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USAID/BANGLADESH FEED THE FUTURE BANGLADESH LIVESTOCK PRODUCTION FOR IMPROVED NUTRITION ACTIVITY FINAL PERFORMANCE EVALUATION

JUNE 5, 2021

REVISED AUGUST 8, 2021

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USAID Bangladesh Monitoring, Evaluation, and Learning Activity

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ACRONYMS

Acronym/Term	Description
AESA	Agricultural Extension Support Activity
AI	Artificial Insemination
AIRN	Agricultural Input Retailers' Network
AOR	Agreement Officer's Representative
APR	Annual Progress Report
BC	Behavioral Change
BIHS	Bangladesh Integrated Household Survey
BLRI	Bangladesh Livestock Research Institute
BMEL	Bangladesh Monitoring, Evaluation, and Learning Activity
BNA	Bangladesh Nutrition Activity
BNNC	Bangladesh National Nutrition Council
BRAC	Building Resources Across Communities
BSCIC	Bangladesh Small and Cottage Industries Corporation
CA	Community Agent
CAHW	Community-Based Animal Health Worker
CBHC	Community-Based Health Care
CIMMYT	International Maize and Wheat Improvement Center
CNA	Community Nutrition Agent
CNFA	Cultivating New Frontiers in Agriculture
COP	Chief of Party
COR	Contracting Officer's Representative
COVID-19	Coronavirus Disease 2019
CSISA	Cereal Systems Initiative for South Asia
CSO	Civil Society Organization
CVASU	Chattogram Veterinary and Animal Sciences University, Chittagong
DCCI	Dhaka Chamber of Commerce and Industry
DLS	Department of Livestock Services
ECTAD	Emergency Center for Transboundary Animal Diseases (FAO)
ET	Evaluation Team
EQ	Evaluation Question
FAO	Food and Agriculture Organization of the United Nations
FGD	Focus Group Discussion
FMD	Foot and Mouth Disease
FPE	Final Performance Evaluation
FTF	Feed the Future
GOB	Government of Bangladesh
IAHBI	Integrated Agriculture-Health-Based Initiative for Improved Food and Nutriti Security
ICBA	International Center for Biosaline Agriculture
ICT	Information and Communication Technology
IFPRI	International Food Policy Research Institute
IPHN	Institute of Public Health Nutrition
IRRI	International Rice Research Institute
JICA	Japan International Cooperation Agency
KII	Key Informant Interview
Livestock and Nutrition	Livestock Production for Improved Nutrition Activity

Acronym/Term	Description
LDDP	Livestock Dairy Development Project
LPIN	Livestock Production for Improved Nutrition (Livestock and Nutrition) Activity
LSP	Local (Livestock) Service Provider
M&E	Monitoring and Evaluation
MAM	Moderate Acute Malnutrition
ME&A	ME&A, Inc. (formerly Mendez England & Associates)
MOA	Ministry of Agriculture
MOFDM	Ministry of Food and Disaster Management
MOFL	Ministry of Fisheries and Livestock
MOHFW	Ministry of Health and Family Welfare
MOU	Memorandum of Understanding
MOWCA	Ministry of Women and Children's Affairs
MUCH	Meeting the Undernutrition Challenge
NATP	National Agricultural Technology Project
NCC	Nutrition Coordination Committee
NGO	Nongovernmental Organization
PPP	Public-Private Partnership
PRAN	Program for Rural Advancement Nationally (Dairy)
PROSHAR	Program for Strengthening Household Access to Resources
PRTC	Poultry Research and Training Center
RCHCIB	Revitalization of Community Health Care Initiatives in Bangladesh Project
RDC	Rice and Diversified Crops Activity
SAM	Severe Acute Malnutrition
SBCC	Social and Behavioral Change Communication
SEP	Sustainable Environment Project
SMEC	Bangladesh SME Corporation
SOW	Scope of Work
SPRING	The Strengthening Partnerships, Results, and Innovations in Nutrition Globally Project
SPSS	A Statistical Software Package
TOC	Theory of Change
TOT	Training of Trainers
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USG	United States Government
VHW	Village Health Worker
WHO	World Health Organization
ZOI	Zone of Influence
ZOR	Zone of Resilience

EXECUTIVE SUMMARY

INTRODUCTION

The Feed the Future Bangladesh Livestock Production for Improved Nutrition Activity (Livestock and Nutrition Activity), implemented by ACDI/VOCA from June 15, 2015, to June 14, 2021, aimed to boost livestock productivity by expanding access to better livestock management techniques and animal health care services and increase availability of hygienic, diverse, high-quality food to enhance rural households' nutrition and health status, especially that of women and children.[1] The Activity was implemented with an allocated budget of $10.9 million in four divisions, eight districts, and 31 *upazilas* of the Feed the Future (FTF) Zone of Influence (ZOI) in Barisal, Dhaka, and Khulna Divisions and Cox's Bazar District in the FTF Zone of Resilience (ZOR) under Chattogram Division.

The United States Agency for International Development (USAID) in Bangladesh issued Tasking Request S025 for the USAID/Bangladesh Monitoring, Evaluation, and Learning (BMEL) Activity, led by ME&A, Inc. (ME&A), to conduct a final performance evaluation (FPE) of the Livestock and Nutrition Activity, implemented under USAID's Development Objective 2: Food Security Improved. This FPE aimed to review the extent to which the Activity has achieved its objectives, provide conclusions and lessons learned, and offer recommendations for actionable strategic and programmatic options for future livestock, nutrition, and food security activities.

EVALUATION QUESTIONS AND AUDIENCE

USAID articulated seven evaluation questions (EQs). The questions were disaggregated into four categories: livestock productivity, livestock product consumption at household level, behavior change to increase the consumption of safe livestock products, and two cross cutting issues—public-private partnerships (PPPs) and gender. These questions were ascribed sub-questions by the ET to create better resolution of the issues involved (Annex 3).

The primary intended audience for the FPE findings and recommendations is the USAID/Bangladesh Economic Growth office. USAID may distribute the report to other parties involved in identifying, designing, or implementing other FTF initiatives, the Government of Bangladesh (GOB) ministries and departments across the multisectoral range of development, other donors, and private sector entities. Upon approval by USAID, ME&A will upload the final report to the USAID Development Experience Clearinghouse and USAID may share this link widely.

EVALUATION METHODOLOGY AND LIMITATIONS

The evaluation team (ET) comprised three specialists—an international Team Leader/Senior Evaluation Specialist (John Ashley, Ph.D.), who led the team remotely; a national Livestock Specialist with expertise in food processing (Raihan Habib, Ph.D.); and a national Nutrition Specialist with a secondary Behavioral Communication background (Rehan Uddin Ahmed Raju, M.P.H.)—and two evaluation/research assistants (Biplob Banerjee and Humaira Pranty [replacing Alpona Shirin]). The evaluation combined qualitative and quantitative data collection methods, including document review, key informant interviews (KIIs), focus group discussions (FGDs), and a general survey. The team addressed gender balance by ensuring more than 50 percent representation of women as respondents in the FGDs and surveys.

Of the 31 *upazilas* targeted by the Activity, USAID selected 15 across eight districts as the sampling frame and provided a list of key stakeholders by name, designation, and contact number. ACDI/VOCA management facilitated arrangements for ET meetings with many of these 200+ stakeholders.

COVID-19-related restrictions presented challenges for the evaluation. For example, the Team Leader could not travel to Bangladesh and instead participated remotely from his base in the UK. In addition,

[1] Livestock in this context refers mainly to cattle.

some primary data collection needed to be conducted remotely.

FINDINGS AND CONCLUSIONS

Findings and conclusions from the team's review of Activity outputs and outcomes are generally positive. The 203 respondents across the eight districts expressed an overwhelming level of satisfaction, with 97.5 percent of total respondents being either extremely or fairly satisfied with the support they received from the Activity.

LIVESTOCK PRODUCTIVITY

The Activity has stimulated greater fodder production and land allocated for it, which has enabled greater milk production and incremental income generation, particularly in non-saline soil areas. Suitable high-yielding palatable types/varieties are available and have proved popular, especially Pakchung Napier. The Activity has facilitated fodder production becoming a profitable business, with planting material or the fodder itself being sold to other farmers. Networks of fodder-producing farmers have evolved. Demand for fodder exceeds supply, especially in the lean season, because of farmers' failure to produce sufficient fodder to store as hay when fodder/forage in the fields is scarce.

The Activity has trained livestock officers in fodder production and supported the Department of Livestock Services (DLS) field activities, including recruiting, training, and mobilizing livestock service providers (LSPs). LSPs effectively supplement GOB's overstretched capability though their services are limited by their skill levels and numbers. The Activity provided training for them and promoted recruitment of female LSPs, with whom women farmers prefer to deal. The Borlaug Institute, however, observed weak cooperation between the Bangladesh Livestock Research Institute (BLRI) and DLS.

Productivity has grown for dairy and beef cattle though demand for milk and meat still exceeds supply. The Activity's fostering of the practice of growing and feeding supplementary fodder has improved dairy and beef productivity and profitability, but productivity could be further improved through provision of multinutrient blocks. Increased supply of green fodder alone has boosted productivity of local and crossbred cattle by some 50 percent since 2015. Farmers have not adopted multinutrient blocks in the past largely because of a shortage of quality ingredients nationally and of block availability on the commercial market. Access to quality ingredients needs to be ensured and the blocks made available on the local market for this supplementary feed to be adopted by farmers on a commercial basis. The Activity has secured a modest increase in secondary (processed) milk products[2], but little progress has been made in homestead processed meat production and consumption. For example, only 6.5 percent of FGD respondents reported an increase in locally processed meat production, compared with 93.5 percent who reported an increase in the production of various milk-based products.

