivery services and information support such as CAS, SDI etc. to facilitate the researchers. The library's photocopying service is made available to them as needed. Number of 1,43,522 Photocopy materials has been delivered for official and research purposes for the year 2023-2024.

Computer: One personal computer was acquired for the library to facilitate word processing and database related work. Another one personal computer was added from NATP Project BARC to develop library database. New database process is under-way to computerize the library collections in near future to strengthen information retrieval facilities.

Borrowing facilities: The library's borrowing facilities were made available as usual to the researchers, administrators, M.Phil students, Ph.D students, scientists, officers and staffs of the institute and those of the RV & F Depot, Savar Dairy Farm (on a limited basis). The library maintained formal relationship with the SAIC, AIC, BAU Library, BANSDOC Library, BARI Library, Jahanginagar University Library and BPATC Library.

Reference service: The library staffs are often required to find answers to formal/informal reference queries, they are committed to response the queries and to check various reference citations.

Accounts Section

Financial Statement for the Year 2023-2024 (Revenue Budget)

Table: Financial Statement of Fy 2023-24   **Taka in lakh**

Economic Code	Particular	Total Budget	Total Expenditure	Balance
3111101	Officers Salary	603.75	600.97	2.78
3111201	Staff Salary	239.00	236.55	2.45
3111352	Special Benefit	70.11	69.66	0.45
3631102	Allowances	571.08	561.93	9.15
3631103	Supply & Service	1947.37	1901.63	45.74
3631104	Retirement Allowance Gratuity	384.00	384.00	-
3421506	Contributory Provident fund	100.00	100.00	-
3257103	Research	316.25	316.25	-
3631199	Others Grant	30.75	26.64	4.11
	Grand Total:	**4262.31**	**4197.63**	**64.68**
	Revenue Budget Adjustment:	**(-) 100.00**	**(-) 100.00**	**-**
	GOB Net Expenditure:	**4162.31**	**4097.63**	**64.68**

ICT Infrastructure and Activities (2023–2024)

Bangladesh Livestock Research Institute (BLRI)

In FY 2023–2024, the Bangladesh Livestock Research Institute (BLRI) made significant advancements in its Information and Communication Technology (ICT) infrastructure and services to strengthen research, administrative efficiency, and nationwide communication.

Upgraded Server Room and Network Facilities

The BLRI server room has been structurally upgraded to meet modern standards, featuring the installation of high-performance servers, server racks, CISCO networking equipment, online UPS systems, and other essential accessories. The server room has also been equipped with a raised floor, making it a secure and well-managed facility.

IP Surveillance System Expansion

To enhance institutional security, an IP camera-based surveillance system has been installed in key areas of the main office building and research farms. This surveillance system has also been extended to regional sub-centers in Baghabari (Sirajganj), Naikhongchari (Bandarban), Rajabarihat (Rajshahi), Jashore, and Bhanga (Faridpur).

Integrated Communication through IPTSP and IP Telephony

BLRI has successfully implemented the IP Telephony Service Provider (IPTSP) system across its headquarters and regional offices. Staff members now communicate seamlessly via IP phones using internet connectivity, improving operational efficiency and collaboration.

Mobile Applications and Citizen Services

Several mobile applications developed by BLRI are now in active use nationwide. These apps serve to disseminate important livestock information and services to farmers, researchers, and stakeholders, enhancing BLRI's outreach.

Connectivity with BdREN and UGC Services

BLRI is electronically connected with the Bangladesh Research and Education Network (BdREN), allowing access to various services offered by the University Grants Commission (UGC) via Virtual Private Network (VPN). This connectivity provides researchers with access to a wide array of digital academic resources.

Access to TEEAL and Digital Library Services

Scientists at BLRI continue to utilize The Essential Electronic Agricultural Library (TEEAL), which offers over 465,000 full-text PDF articles from more than 350 international journals (1990–2011). Access is enabled via the Local Area Network (LAN), facilitating enhanced research capabilities.

Optical Fiber Backbone and LAN Infrastructure

All office buildings and some farm areas are now interconnected through an underground optical fiber backbone. The LAN connects office rooms, laboratories, the library, conference rooms, guest houses, and the Director General's bungalow. This robust infrastructure allows for file and print sharing, intra-office communication, and centralized network access.

High-Speed Internet Access

A dedicated 100 Mbps full-duplex internet connection supports uninterrupted 24/7 access for all users on the LAN. Wireless internet (Wi-Fi) is also available in designated office areas, accessible via smartphones, tablets, laptops, and other mobile devices.