The Activity has sought to improve profitability of smallholder livestock farming in USAID's ZOI and ZOR through a market development business model with LSPs as the model's core ingredient. Linked with the private sector and universities, LSPs pass on benefits to farmers. The link has involved training LSPs and facilitating cheap credit, among other features. Value addition is low, value chains are fragmented, and farmers are paid too little for their milk because of milk-buying cartels. Nevertheless, fodder production and cattle rearing are money spinners—potentially more profitable and less labor intensive than rice growing. The LSP intermediary cadre also makes good money from providing services to farmers and pharma companies. Finally, value chain actors toward the end of the value chain—processors, wholesalers, and retail outlets—can earn good income, as a result of the extra beef, milk and processed dairy derivatives produced. For post-Activity sustainability, the private sector–led LSP model needs to be better institutionalized within GOB, which should recognize LSP status and clarify their duties. LSPs need upgrading through more training, and more LSPs should be recruited. Their networking and coordination

[2] 'Secondary' milk products refers to products 'processed' from the primary product (the milk).

also must be established and institutionalized to promote accountability and transparency.

HOUSEHOLD CONSUMPTION

Meat consumption at household level has greatly increased as a result of the Activity. Consumption of the incremental milk produced and dairy products made from it has grown. An average of 89.5 percent of 201 respondents across the eight districts said that their consumption of meat and milk had grown to a "great" or "moderate" extent.

BEHAVIOR CHANGE

Awareness raising on livestock and nutrition issues has proven extremely effective as communities are eager to accept positive changes in livelihoods. Community agents are important social mobilizers at village household level. At the social institutional level, imams and the Islamic Foundation have proven an excellent modality to bring about behavior change. At the government institutional level, the nutrition coordination committees (NCCs) have a strong potential role to play in messaging. Yard meetings and nutritional campaigns proved highly effective (as explained in Finding 5a.1 and Conclusion 5a). A diversified approach to messaging was implemented by the Activity.

CROSSCUTTING ISSUES

Strong integrated efforts are needed to secure domestic and foreign investment in dairy and beef enterprises in southern Bangladesh. Collaboration in livestock enterprise between the public and private sectors was undermined by the sectors' contrasting attitudes and protocols. District and *upazila* NCCs are a means to foster such public-private partnerships, as long as private sector membership in them can be approved by GoB and *upazila* NCCs activated (see Findings 6.3 and 5a.5 respectively). The private sector could provide loans or external investment in district livestock enterprises, especially chilling centers, secondary dairy product manufacture, and livestock markets, hence their membership in NCCs is considered important.

The Activity promoted women's leadership in new market opportunities. Women in rural communities are the prime beneficiaries of livestock enterprises as they are now more involved than their male family members in livestock rearing. Women and their husbands welcome this social evolution under the Activity as a means for women to earn an income while staying at or close to home. The Activity brought women into the mainstream of livestock production, empowering them socioeconomically by giving them control of resources and decision making. The Activity has also brought women into the sector as service providers. The improvement that the Activity has generated in women's condition is consistently mentioned across gender-related responses in the survey, FGDs, and KIIs. Gender-related success stories that the ET witnessed demonstrate that gender integration in the sector is sustainable.

RECOMMENDATIONS

LIVESTOCK PRODUCTION

1. The follow-up Activity could prioritize distribution of planting material of high-yielding fodder types/varieties that have proven suitable for "sweet" soils in the agro-ecological conditions of the FTF area. Provide training on how to cultivate and harvest such types/varieties.

2. The follow-up Activity could commission the Borlaug Institute to conduct annual reviews of the status of fodder production and use of supplementary feed in the FTF area. This is discussed under Recommendation EQ1b.1. One aspect of added value is that the Borlaug Institute's annual recommendations would be monitored and institutions/individuals held accountable for their delivery.

3. The follow-up Activity could facilitate recognition of LSP status and function. Together with GOB, commission a task assessment of what FTF LSPs should and should not legally do. Conduct a training needs assessment to upgrade LSPs' skills in discharging these tasks/duties (theory and hands-on practical;

on-the-job). Plan and conduct the necessary training. The immediate training for current Activity LSPs should last for at least two months, using a curriculum agreed by the DLO offices and conducted by one or more of the institutions cited in the Recommendations section (5.1, EQ2a). While it would be ideal for all LSPs to undertake a two-year veterinarian compounder training, this will likely not be attainable because of the lack of institutional programs.

4. The follow-up Activity could recruit and train more LSPs; priority to be accorded to recruiting female LSPs as they are more effective in engaging with livestock farmers, most of whom are female.

5. The follow-up Activity could customize the SHUDOKKHO app better to make it more user friendly and link it, if possible, with the DLS database. Commission an independent evaluation of its effectiveness, rollout, impact to inform the customization. This could be done in coordination with the FTF Bangladesh Digital Agriculture Activity, currently being set-up.

6. The follow-up Activity could establish a multisectoral working group to promote the supply and demand of supplementary feed (multinutrient) blocks.

7. The follow-up Activity could advocate for and facilitate greater storage of dry grass/leguminous hay to cover the lean season, and corn-based silage to stabilize milk production, marketing and cattle health throughout the year. Keeping milk yields stable over the year is a requirement for a strong processed milk product market to develop in the south, which offers as much promise of incremental income to farmers as producing fodder.

8. The follow-up Activity could encourage milk processors to prepare for a time when milk supply exceeds demand or when milk collection services to village locations intermittently fail.

9. The follow-up Activity could promote beef cattle fattening to address the shortfall in meat, especially at religious festivals such as Eid-ul-Azha.

10. The follow-up Activity could conduct study tours for key champions to the north of Bangladesh where milk production from improved breeds is far greater. Study tours for livestock sector stakeholder representatives from the FTF areas in the south to selected sites in the north would enable the visitors to identify gaps in the way they conduct their livestock agribusiness that limit their yields and profitability. Also conduct study tours to promote multinutrient blocks and gender success stories.

11. More training and investment in milk processing is needed, such as establishing cold chains. The follow-up Activity could promote better linkage between farmers and local milk processors by contacting potential investors, arranging processing fairs and conferences, and making and implementing a training and financing plan, and conduct training for milk processors in business methods, accounting, labeling, branding, packaging, and marketing.

12. The follow-up Activity could conduct a comparative study to determine the relative success of the low-interest loans offered through Activity partners,[3] how they improved business performance, and which businesses deserve to be scaled up.

13. The follow-up Activity could advocate on policy issues to recognize LSP status, mobilize *upazila* NCCs (with private sector membership), and address many other issues conditioning the operational and investment enabling environment for livestock and nutrition. This could be done in collaboration with the FTF Bangladesh Policy LINK Agricultural Policy Activity (2019-24).

HOUSEHOLD CONSUMPTION

1. The follow-up Activity could commission a study by a cultural/social/nutritional anthropologist to explore options to improve processed meat acceptability in the Bangladeshi rural diet, which could increase demand.

[3] SME Corporation/Bank Asia, BRAC Dairy and Food.

2. The follow-up Activity could promote better hygiene during meat handling, especially at slaughtering facilities.

3. The follow-up Activity could identify investors and promote establishment of more supporting physical and operational infrastructure, such as expanding the network of formal market chilling centers/cold chains in FTF rural areas. This will enable better preservation of milk and milk products at rural level and thereby longer shelf life and increased sales. A given investment's profitability can be tested by making a business case. This intervention could be coordinated with the FTF Bangladesh Agricultural Infrastructure Development Activity.

BEHAVIOR CHANGE

1. The follow-up Activity could invigorate links with the Islamic Foundation to enhance rollout to more mosques. This will help socially institutionalize the important nutrition social and behavioral change communication (SBCC) role that imams play in the community. This could be coordinated in collaboration with the ongoing Bangladesh Nutrition Activity.

2. The follow-up Activity could promote other SBCC modalities such as interactive community radio programs, radio clubs, and school drama groups, in collaboration with the ongoing FTF Bangladesh Nutrition Activity.

3. The follow-up Activity could employ a social/nutritional anthropologist to research how to make CAs a sustainable cadre post-Activity by devising payment-in-kind from their communities for their services, including SBC. This could be done in collaboration with the FTF Bangladesh Nutrition Activity.

CROSSCUTTING ISSUES

1. The follow-up Activity could commission a study to formulate pre-investment livestock business cases with gross margin analyses, creating a menu to attract GOB and private/corporate investors and to provide a basis for fully fledged business plans.

2. The follow-up Activity could proactively seek investors (both domestic and from the diaspora community) and link them with the business cases formulated in accordance with the above recommendation.

3. The follow-up Activity could employ policy specialists to promote livestock policy issues with GOB through Parliament's agricultural/livestock committee and the relevant ministries to improve the livestock sector enabling environment. A USAID program mobilizing livestock policy specialists to work hand in hand with Parliament, DLS, and the Ministry of Planning to improve the policy framework would further the sector's development and attract investors. This could be done in collaboration with the FTF Bangladesh Policy LINK Agricultural Policy Activity.

4. The follow-up Activity could arrange professionally made video documentaries of women at work. These videos can be broadcast on the Chittagong regional TV channel, for instance. Success stories can also be uploaded to YouTube, Facebook, and other social media and be covered by community radio to broadcast proof that gender integration is sustainable. Study tours can be arranged to success sites for local leaders within the FTF areas and university students in the social and veterinary sciences.

GENERAL CONCLUSIONS AND LESSONS LEARNED

1. In its allocation of public sector expenditure, GOB has not prioritized livestock as much as it has crops. The Activity has helped correct this imbalance.

2. A livestock sector upgrade is needed, and the Activity has made a serious contribution to it.

3. There is variable livestock sector development potential across the FTF area. "One size fits all" recommendations will not work.

4. The first phase of the Activity was for five years (2015–2020), plus a one-year extension. Progress during the initial stages of implementation was slow because of delays in staff recruitment and replacement of the COP. The Activity gained momentum from the latter half of 2017. Though LSP trainings were postponed in 2020 due to COVID-19-related university closures, the Activity continued to achieve its targets. The ACDI/VOCA team has laid an excellent foundation and now has a robust team with good direction. Team spirit and current coordination are very good. The community in the whole catchment area is very positive toward the Activity, as witnessed by ET observations in the field.

5. The follow-up Activity could strengthen/expand into less well-endowed districts and *upazila*s to mitigate the potential of internal migration/climate refugees. Satkhira and Jessore are elite districts whose residents are full of ideas for self-improvement. This proactive attitude has historical roots. For instance, fodder growing has been traditional in Satkhira but not in Khulna (before the Activity). Champions/cheerleaders may need to be mobilized for other districts so that they too benefit from livestock and nutrition interventions.

6. The follow-up Activity could develop a more equitable method of selecting upazilas. Some *upazilas* were omitted in the Activity's "first round" and not all unions of a targeted *upazila* were included in Activity actions. Reflect on the reasons for omitting some deserving administrative units that have alarming human nutrition indicators so that they may be included in the "second round." Also emphasize districts that were targeted late in the Activity's life, such as Cox's Bazar and Barishal.

1.0 INTRODUCTION

1.1 ACTIVITY BACKGROUND

The FTF Bangladesh Livestock Production for Improved Nutrition Activity (Livestock and Nutrition Activity), implemented by ACDI/VOCA from June 15, 2015, to June 14, 2021, aimed to boost livestock productivity by expanding access to better livestock management techniques and animal health care services and increase availability of hygienic, diverse, high-quality food to enhance rural households' nutrition and health status, especially that of women and children.[4] The Activity was implemented with an allocated budget of $10.9 million in four divisions, eight districts, and 31 *upazilas* of the Feed the Future (FTF) Zone of Influence (ZOI) in Barisal, Dhaka, and Khulna Divisions and Cox's Bazar District in the FTF Zone of Resilience (ZOR) under Chattogram Division.

Although Bangladesh has seen improvement in child nutrition indicators over recent decades, the country still has some of the highest global indicators of undernutrition. Poverty, poor access to agricultural land, and suboptimal nutrition practices are rife, particularly in the FTF ZOI. An International Food Policy Research Institute (IFPRI) report of April 2013, citing the Bangladesh Integrated Household Survey (BIHS) covering 2011–2012, showed that 36.8 percent of households in the FTF ZOI were hungry (food-energy deficient) and, because of their poverty, unable to secure the threshold of 2,122 kilocalories (kcal)/person/day, with 17.5 percent of households being below the severely food-energy deficient threshold of 1,805 kcal/person/day. The survey also showed that although production of rice, the main staple food, has been growing, production and consumption of nutrient-dense foods (vegetables, fruit, fish, eggs, dairy, and meat products) were very limited.

The BIHS report provides the basis for the Livestock and Nutrition Activity, showing that increased livestock production and consumption of its various derived food products offer a rational means of positively addressing the calorie, protein, and micronutrient deficiencies of marginalized households and communities in the FTF ZOI.

Scrutiny of the data showed that one of the main causes of low intake of dairy and meat products is the low level of livestock production in Bangladesh. According to the Food and Agriculture Organization of the United Nations–Emergency Center for Transboundary Animal Diseases (FAO-ECTAD), Bangladesh produces only 43.5 percent of its required milk demand (6.09 of 14.02 million tons), with the remainder being met through milk powder imports.[5] Productivity of local cows is poor, with FAO-ECTAD quoting between 1.5 and 3 liters of milk a day, while the average weight of mature beef cattle is only 200–225 kg.[6] These poor productivity data point to the cattle themselves being undernourished because of the shortage of year-round quality feed, especially in the southern coastal regions associated with limited availability of land and infertile soils. There is also a shortage of quality fodder planting materials (cuttings, seed, transplants), especially of drought- and saline-tolerant varieties (the most drought-affected part of Bangladesh is the northwest, followed by the southwest region). In addition to these livestock feed management issues, there are productivity constraints related to suboptimal livestock health services and genetic improvement in the FTF ZOI.

1.2 ACTIVITY GOALS AND THEORY OF CHANGE

The Activity had three distinct components:

- Component I: Increased livestock productivity through increased access to better livestock management techniques and primary animal health care services

[4]Livestock in this context refers mainly to cattle.

[5]USAID Bangladesh (2018), Modification of Assistance regarding FTF LPIN Project Attachment B, Program Description. Dec 3, 2018. p6 of 27pp.

[6]Ibid.

- Component II: Improved access of rural households to hygienic, diverse, and quality food to enhance (human) nutrition and health status, especially for women and children
- Component III: Improved nutrition-related behaviors of rural households

The Activity goal and results framework are shown in Annex 1.

The Activity's theory of change (TOC) for achieving better rural household nutrition through the improved availability, access, and utilization of livestock products was based on two behavioral pathways: livestock production for household consumption and livestock production for incremental income generation. The Activity sought to positively influence household consumption of meat and dairy products through social and behavioral change communication (SBCC) messages tailored to men and women. It aimed to effect this change by transitioning 82 artificial insemination (AI) workers into one-stop livestock service providers (LSPs) offering feed, AI, animal health products, and services to 178,400 livestock households in the FTF ZOI.[7] This effort was twinned with training 219 village health workers (VHWs) to communicate the health benefits of livestock products, preparation techniques for safe and nutritious milk- and meat-based foods, and the advantages of investing income generation from livestock into increased consumption of those milk and meat products, thereby benefiting household nutrition.

An important aspect of the TOC was the priority accorded to involving private sector entrepreneurs in livestock production and processing services and products to the target beneficiaries. The rationale was that these entrepreneurs would promote sustainability of Activity outputs and outcomes by working with the Government of Bangladesh (GOB) post-Activity. To synergize with this rationale, the Activity has also prioritized capacity building of government entities that work with private sector actors.

To achieve the Activity aim of better utilization of livestock products by rural households, thereby contributing to the overall goal of improved household food and nutrition security, ACDI/VOCA intended to follow a "facilitative" outreach implementation approach that fosters sustainability of gains by livestock producers within the technical context cited above. During implementation of demand-led interventions, this approach should strengthen local actors in government, the private entrepreneurial sector, and community structures and forge/strengthen working linkages among them. The implementer intended to exploit all opportunities to upscale intervention benefits to actors beyond the 178,400 targeted households through kith and kin outreach. This would more than double the initially intended 82,000 beneficiary cattle-owning households, as recorded in the Annual Progress Report of 2015.

2.0 EVALUATION PURPOSE, AUDIENCE, SCOPE, AND QUESTIONS

2.1 EVALUATION PURPOSE, AUDIENCE, AND SCOPE

The United States Agency for International Development (USAID)/Bangladesh issued Tasking Request S025 for the USAID/Bangladesh Monitoring, Evaluation, and Learning (BMEL) Activity, led by ME&A, Inc. (ME&A), to conduct a final performance evaluation (FPE) of USAID's Livestock and Nutrition Activity, implemented under USAID's Development Objective 2: Food Security Improved. This FPE aimed to review the extent to which the Activity has achieved its objectives, provide conclusions and lessons learned, and offer recommendations for actionable strategic and programmatic options for future livestock, nutrition, and food security activities. Annex 2 presents the Scope of Work for this evaluation.

The primary intended audience for the FPE findings and recommendations is the USAID/Bangladesh Economic Growth office. USAID may distribute the report to other parties involved in identifying, designing, or implementing other FTF initiatives for GOB ministries and departments across the multisectoral range of development, other donors, and private sector entities. Upon approval by USAID,

[7]ACDI/VOCA (2020). Livestock and Nutrition Activity Annual Progress Report, FY20, November 2020. page 1.

ME&A will upload the final report to the USAID Development Experience Clearinghouse and USAID may share this link widely.

2.2 EVALUATION QUESTIONS

USAID articulated seven evaluation questions (EQs) for the FPE (see Scope of Work in Annex 2). The questions were disaggregated into four categories: livestock productivity (Questions 1–3), livestock product consumption at household level (Question 4), behavior change in pursuit of greater consumption of safe livestock products (Question 5), and two crosscutting issues—public-private partnerships (PPPs) and gender (Questions 6 and 7). These questions were ascribed sub-questions by the ET to create better resolution of the issues involved (Annex 3).