International Collaboration and Web Presence

BLRI's scientists and officials are actively engaging with international research institutions, universities, and relevant organizations through high-speed internet, enabling improved research and development (R&D) collaboration. Updated R&D news, reports, and institutional activities are regularly published on the official BLRI websi te (www.blri.gov.bd) in both Bangla and English.

IP-Based Intercom and Regional Communication

The institute has implemented an Internet Protocol (IP) based intercom phone service for efficient internal communication. Regional offices are also integrated into this system, ensuring streamlined connectivity across all BLRI stations.

Video Conferencing Facility

A state-of-the-art video conferencing system has been established, enabling BLRI to host international meetings, research collaborations, training sessions, and virtual conferences, significantly enhancing the institute's global engagement.

Store cum Procurement Section

During 2023-24 financial year store & procurement section procured the following goods.

SI NO.	Description	Tk. (Lakh)
01	Animal & Poultry Feed	750.00
02	Stationery items	10.00
02	Cattle Animal Medicine	3.00
03	Lawn Mower Machine	3.00
04	Milk Keeping Poly-Pack & Other accessories	3.00
05	Split type Air-cooler and Water Filter	2.97
06	Solar Battery	2.20
07	Toner and Printer	2.97
08	Liveries	2.95
09	Renting a stall for 5th AHCAB International fair.	2.56
10	Procurement of Bag, Program schedule Book and Proceedings for Annual Research Review Workshop 2023	3.00
11	Printing, Binding & Supply of Proceedings for Annual Research Review Workshop 2023.	2.96
12	Refrigerator & Microwave Oven	0.81
13	Furniture	2.88
14	Electrical goods	9.43
15	Sanitary & Plumbing goods	10.17
16	Repairing and supplying of Damage LAN, Internet, Optical fiber backbone network, surveillance system and outdoor digital display system	16.75
17	Procurement of books	5.16
18	Computers, Laptop and UPS	12.60
	Total	846.41

List of Personnel-2024
(Not in the order of Seniority)

No.	Name	Designation
1.	Shakila Faruque, PhD (Animal Breeding & Genetics)	Chief scientific Officer (R.C.)
2.	A B M Mustanur Rahman, PhD	Additional Director
3.	S.M. Jahangir Hossain, PhD (Animal Breeding & Genetics)	Chief scientific Officer
4.	Nasrin Sultana, PhD (Animal Nutrition)	Chief Scientific Officer
5.	Md. Zillur Rahman PhD (Animal Nutrition)	Principal Scientific Officer
6.	Biplop Kumar Roy, PhD (Livestock Production Management)	Principal Scientific Officer
7.	Md. Sazedul Karim Sarker, PhD (Poultry Nutrition)	Principal Scientific Officer
8.	Most. Parvin Mostari, PhD (Neuroendocirnology & Animal Reproduction)	Principal Scientific Officer
9.	Gautam Kumar Deb, PhD (Reproductive Biotechnology)	Principal Scientific Officer
10.	Sardar Muhammad Amanullah, PhD (Applied Life Science)	Principal Scientific Officer
11.	Razia Khatun, PhD (Food Safety)	Principal Scientific Officer
12.	Kamurn Nahar Monira, PhD (Animal Breeding & Genetics)	Principal Scientific Officer
13.	Dr. Md. Nuruzzaman Munsi, M.S. (Theriogenology), PhD	Principal Scientific Officer
14.	Md. Rakibul Hassan, PhD (Agriculture poultry nutrition of physiology)	Principal Scientific Officer
15.	Sadek Ahmed, PhD (Animal Nutrition)	Principal Scientific Officer
16.	Mohammed Abdus Samad, PhD (Bio-medical Engineering)	Principal Scientific Officer
17.	Mohammad Lutful Haque, M.Sc. (Informatics and Computer Engineering.)	System Analyst
18.	Md. Shahin Alam, PhD	Principal Scientific Officer
19.	Mohammad Abdur Rashid, PhD	Principal Scientific Officer
20.	Shamim Ahmed, PhD	Principal Scientific Officer
21.	Halima Khatun, PhD	Principal Scientific Officer
22.	Mohammad Sirajul Islam, PhD	Principal Scientific Officer
23.	Md. Ashraful Islam, B.Sc,(Civil Engg.) MBA (F&B) MIEB	Executive Engineer
24.	Noni Gopal Das, M.S. (Animal Science)	Senior Scientific Officer
25.	Farhana Afroz, PhD	Senior Scientific Officer
26.	Md. Asadul Alam, PhD	Senior Scientific Officer
27.	Md. Yousuf Ali, M.S. (Poultry Science) PhD fellow	Senior Scientific Officer
28.	Yousuf Ali Khan, M.S. (Animal Breeding & Genetics)	Senior Scientific Officer
29.	Md. Khairul Basar, M.S. (Poultry Science) PhD	Senior Scientific Officer
30.	Dr. Md. Saiful Islam PhD	Senior Scientific Officer
31.	Md. Rezaul Karim, M.S. (Microbiology) PhD	Senior Scientific Officer
32.	Md. Nazmul Huda, B.Sc. & AH. (Hon's) PhD fellow	Senior Scientific Officer
33.	Md. Abu Hemayet, MS. (Poultry Science) PhD fellow	Senior Scientific Officer
34.	Md. Hafizur Rahman, M.S. (Microbiology) PhD	Senior Scientific Officer