3.0 EVALUATION METHODOLOGY AND LIMITATIONS

The evaluation team (ET) comprised three specialists—an international Team Leader/Senior Evaluation Specialist (John Ashley, Ph.D.), who led the team remotely; a national Livestock Specialist with expertise in food processing (Raihan Habib, Ph.D.); and a national Nutrition Specialist with a secondary Behavioral Communication background (Rehan Uddin Ahmed Raju, M.P.H.)—and two evaluation/research assistants (Biplob Banerjee and Humaira Pranty [replacing Alpona Shirin]). The evaluation combined qualitative and quantitative data collection methods, including document review, key informant interviews (KIIs), focus group discussions (FGDs), and a general survey. The team addressed gender balance by ensuring more than 50 percent representation of women as respondents in the FGDs and surveys.

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COVID-19-related restrictions presented challenges for the evaluation. For example, the Team Leader could not travel to Bangladesh and instead participated remotely from his base in the UK. In addition, some primary data collection needed to be conducted remotely.

See Annex 4 for a full description of the evaluation's methodology and limitations.

4.0 FINDINGS AND CONCLUSIONS

Evaluation findings revealed not only outputs but also beneficial outcomes and impact on people's lives. Venturing beyond KIIs, FGDs, and the general survey, the ET collected success stories from direct observations and interviews (see Annex 21).

COMPONENT 1: LIVESTOCK PRODUCTIVITY

4.1 EVALUATION QUESTION 1

Findings

1a. Fodder Production, Processing, and Utilization

1a.1. Field observations and discussions revealed that fodder production and utilization have expanded substantially since the start of the Activity.

Survey responses showed that of 199 respondents, 45.7 percent said that fodder production had grown to a "great extent" and 47.7 percent said it had grown to a "moderate extent" (93.4 percent total). Of 201 respondents who were asked to what extent the Activity had increased fodder utilization, 51.2 percent indicated to a "great extent" and 43.8 percent to a "moderate extent" (95.0 percent total). Of 202 respondents, 55.4 percent said they were extremely satisfied with fodder production and supply over the past five years and 31.7 percent were fairly satisfied (87.1 percent total).

FGD responses also provided evidence of increased fodder production through the Activity. Thirty-six of 38 respondents (94.7 percent) said that fodder had been a constraint before the Activity so farmers relied

on roadside grasses for their supply (FGD Question A1). Before 2015, farmers had not cultivated their own improved fodder. Thirty-seven of 38 respondents (97.4 percent) said they had collected fodder from the wild or used rice straw (FGD Question A4). The help most appreciated by Activity beneficiaries was training (24 respondents, 66.7 percent); 10 respondents (27.8 percent) mentioned information (FGD Question A2). LSPs received four days of training on farm management and fodder cultivation and CAs were trained on animal feeding and livestock rearing. Farmers received hands-on training on livestock rearing, and fodder feeding and cultivation and were given fodder seeds. LSPs also said that farmer revenue from fodder sales is up to 5,000–7,000Tk/week (FGD Question A5).

Twenty-nine respondents (76.3 percent) said that LSPs and GOB (DLS) had helped them, whereas 9 respondents (23.7 percent) said that only the LSPs had helped (FGD Question A6). Twenty-four of 38 (63.2 percent) groups said they had received better attention from LSPs under the Activity than before. (FGD Question A9). Thirty-six group responses (94.7 percent) showed that respondents vowed to continue post-Activity with what they had learned (FGD Question A8).

In response to a KII question on how the Activity enabled DLS to improve farmers' fodder supply and profitability, DLS officers indicated that the Activity "provided support in fodder production, supplying cuttings to farmers" (29.4 percent), "helped us reduce feed cost through fodder cultivation" (17.6 percent), and "linked farmers with the *upazila* livestock officers (ULOs) so they could obtain fodder cuttings" (11.8 percent) and that "the area down to fodder has increased by 50 percent since the start of the Activity" (5.9 percent).

All 17 respondents to a KII question on the increase in hectarage of fodder grown since 2015 said that the area of land used for fodder cultivation has increased, with estimated increases over the last five years averaging 70 percent: Some individual responses were "In 2015–2016, fodder was cultivated on 6 acres of land in Chokoria Upazila, that area having increased to 12 acres now"; "Five years back only two acres in my *upazila* were used for fodder production, but that has now increased to 14 acres"; "The number of fodder cultivators increased from 10 to 100 over the last three years in my *upazila*."

To ensure sufficient and sustainable planting material supply, the Activity provided advice on fodder to the village one-stop-shop groups it had established and to dairy companies (Akij, BRAC, and PRAN). The Activity advised the latter not to wait for milk to come to their processing plants but to proactively improve fodder supplementation of livestock diets. The Activity has trained fodder entrepreneurs, as has DLS, which was given a list of fodder entrepreneurs by the Activity. These entrepreneurs are a significant resource for fodder initiatives. BLRI has distributed three tons of seed to farmers under the Activity, as reported by the Activity Chief of Party (COP) in the ACDI/VOCA KII with the Team Leader.

A private veterinary trainer under the Activity in Satkhira District interviewed by the ET says that fodder production in that district is a longstanding practice but praised the Activity for encouraging it as a business in its own right. He cites a potential income for such a business as 500–700Tk/day from fodder sales. There are fewer cows now, he says, as farmers replace local breeds with improved Friesian stock. Raising Friesian cross cattle has become highly profitable because of the improved fodder supply over the past five years. Perennial fodder varieties (Pakchung and other Napier) are adapted to the FTF area and cultivated all year. The veterinary trainer opines that Pakchung Napier is the most highly regarded grass among farmers, in part because of its high growth rate and succulence even in winter. It is taller with more biomass per unit area and is late flowering (this development phase signaling a halt to vegetative growth and a drop in digestibility). (All 38 focus groups said that the preferred fodder is Pakchung or other Napier [FGD Question A6].) However, only Napier 3 is suitable for areas with predominantly lowland saline soils such as those at Batiaghata, Khulna.

1a.2. Continuing fodder supply deficit: Despite these gains, fodder remains in short supply for the number and type of cattle in the districts/*upazilas* surveyed during field visits. On the current trajectory, a balance of fodder production and utilization will arise at some point, sooner in some districts/*upazilas*

than others (see EQ3c). When asked whether fodder availability issues constrained their ruminant livestock before the Activity, LSPs in Batiaghata, Khulna, responded, "Yes, but farmers did not realize it."

1a.3. Profitable business: Fodder production has become established as a profitable business. On average, there are 200 fodder producers in each union where the Activity operates, according to ET member Dr. Raihan Habib. Some dairy farmers often sell surplus fodder to other farmers to increase profit. Women are more interested in fodder cultivation as they are socially less able than men to collect wild fodder, which is often in short supply. The field team's inquiries revealed that many fodder growers are women who have their own fodder land near their farmstead.

1a.4. Fodder production networks: During visits to the Activity area in 2015–2017, Borlaug Institute staff applauded the farmer/entrepreneur fodder production networks that had evolved as a result of the Activity's ULO demonstrations and distribution of planting material. They noted that farmers do not understand cattle's nutritional needs, only their hunger, and that farmers do not prioritize storing hay/fodder or making silage to cover ruminants' needs for the lean season (July–October) when field graze and browse are restricted.[8]

1b. BLRI and DLS Capacity Building

1b.1. Help with building GOB capacity: According to many interviews (KIIs and FGDs), the Activity has helped build GOB capacity—for example, by training ULO staff, publicizing within the farming community the presence of veterinary staff at *upazila*-level DLS offices, mobilizing the Borlaug Institute for the BLRI institutional assessment, and providing training to GOB staff. Many DLS district livestock officers (DLOs) and ULOs received training of trainers. LSPs[9] trained by the Activity helped DLS in extension services, such as rollout of vaccination campaigns, deworming, primary health care, and distribution of cuttings (see EQ 2a).

However, not all KII comments were positive on the Activity's assistance to BLRI and DLS. During a KII at the end of March, a very senior livestock sector officer opined that the Activity had reduced its communication with BLRI during the later years of the six-year implementation. Moreover, more than one ULO complained that program staff did not properly involve government stakeholders and failed to sufficiently engage DLS officials with planning and implementation of field activities. On the positive side, that officer approved the Activity's success in developing many fodder entrepreneurs, 60 percent of whom were women.

1b 2. The Borlaug Institute of Texas A & M University: The Institute conducted an assessment of BLRI's capacity-building needs, trained 12 BLRI scientists on better fodder production, and provided recommendations for the management of demonstration plots and farmer access to them. The Institute further noted that DLS and BLRI declined to attend the same workshop together, revealing an institutional impasse that curtails effective GOB livestock service delivery. The Activity COP points to the disparity in weighting between the two agencies: DLS is mandated with more resources than BLRI, but those resources are insufficient for it to properly address its mandate for disease control. The Institute also noted that BLRI greatly needs generic capacity building (staff training, facilities, lab equipment, logistic

[8] The Activity developed related strategies and mobilized AKIJ Food and Beverage, BRAC Dairy, and PRAN Dairy, all three of which aligned with the Activity's fodder strategies and were provided with planting materials suitable for the lean period. COP Sidiquee asked them to collect milk during the lean period and simultaneously provide fodder planting material that grows then. The Activity also linked the dairies with silage producers. In 2020, the Activity provided to the dairies a list of silage dealers/processors in the Southwest, and these linkages with fodder producers are still expanding. Silage sales have grown, so they made more of it and distributed it to smaller retailers. The COP is not encouraging farmers to make their own silage as this does not seem viable at farm level. Siddiquee observed that when grass is plentiful, some farmers dry the surplus and keep it for some months—such farmers can be linked with silage processors. Maybe the silage producers can collect this and market hay too. Traditionally, rice straw is used as fodder in the lean season, but it is not very nutritious and has become very expensive.

[9] LSP: generically means Local Service Provider, which could refer to mechanization, for example, says the AOR. More concretely in the Activity context, LSP refers to a Livestock Service Provider.

support) though this is beyond the Activity's mandate. Borlaug staff opined that planting material distribution and training are more important than fine-tuning current variety recommendations and cautioned that cost-benefit analyses need to accompany all fodder solutions. They also observed that some fodder demonstrations upcountry were poorly managed, with no facilitation for farmers to visit on open days, and urged that saline-tolerant species/varieties be included as entries for testing in salinity-prone soils.[10]

Conclusions

1a. Fodder Production, Processing, and Utilization

The Activity has stimulated greater fodder production and expanded land allocated to it, which in turn has enabled greater milk production and incremental income generation, particularly in non-saline soil areas. Suitable high-yielding palatable types/varieties are available and have proved popular, especially Pakchung Napier. The Activity has facilitated fodder production becoming a profitable business in its own right, planting material or the fodder itself being sold to other farmers. Networks of fodder-producing farmers have evolved. Demand for fodder exceeds supply, especially in the lean season, because farmers do not produce enough fodder to store as hay when fodder in the fields is scarce.

The idea that a project should emphasize fodder cultivation as an aid to animal husbandry was unique in Bangladesh in 2015. Greater availability of fodder increased expression of cattle's (milk and meat) productivity capability, especially in Friesian crossbreeds, high genetic potential for which had been suppressed by poor feeding. The increase in productivity has encouraged many farmers to replace native stock with high-yield potential crossbreeds. Interest in dairy farming has grown tremendously as it has proved a profitable venture, rather than continuing to take a poor second place to arable cropping.

1b. DLS and BLRI Capacity Building

The Borlaug Institute made a good start in the program's first two years in assessing BLRI institutional needs, but the necessary follow-up apparently did not materialize. It was BLRI's understanding that two BLRI scientists were supposed to visit the Borlaug Institute in Texas, and another two were supposed to receive hands-on training on molecular technology in fodder cultivation. Additionally, it was BRLI's impression that BLRI scientists were to participate extensively as resource persons at LSP trainings on fodder production. None of these provisions materialized. However, BLRI accepted that they did receive several benefits, such as the following:[11]

1. Twelve of their junior scientists received in-country five-day training on fodder production by resource persons from Borlaug Institute, which also donated 10 books related to fodder.
2. BLRI scientists acted as resource persons in several LSP training programs.
3. The BLRI Director General and Activity Focal Person were invited as keynote speakers at the Activity's seminars.

The Borlaug Institute pointed to the absence of cooperation and synergy between BLRI and DLS, which reduces GOB's coherent service to the livestock community. The Activity has trained livestock officers in fodder production and in other ways supported DLS field activities, especially by recruiting, training, and mobilizing LSPs. However, a senior BLRI staff member felt the Activity had not thoroughly meshed its activities with those of Government.

[10]These plots, initially run by the Activity, are now managed by DLS; On April 7, COP Siddiquee told the ET that saline-tolerant accessions are now being assessed in collaboration with IRRI and that other management issues raised in the Borlaug Institute advisories of 2015–2017 have been addressed.

[11] According to a senior BLRI officer.

4.2 EVALUATION QUESTION 2

Findings

2. LSP Capacity Building

2.1. LSP context: A criterion for employment as an LSP with the Activity was that candidates had graduated from secondary school and received a few weeks of training in livestock matters. However, skill levels varied widely among LSP recruits on entry, which affected their capacity to serve. Once employed, LSPs received a few days of initiation training from ACDI/VOCA staff on Activity parameters. LSPs were then trained in specific topics by Activity partner universities (see EQ 7.4), after which they received on-the-job training so that they could better retain and apply the information and skills they had learned. Yet they still require more extensive hands-on training under qualified trainers and on-the-job mentoring. Unfortunately, the Activity's planned LSP training program (2015–2021) was curtailed, partly because of management issues in 2015–2016 and COVID-19-related restrictions.

Direct observations in the field by the ET revealed that veterinarians employed by DLS often considered LSPs their competitors in private practice, providing treatment for livestock. Veterinarians expect that LSPs should be involved only in organizing farmers, conducting field surveys, or performing extension activities such as fodder cultivation and animal nutrition or helping in vaccination and deworming. In fact, LSPs are acting as para-vets, encouraged to do so by the Activity, through being trained in use of the SHUDOKKHO app, for instance (see EQ 2a 3).[12]

If the government wishes LSPs to act as para-vets or veterinary assistants, they must receive para-vet or veterinary compounder training from DLS or other authorized technical schools (something the Activity has requested). Otherwise, LSPs will continue to be regarded as "quacks" by GOB veterinarians, undermining the Activity's market-based business plan and threatening USAID's in-country reputation.

Para-vets are not substitutes for trained veterinarians. However, they must have the knowledge and skills to provide primary veterinary health care, which is in great demand. This service is currently provided by only a very limited number of government veterinary compounders, who have had two years of para-vet training. By comparison, LSPs should have at least 6-month training on primary health care, which would significantly improve the efficacy of the LSP service. Otherwise, farmers will become less interested in calling the LSPs to assist them. Lack of proper coordination and monitoring within DLS currently results in LSPs practicing like para-vets. A structured system needs to be developed. When income is an issue, there is a conflict of interest between GOB vets and LSPs.

2.2. Survey and KII responses: When asked about the extent to which the Activity has built survey respondents' capacity, 48.8 percent (203 respondents) across all eight districts stated that their capacity had increased to a great extent, with 44.3 percent saying to a moderate extent (totaling 93.1 percent). None of the 203 respondents declared that his/her capacity had not been built at all (Survey Question 2a). When asked to what extent they were satisfied with training under the Activity, an average of 70.0 percent of the 203 respondents across all eight districts said they were extremely satisfied and 28.6 percent said they were fairly satisfied, making 98.6 percent in total (Survey Question 2b).

When asked how successful the Activity had been in building respondents' capacity to train livestock farmers and other livestock value chain actors, 35.9 percent of 184 respondents said "extremely successful," with 53.8 percent saying "fairly successful." Thus, 89.7 percent overall (and 100 percent in Faridpur and Rajbari) allocated their experience to the top two of the four categories (Survey Question 3g). The 184 respondents comprised relatively equal numbers of LSPs, CAs, and farmers, all giving similar responses and all involved in farmer capacity building.

[12] The ET's Recommendation 2a.1 in Chapter 6 stresses the need for the anomaly of LSP status and function to be urgently resolved.

A KII question about the Activity's success in building LSPs' capacity elicited 26 responses from 18 respondents, with citations of training and networking benefits accounting for 61.6 percent of those responses and outreach and skill development accounting for a further 19.2 percent (KII Question 2a.1).

2.3. Women LSPs prioritized: Affirmative action was accorded under the Activity to train women as LSPs/AI technicians. Several universities and private sector entities were instrumental in this effort.

2.4. mPower: DLS cannot service all resource-poor farmers; other ways must be found. One option the Activity tried was a mobile app geared to bring "solutions" to LSPs and pharma companies and ultimately to farmers. In early 2018, the Activity signed a grant-based MOU with mPower, a Bangladesh-based social enterprise, to develop an app specifically for livestock, the result being dubbed SHUDOKKHO (meaning "highly skilled" in Bangla). Specializing in veterinary care, AI services, and emergencies, the app targets the better-educated LSP cadre that pharma companies also target. LSPs write about 80 percent of veterinary prescriptions in southern districts.[13]

mPower provides this service free of charge to LSPs. To render SHUDOKKHO commercially viable and hence sustainable post-Activity, mPower charges a subscription fee to other beneficiary users that can afford to pay, such as pharma companies, microfinance institutions, GOB agencies, and international NGOs. Interested LSPs downloaded this mobile application onto their smartphones from Google Play. According to mPower's Director of e-Agriculture, 1,100 LSPs are currently using the mobile application. The 2019–2020 Activity Annual Progress Report states that the gross income of LSPs trained on the app rose on average by 16.8 percent, from $245 to $285 (BDT 20,216–23,607) a month, and the average number of client farmers per LSP rose by 20.6 percent, from 115 to 139. (This could not be verified quantitatively during the ET field phase as LSPs are still getting accustomed to this software; it is too early to get such an estimate. During FGDs, the LSPs mentioned the trend of their increasing income and client numbers, in general). SHUDOKKHO was also used to disseminate nutrition-related messages during National Nutrition Week, April 23–29, 2020.

However, feedback from LSPs and government livestock officers indicates that the app may be too complicated for LSPs given their very basic internet skills, except as a source of learning. mPower itself wishes for an independent review of their mobile application's usefulness to be undertaken at field level. A DLO and a ULO in Satkhira District indicated that they had trained LSPs in SHUDOKKHO. The DLO says he has had the app training but there was no follow-up. He regretted that the app software is not linked with the DLS database. The ET did not find the app "visible" during the fortnight it spent in the field. More work seems needed on the app to properly customize it and an independent evaluation undertaken of its effectiveness. More detail on the SHUDOKKHO app is presented in Annexes 19 and 20.