No.	Name	Designation
35.	Md. Rezaul Hai Rakib, B.Sc, (A.H.) Hon's PhD fellow	Senior Scientific Officer
36.	Md. Abu Yousuf, M.S. (Pathology)	Senior Scientific Officer
37.	Mrs. Mahafuza Khatun, PhD	Senior Training Officer
38.	Ponir Chowdhury M.S. (Animal Breeding & Genetics) PhD	Senior Scientific Officer
39.	Md. Mukhlesur Rahman, M.Sc. (Animal Nutrition)	Senior Scientific Officer
40.	Md. Ahsanul Kabir, M.S. (Dairy Science) PhD fellow	Senior Scientific Officer
41.	Md. Zakir Hassan, M.S. (Medicine) PhD fellow	Senior Scientific Officer
42.	Md. Anwar Hossain, M.S. (Microbiology)	Senior Scientific Officer
43.	Sabina Yasmin, M.S. (Agriculture Economics)	Senior Scientific Officer
44.	Md. Humayun Kabir, M.S. (Pathology) PhD	Senior Scientific Officer
45.	Md. Amirul Hasan, M.S. (Medicine) PhD	Senior Scientific Officer
46.	Jobaida Shovona Khanam, M.S. (Animal Breeding & Genetics)	Senior Scientific Officer
47.	Md. Faizul Hossain Miraz, M.Sc. (Animal Science)	Senior Scientific Officer
48.	Dr. A.S.M. Ashab Uddin, DVM, M.S.C (Microbiology)	Senior Scientific Officer
49.	Sabiha Sultana, PhD (Poultry Nutrition of Physology)	Senior Scientific Officer
50.	Md. Ataul Gani Rabbani, B.Sc. AH. (Hon's) PhD fellow	Senior Scientific Officer
51.	Nure Hasni Disha, M.S. (Animal Breeding & Genetics)	Senior Scientific Officer
52.	Md. Redoan Akond Sumon, M.S. (Animal Nutrition)	Senior Scientific Officer
53.	Sonia Akter, M.S. (Pathology)	Senior Scientific Officer
54.	Md. Zulfekar Ali, M.S. (Microbiology)	Senior Scientific Officer
55.	Md. Habibur Rahaman, DVM	Senior Scientific Officer
56.	Md. Monjurul Alam	Programmer
57.	Md. Obayed Al Rahman, M.S. (Poultry Science)	Scientific Officer
58.	Ummeya Shiha Alam	Scientific Officer
59.	Md. Shamim Hasan	Scientific Officer
60.	Md. Al-Mamun, M.A (Information Science & Library Management)	Librarian
61.	Md. Zahidul Islam M.S.S (Public Administration)	Publication Officer
62.	Devjyoti Ghosh M.S.S (Journalism and media studies)	Information Officer
63.	Md. Mahmudul Hasan Pasha	Scientific Officer
64.	Md. Ashraful Islam	Scientific Officer
65.	Shahana Nazneen	Scientific Officer
66.	Md. Tasmirul Islam	Scientific Officer
67.	Md. Ariful Islam	Scientific Officer
68.	Md. Hafizur Rahman	Scientific Officer
69.	Ayesha Shiddika Afsana	Scientific Officer
70.	Enam Ahmed	Scientific Officer