Conclusions

2. LSP Capacity Building

LSPs are very effective as primary livestock health care providers and extension agents though in any future intervention their number should be increased and their skills improved. A pool of these services is needed to supplement GOB's overstretched capability—for example, as AI technicians—though LSPs' status needs formalizing through GOB policy. The Activity provided LSP training linked to three universities and mPower, with affirmative action to recruit only females (with whom women farmers

[13] According to ET member Dr. Raihan Habib. Ideally, veterinarians should be writing the prescriptions, yet the veterinarians are few and based in urban centers, with only one GOB veterinarian available per upazila. LSPs by default often act as para-vets to solve farmers' problems, being in contact with veterinarians by phone when needed. Whilst not ideal, this is the actual situation. Veterinarians are often not interested to visit farmer's houses located in remote locations. Their service is mostly limited to urban and peri-urban areas. Moreover, they are seldom inclined to visit their clients during the night in emergencies. Additionally, it is difficult to transport cattle to a veterinary hospital. So, in most cases, LSPs seek a prescription over the telephone from a veterinarian with whom they have a good understanding. Having gained some hands-on knowledge in this way about the treatment protocol, they can themselves start to act as veterinarians. This practice, however, frustrates the true veterinarians.

prefer to deal). The SHUDOKKHO app, commissioned by the Activity from mPower as an aid to veterinary and AI services, needs better adaptation to LSP capability and GOB needs.

4.3 EVALUATION QUESTION 3

Findings

3a. Increased Productivity of Local and Crossbred Cattle

3a.1. Quantitative evidence of improved productivity: Both survey and FGD data reveal quantitative improvements. When asked whether more primary and secondary meat and milk products have been produced, all 38 FGD respondents said that both milk and meat production had improved under the Activity. Estimates by farmers for milk yield increase over the last five years ranged from 50 percent to 60 percent; LSPs opined a 50–100 percent increase and CAs 200–300 percent. Based on his discussions with farmers in the field, the ET's Dr Raihan noted that for local breed cows, milk production has increased from 2 liters per day to 3 liters in the project area over the Activity period. However, for crossbred cows, milk production increased from 6-8 liters to as high as 13 liters per day. Farmer FGDs said that meat production and consumption had grown by 150 percent and LSP groups estimated that meat production was up by 200 percent (FGD Question B1).

When asked whether the incremental milk production was consumed at household level or sold, 23 of 38 FGD respondents (60.5 percent) said they both consumed and sold it, the other 15 (39.5 percent) saying they consumed it all. All respondents agreed that the family takes what it needs first and sells the surplus, CAs estimating that 10–30 percent of households sell some (FGD Question B3). From general discussions in the field though, the ET assessed that whatever quantity of milk a family produced, it reserved 1-1.5 liters of milk for its members, with any surplus being sold.

Thirty-six of the 38 FGD respondents (94.7 percent) said that milk production had increased, with suggested increases between 20 and 200 percent. CAs said that before 2015, a crossbred cow produced 4–5 kg of milk a day; now a crossbred cow produces 8–12 kg daily because more green fodder is available. This level of increase was confirmed by a number of farmers in Jashore and Shatkhira districts. LSPs said that revenue for some farmers from their fodder sales is up to 5,000–7,000Tk a week. The ET heard from many farmers themselves in remote areas that they were making that level of profit, including Hasina Begum (see Annex 21). Some farmers said that since the Activity's start, it takes only four months for flushing beef cattle, whereas before 2017 it took eight months. Other farmers said that the livestock growth rate has significantly increased; they can now sell a calf at the age of only nine months; before 2015, it took 20–24 months to attain a marketable weight (FGD Question A5). The standard market weight for local bulls is around 200 kg (at the age of around 3-4 years), while it is 350-400 kg for crossbred bulls (at the age of two and a half years). However, it is common practice to sell bull calves, both crossbred and local, at the age of 7-9 months, to another group of farmers who fatten the bull calves for later sale as beef. [FAO & UNIDO (2019) cite the countrywide average weight of a beef animal at sale as 225kg)].[14]

An average of 42.8 percent of 201 survey respondents across the eight districts declared that livestock productivity had grown through Activity support to a "great extent" and 48.3 percent indicated a "moderate extent" (total 91.1 percent). The 20 respondents in Barisal district bucked this trend, with 30 percent declaring that productivity had grown only to "some extent," perhaps reflecting the district's relatively high soil salinity, which would have reduced growth of the standard fodder varieties used (Survey Question 1d).

Of 198 survey respondents, 93.4 percent reported that the Activity had been either "extremely" or "fairly" successful in increasing the productivity of local and crossbred cattle in terms of milk yield per

[14] The dairy and beef value chain in Bangladesh. Draft Report May 2019. 202pps. Table 15, page 40. https://www.unido.org/sites/default/files/files/2019-05/Bangladesh%20dairy%20and%20beef%20vc%20report%20%28Wei%27s%20final%20version%29%20.pdf

cow for dairy cows and days to achieve market weight and increase in market weights for beef cattle. Only 6.5 percent, mainly from Cox's Bazar and Barisal, cited the lowest two assessment categories ("somewhat successful" or "not successful at all') (Survey Question 3i). Of 199 respondents over the eight districts, 66.8 percent said they were extremely satisfied with the Activity's support for increasing livestock productivity, and 28.6 percent were fairly satisfied (95.4 percent total) (Survey Question 3b).

When KII respondents were asked if it were more profitable to feed fodder to local or exotic cattle, all 30 agreed that crossbred cattle are more profitable than local breeds (KII Question 3a.2). A question asking farmers and entrepreneurs to express the Activity's benefits for dairy and beef enterprises in quantitative terms elicited 60 responses from 23 respondents, all confirming improved businesses. Where milk yield was cited, all respondents said the level had increased, half estimating it to be by 50–60 percent per unit of time, namely 50-60 percent of 2 liters in the case of local cows, and 50-60 percent of 6-8 liters in the case of crossbred cows. Four respondents said their calves matured much faster, by at least 25 percent (KII Question 3a.3).

3a.2. Fodder grass is not a balanced feed: The improved quality and increased quantity of fodder that the Activity has promoted improved livestock productivity, and also livestock enterprise profitability, especially now that rice straw is becoming very expensive (10–12 Tk/kg compared with only 1–3Tk/kg for green grass). However, the Borlaug Institute noted that overreliance on Napier grass can lead to ruminant metabolic deficiency disorders and death unless mineral-dense supplementation is provided, and recommended that farmers must also provide a micronutrient-rich nutritional supplement. Moreover, fodder is often cut before proper maturity, leading to insufficient protein and energy values. Fewer than one-quarter of FGD respondents said they had tried multinutrient blocks (see Question 3c.3).

3a.3. Supply and demand for milk and meat: Currently, demand for milk exceeds supply countrywide. Based on inquiries in the field, the ET believes that if the current trend of increase in annual milk production in Activity districts continues, supply will eventually exceed demand locally and nationally (even allowing for increase in local demand due to greater awareness of milk's nutritional benefits and to its greater affordability). Before that balance is achieved, processing of secondary milk products needs to be made more commercially viable through investment and training. An alternative or parallel scenario is that dairy production would even off, with the increased fodder being channeled into incremental beef cattle raising and fattening; the local demand for meat is currently far greater than local supply (especially since export of live animals from India was stopped). People are more interested in consuming processed dairy products than liquid milk. Moreover, new farmers and entrepreneurs regard milk processing as a potential business opportunity because of higher value-addition benefits.

3b. Increased Amount of Value-Added Secondary Products (from Milk and Meat)

3b.1. Success with milk processing rollout: There was some preliminary success in promoting value addition to milk, as the trainings and facilitations on this under the Activity were only very basic. The ET found that in some cases, just a one-off training was given that could not have much impact on a processor's performance. [15]Value addition to meat is negligible because of rural communities' current lack of interest in consuming processed meat. When asked which processed products had increased in production under the Activity, 24.7 percent of FGD responses were "yoghurt," 18.2 percent "sweetmeat," 14.3 percent "ghee," 13.0 percent each "butter" and "cheese," 10.4 percent "rice pudding," and 6.5 percent "meat" (FGD Question B2). Reasons given for increased production were "availability of improved fodder" (39.0 percent), "more milk production" (31.7 percent), "awareness raising" (19.5 percent), and "crossbred cows" (9.8 percent). All LSPs commented that "both milk and meat production have increased due to improved nutrition of the cows through eating more (high-quality) fodder." CAs commented that "due to increased milk production, preparation of milk products increased." Farmers

[15] Recommendations on capacity building of milk processors is provided under EQ3b.1 and EQ3c.1 and EQ3c.2

commented that "both milk and meat production increased because of fodder, nutritious food, and crossbreeding. Milk production increased almost 100 percent."

When processor FGD groups were asked what training and technical knowledge they had received, 6 of the 11 (54.5 percent) cited milk processing and 5 (45.5 percent) cited yoghurt/ghee/butter preparation (FGD Question B4). The groups receiving training comprised CAs, LSPs and farmers. The CAs said that they were now preparing these secondary products in their homes; LSPs stated that their training also included deworming, vaccination, and treatment of livestock.