No.	Name	Designation
71.	Shahanaj Ferdousi Shejuty	Scientific Officer
72.	Manik Miah	Scientific Officer
73.	Sadia Afrin	Scientific Officer
74.	Md. Mostain Billah	Scientific Officer
75.	Abu Haris Miah	Scientific Officer
76.	Md. Asief Hossain Zihadi	Scientific Officer
77.	Farzana Yasmin	Scientific Officer
78.	Mohammad Mahbub Hasan	Scientific Officer
79.	Mizanur Rahman Khan	Scientific Officer
80.	Khairun Nahar Shithi	Scientific Officer
81.	Mst. Nazia Akter	Scientific Officer
82.	Sukumar Roy	Scientific Officer
83.	Dipu Roy	Scientific Officer
84.	Aminul Islam	Scientific Officer
85.	Bijoy Barua	Scientific Officer
86.	Syidul Islam	Scientific Officer
87.	Zamila Bueaza Bupasha	Scientific Officer
88.	Mizanur Rahman Manu	Scientific Officer
89.	Sadia Binte Sadrul	Scientific Officer
90.	Al-Amin Hossain	Scientific Officer
91.	Anowar Hosen	Scientific Officer
92.	Sonia Sultana	Scientific Officer
93.	Sharmin Akter Tule	Scientific Officer
94.	Dipa Das	Scientific Officer
95.	Khadiza-Tut-Tahira	Scientific Officer
96.	Lipi Rani Sarker	Scientific Officer
97.	Eshtiak Ahamed Pehan	Scientific Officer
98.	Obydul Islam	Scientific Officer
99.	Md. Hossen Ali	Scientific Officer
100.	Md. Tareq Hossain	Scientific Officer
101.	Shahrina Akter	Scientific Officer
102.	SM Soheb Ahmed	Scientific Officer
103.	Homayra Siddika	Scientific Officer
104.	Md. Razibul Hasan	Scientific Officer
105.	Mohammad Nizamul Hoque Touhid	Scientific Officer
106.	Md. Nurul Haque	Scientific Officer

No.	Name	Designation
107.	Mst. Mamata Akter	Scientific Officer
108.	Md. Nazmul Huda	Scientific Officer
109.	Md. Rasel Miah	Scientific Officer
110.	Monjura Mojib Bonet	Scientific Officer
111.	Md. Iftakher Alam Sarker	Scientific Officer
112.	Md. Tarikul Islam	Scientific Officer
113.	Nushrat Nourin Lisa	Scientific Officer
114.	Kamrun Naher Papry	Scientific Officer
115.	Ahnaf Anjum Dara	Scientific Officer
116.	Sharmin Sultana	Scientific Officer
117.	Most. Umme Saleheen Ety	Scientific Officer
118.	Sifat Hossain Joya	Scientific Officer
119.	Dr: Ovirup Bhushan Paul	Scientific Officer
120.	Dr. Lutfun Naher	Scientific Officer
121.	Md. Nahid Hassan Chawdhury	Scientific Officer
122.	Dr. Isnat Jahan	Scientific Officer
123.	Dr. Shihab Ahmed	Scientific Officer
124.	Rumana Khatun	Scientific Officer
125.	Dr. Md. Tarikul Islam	Scientific Officer
126.	Dr. S.M. Ahsanul Kabir Udoy	Scientific Officer
127.	Rokaiya Sultana Heera	Scientific Officer
128.	Dr. Md. Asabur Rahman	Scientific Officer
129.	Md: Raziul Islam	Scientific Officer
130.	Narsisa Akon	Scientific Officer
131.	Rezwanul Islam	Scientific Officer
132.	Md. Enamul Haque Khandaker	Accounts Officer
133.	Junnurain	Asst. Maintenance Engineer
134.	Md. Bakhtiar Kakee	Scientific Officer
135.	Dr. Md. Niamul Shahadat	Scientific Officer
136.	Rushan Manzur	Assistant Engineer (Civil)
137.	Dr. Md. Shehanul Islam	Medical Officer
138.	Md. Shafiqul Alam Mondol, Dip-in-Eng. (Electric)	Sub Asst. Engineer (Electronics)
139.	Md. Ahsan Habib, M.Com	Security Officer
140.	Md. Farid Miah, M.B.S.	Procurement Officer
141.	Md. Eaqub Ali	Sub Asst. Engineer (Civil)
142.	Md. Imran Hossain	Photographer
143.	Iqbal Hossain	Sub Asst. Engineer (Civil)