All 11 groups said they had applied the skills they had learned through training and that the training had impacted their businesses. CAs reported that they now make ghee at home and sell it in the market, and some farmers said they had started their own sweetmeat shops; three said their income had risen, another three said they could prepare additional products, and another three said they had generated new business. The most frequently mentioned impacts of training were "increased income," "ability to prepare different milk products," and "new business generated" (27.3 percent each), followed by "increased milk consumption" and "raised awareness" (9.1 percent each) (FGD Question B5).

3b.2. Approach to processing milk: ACDI/VOCA has international experience with milk processing, and BRAC brought its local experience to the program. Both implementers discussed options with producers and consumers in the Activity target area. KII and FGD data and Activity annual progress reports show a modest increase in processed milk products since 2015 in Activity areas. Further progress needs a whole value chain and market approach as the chain is currently fragmented.

In Bangladesh there is traditional knowledge about processed food items, especially made from milk. Many villagers expressed a wish to be trained in local milk product processing and some have access to equipment such as a cream separator. The Activity has developed an excellent stakeholder network and has supported staff training in a processing company (Akij) and trained farmers in the benefits of tying milk price to milk quality. Feeding good fodder improves milk quality and quantity, benefiting dairy processing. Increased primary production also provides a more stable supply to processing factories.

Milk collection points and rural chilling centers (cold chains), which are necessary because milk is perishable, are sparse in the Activity area compared with the north of the country.[16] One dairy processor said that the Activity had tried to connect him to the largest national retailer (SHWAPNO) to sell the secondary products produced in the villages but that this had failed because of the lack of a cold chain. Processed dairy products have a huge potential, but investment is needed. Local milk, cattle, and fodder markets are needed too so that women can participate even more in the livestock sector.[17]

3c. Constraints, Opportunities, and Sustainability of the LSP (Market Development) Business Model

Constraints

Through general inquiries during the field visits, the ET identified some constraints on the LSP business model.

3c.1. LSPs' limited number and capability: LSPs often play the role of veterinarians though they have neither para-vet nor veterinary compounder training. Perhaps because of this, the relationship between DLS officials and LSPs is often uneasy. The number of LSPs is insufficient to meet the demand for livestock services (e.g., AI, veterinary care, how to tackle disease outbreaks, and advice on fodder). By contrast, service from registered veterinarians is often very difficult to obtain in time and is highly expensive. Hence, farmers are bound to rely on services provided by LSPs, who are readily available on call and are far

[16] Thirty-three were set up in southern Bangladesh under the USDA Bangladesh Dairy Enhancement Project (and 40 in the north). These 33 were supplemented by chilling centers set up by PRAN Dairy using its own funding, which the Activity involved in its rollout. The Activity benefited from these chilling centers.

[17] The Activity did not invest much in non-revenue-generating common services such as establishment of fodder or milk markets. An exception was the establishment of one-stop service centers for farmers, each run by an LSP, where the farmers received support such as advice, medicine, concentrate feed, and fertilizer.

cheaper. Farmers are generally satisfied with LSPs' services, but LSPs must take advice from registered veterinarians when dealing with critical cases.

3c.2. Formalities and cost of accessing credit can demotivate smallholders: Activity partners with readily available and suitable credit products, such as the Bangladesh SME Corporation (SMEC) and BRAC, that give/broker low-interest loans provide a worthy option to bank loans, though their coverage is insignificant compared with the need. Bank loans have hitherto not been available to smallholders with just one or two cattle. To participate in the loan scheme administered through DLS, the farmer must have a minimum of 10 cows. Landless but experienced farmers also experience challenges getting a loan, says SMEC, as they cannot provide the required collateral. Interest rates through NGOs can be as high as 28 percent, and loan sharks charge up to 150 percent. Many smallholders already carry a staggering level of debt. Consequently, many or most of them cannot invest in their farms.

Of the 29 responses to a KII question on whether credit is readily available to farmers and entrepreneurs, 21 (72.4 percent) said that credit was available to increase fodder production and develop meat and milk value chains, though most respondents thought the procedures were complex and intimidating (KII Question 3c.1).

3c.3. Non-use of multinutrient blocks: Only 9 of the 38 FGD respondents (23.7 percent) said they had tried multinutrient blocks. An LSP said that 15 percent of farmers use them as they increase the cattle's appetite and make the cattle's skin smoother (FGD Question A10). Farmers requested training on this technology. During the ET's interactions with Activity stakeholders, scientists issued warnings of ruminant metabolic disorders unless Napier grass diets were supplemented by concentrate foods containing micronutrients. The cheapest of these, micronutrient blocks, relieve the metabolic insufficiency of calcium and other minerals and micronutrients and can improve animal growth and reproductive outcomes, especially in the ZOI, where the soils are not saline. Farmers' limited use of these blocks could be attributed to insufficient information being communicated to them on the benefits of feeding. Moreover, misconception and fear among farmers about the use of urea in the blocks has restricted the use of this technology. A DLS Deputy Director said during his KII that the Activity could have done more to demonstrate these blocks and that awareness-raising efforts were insufficient. With greater awareness, farmers may not fear urea toxicity, a problem that has blighted previous rollout initiatives. ACI is a supplier of these blocks, according to an entrepreneur interviewed in a KII.

3c.4. Milk marketing middlemen: Significant increase in secondary milk production is possible only with a local surplus of milk production. Because of the Activity's success, this surplus will come about before long, district by district, offering an opportunity. However, milk-buying cartels constrain production as they depress prices to farmers in favor of urban consumers. Yet "get[ting] rid of middlemen in milk marketing" (a desire expressed by more than one respondent) is not advisable as middlemen provide a crucial service. Negotiation, contract farming, and quality-based prices for raw milk may offer better routes to raise prices.

Opportunities

3c.5. LSPs' core role in the model: DLS has always suffered from a shortage of personnel, so it was eager to extend its outreach coverage using LSPs. A professor and former veterinarian with DLS explained in a KII that each *upazila* has at most only one veterinary assistant to care for an average of a million cattle and a million goats—an impossible task. LSPs are widely accepted by farmers because they are easy to approach; it is especially easy for a female farmer to approach a female LSP. LSPs support themselves through the income they make delivering livestock services.

When asked whether the Activity's LSP business model would be sustainable post-Activity, 25 of the 30 KII respondents (83.3 percent) said "yes" and five (16.7 percent) said "perhaps." The main reasons for the "yes" responses were that the model involved LSPs and entrepreneurs who represent sustainable features and that the model captures the linkage between DLS and farmers. The main concern driving the five

"perhaps" responses was that adequate monitoring and supervision and LSP skills are yet to be developed. Minority concerns among the "perhaps" group were the coordination gap between DLS and LSPs and that after the Activity LSPs may not be as well organized (KII Question 3c.6).

Of the 191 respondents to a survey question asking how sustainable the LSP business model would be after the Activity, 65.4 percent said "extremely sustainable" and 23.0 percent said "fairly sustainable" (88.4 percent total) (Survey Question 3h).

Other survey questions pursued further aspects of sustainability. When asked whether they were satisfied with the improved access to market for their livestock products over the previous five years, 92.4 percent of 198 respondents over the eight districts said they were either extremely or fairly satisfied (Survey Question 3c), and an average of 85.6 percent of 181 respondents agreed that the Activity had established linkages between the respondents' community and GOB departments to a "great" or "moderate" extent (Survey Question 7c).

When asked to what extent the Activity had established partnerships with other stakeholders such as the private sector and marketers, an average of 83.5 percent of 176 survey respondents said that such partnerships had been forged to a "great" or "moderate" extent (Survey Question 7d), and 96.4 percent of 166 respondents said that the partnerships would continue to a "great" or "moderate" extent after the Activity ended (Survey Question 7e).

When asked to what extent the Activity had made positive changes to their community, 97.0 percent of respondents said that it had to a "great" or "moderate" extent (Survey Question 7a), and 90.8 percent said that those changes would remain to a "great" or "moderate" extent after the Activity ended (Survey Question 7b). Of 204 respondents, 95.1 percent said they were very confident or fairly confident about carrying out their activities after the Activity ends (Survey Question 2d).

3c.6. Contribution of university and private sector partners to supporting LSPs: Several Activity partners were instrumental in providing training to LSPs, who then trained farmers—for instance, three universities (Patuakhali, Rajshahi, and Chattagram). Several private sector partners also played a major role, including the BRAC Dairy and Food Project, BRAC AI, and the SME Corporation (SMEC).

Under the BRAC Dairy and Food Project, 56 farmers were trained as grass-growing entrepreneurs whose production area covered 27ha. Of the 3,000 farmers targeted in the collaborative effort, 1,000 were provided with grass seed (3 mt in total). Second, BRAC's silage-making experience was provided to the Activity's farmers, using Jumbo Gold, *Zea mays* (corn), and Napier. Third, credit was provided through BRAC Bank Ltd. at a 4 percent interest rate and used for leasing land to grow fodder, for silage making, and for 1,000 farmers to buy an improved breed animal. BRAC AI trained 19 AI technicians in 2020 and another 3 in 2021. Since the MOU with the Activity was signed in March 2020, training in AI techniques was given only to women; before, such training had been given only to men. BRAC AI works closely with the Patuakhali Veterinary Faculty.

An MOU with SMEC was signed in May 2019 and extended to February 2020. SMEC's role was exclusively to provide access to a finance partner for livestock smallholders targeted by the Activity. Although loans were arranged for a few fodder production and beef-fattening enterprises, the primary focus was dairy. Most funds were used to purchase cows and the associated physical infrastructure (sheds, flooring, and drainage). The average loan was 30,000Tk, which buys a small cow. In total, SMEC said that 95 percent of those receiving loans were women-owned and -led businesses. In the past, when trying to expand their businesses, women often failed to get loans as their collateral was weak. Through negotiation, SMEC removed the need for evidence of land ownership by its Bank Asia partner, helping improve access for women entrepreneurs (ancestral evidence that the family had a long record of farming the land in question and/or a water utility bill was deemed sufficient collateral). In cooperation between the Activity and SMEC, 900 farmers were trained over three months in financial literacy and a group of LSPs trained in dairy farm management; these trainees then trained another 900 farmers.

Conclusions

3a. Increased Productivity of Local and Crossbred Cattle

Productivity has grown for dairy and beef cattle though demand for milk and meat still exceeds supply. The Activity's fostering of the practice of growing and feeding supplementary fodder has improved dairy and beef productivity and profitability, but productivity could be further improved through provision of supplementary mineral blocks. Greater fodder supply boosted productivity of local and crossbred cattle by 50 percent over the last three years. The effect was more pronounced in Friesian crossbred cattle. Farmers have not adopted multinutrient blocks in the past largely because of shortage of quality ingredients nationally and of block availability on the commercial market. Access to quality ingredients needs to be ensured and the blocks made available on the local market to enable this supplementary feed to be adopted by farmers on a commercial basis.

3b. Increased Secondary Milk and Meat Products

The Activity has secured a modest increase in secondary milk products. The link between farmers and local milk processors needs strengthening, and promotion of value addition needs fostering through nutrition coordinating committees (NCCs), training, and attraction of investors to establish more supporting physical and operational infrastructure. Negligible progress has been made in processed meat production and consumption. Local processing entrepreneurship needs further encouragement.

3c. Constraints, Opportunities, and Sustainability of the LSP (Market Development) Business Model

The Activity has sought to improve profitability of smallholder livestock farming in USAID's ZOI and ZOR through a market development business model with LSPs as the model's core ingredient. Linked with the private sector and universities, LSPs pass on benefits to farmers. The link has involved training LSPs and facilitating cheap credit, among other features. LSPs should promote micronutrient blocks. Value addition is low, value chains are fragmented, and farmers are paid too little for their milk because of milk-buying cartels. Nevertheless, fodder production and cattle rearing are money spinners, potentially more profitable and less labor intensive than rice growing. The LSP intermediary cadre also makes good money from providing services to farmers and pharma companies. Finally, those who work toward the end of the value chain—processors, wholesalers, and retail outlets—can earn good income. In the interests of post-Activity sustainability, the private sector–led LSP model needs to be better institutionalized within GOB, which should recognize LSP status. LSPs need upgrading through more training, and more LSPs should be recruited. Their networking and coordination also must be established and formalized for their accountability and transparency to be secured.

COMPONENT 2: HOUSEHOLD CONSUMPTION

4.4 EVALUATION QUESTION 4

Findings

4a. More Household Consumption of Primary and Secondary Meat Products and Better Meat Hygiene

4a.1. Increased meat consumption: Interviewees in the field often made statements such as "We used to eat meat twice a month, but now we eat it twice a week." An average of 89.5 percent of 201 survey respondents across the eight districts said that meat and milk consumption had grown in their families to a "great" or "moderate" extent over the previous five years (Survey Question 5d). All 38 FGD groups said that their households' consumption of milk and meat (or their secondary products) had grown under the Activity (FGD Question C1).

4a.2. Value addition to meat was unimpressive: This was because there is little interest in secondary meat product consumption at the village level (compared with higher demand in urban centers, targeted by the Bengal Meat Processing company). At village level, meat is used primarily in cooking curry; processing of meat into products (either to be frozen or sold in bakeries) such as sausage, meat pie, meat

samusa, burger patty, and nuggets did not happen because of lack of appropriate technologies and low demand for processed meat in rural markets.

4a.3. Poor meat hygiene: Hygiene during meat handling and processing was insufficient, especially in slaughtering facilities located throughout the ZOI. This message came across clearly during the team's interviews.

4b. Increased Consumption of Dairy Products and Increased Sale of Surplus Milk

4b.1. Awareness of milk's nutritional value: The ET's discussions in the field revealed that many families have started to consume 200 ml (a glass) of milk/person/day, which they did not do before 2015, and many FGD respondents reported improved family health. More milk is drunk by all family members as a result of both the incremental milk produced under the Activity and the greater awareness imparted of its nutritional benefits. Generally, milk production per farmstead has grown over the past five years, resulting in better availability of milk for family consumption.

All 38 FGD groups said that the increased consumption of primary or secondary meat and milk products was due to extra fodder availability. The following are some responses: "Previously we got only 1–2kg of milk per day from one cow because of unavailability of fodder"; "Due to availability of fodder the productivity of our livestock has improved, and we are getting more milk and meat now"; "Due to greater availability of fodder, our milk production significantly increased while milk production costs decreased, as compared with that before 2017"; "Availability of green grass resulted in higher milk yield; hence milk consumption increased" (FGD Question C2). All 38 FGD groups also said that consumption of more meat and milk primary or secondary products had improved their families' health (especially that of women and children) (FGD Question C3).

When asked how the Activity had led to a change in household consumption of processed milk products, all 13 responses from the seven respondents indicated that milk consumption had grown since 2015, and quantitative assessments of growth varied from 50 to 150 percent (KII Question 4b1). In response to a KII question on the food safety challenges for meat and milk processing at village level, 11 of the 14 respondents (78.6 percent) opined that the main food safety challenge is that there is no chilling point at local level to allow farmers to preserve milk (KII Question 4b4).

4b.2. Secondary milk product consumption: As a result of increased milk production, consumption of homemade dairy products in the household has significantly grown as many households now prepare yoghurt, rice pudding, ghee, and sweetmeat regularly (see 3b.1).

4b.3. Sale of secondary milk products: Sale of secondary milk products in the informal market has grown by 400 percent, which may be assumed from a fourfold increase in sweetmeat shops in the area, observed by the field ET. However, sale of dairy products in the formal market is restricted because of the absence of a cold chain.

Conclusions

4a. More Household Consumption of Primary and Secondary Meat Products and Better Meat Hygiene

Meat consumption at household level has grown as a result of the Activity though there has been poor uptake of advisories on meat hygiene, especially at slaughtering facilities.[18]

4b. Increased Household Consumption of Dairy Products and Surplus Milk

Consumption of incremental milk produced and dairy products made from it has grown.

COMPONENT 3: BEHAVIOR CHANGE

[18] The Activity worked with Bazar Management Committees to promote hygiene and food safety issues and trained 16 Bazar committees by developing individual action plans to address these issues. In addition, the Activity conducted massive campaigns before Eid-ul Azaha to promote safe slaughtering and meat handling.

4.5 EVALUATION QUESTION 5

Findings

5a. Nutrition Messaging and Generating Awareness

5a.1. Nutrition messaging: The Activity succeeded in promoting nutrition messaging and generating nutrition awareness. Sixteen of 25 KII respondents (64.0 percent) opined that the nutrition messaging had been very effective and useful, with seven responses (28.0 percent) assessing the effort as only "somewhat effective." One respondent underlined the importance of the messenger (the imam in this case) linking the message with the Quranic text: "When I participated in the training, they provided information regarding the specific Verse of the Holy Quran which states that milk is very nutritious for the human body. I also shared this information with others, mentioning the specific provisions of the verse. I will continue spreading knowledge among people in future" (KII Question 5a1).

When asked to identify the key nutritional messages promoted under the Activity, 20 respondents gave 24 responses, 15 (62.5 percent) of which cited "the importance of milk and meat for improved nutrition," 6 (25.0 percent) of which stated that "milk is essential for brain development of human baby as well as essential for all family members," and 2 of which (8.3 percent) cited "hygiene issues" (KII Question 5a2).

When asked what social barriers presented challenges to beneficial dietary change, 12 of the 16 KII respondents (75.0 percent) cited lack of education/knowledge or awareness (KII Question 5a3). Of the 17 responses on the most effective SBCC Activity modalities to change nutrition/dietary behavior, 6 (35.3 percent) prioritized courtyard meetings, 4 (23.5 percent) interpersonal communications, and 2 (11.8 percent) each religious leaders and training (KII Question 5a4). Four of seven respondents (57.1 percent) identified religious leaders as champions of nutrition messages (KII Question 5a6).

When FGD questionnaire respondents were asked how they heard dietary messages, 28.7 percent of the 108 responses identified training programs as the source, 16.7 percent ACDI/VOCA staff, 14.8 percent each CAs and posters/flipcharts, 9.3 percent leaflets, 6.5 percent each prayer meetings at the mosque/imam and community/courtyard meetings, and 2.8 percent LSPs (FGD Question D2).

All 38 FGD respondents stated that they believed the nutrition messages they were given by the Activity, that they also received messages on food safety and/or hygiene, and that they would continue following those messages post-Activity (Questions D3, D4, and D5, respectively). When survey respondents were asked whether their families practiced proper handwashing, 96.1 percent of the 203 respondents said that they did (Survey Question 5b).

Of 202 respondents, 83.7 percent said that the Activity's nutrition messages were either "extremely" or "fairly" useful (Survey Question 4e), and an average of 88.6 percent of 203 respondents said that their food habits had changed/improved to a "great" or "moderate" extent over the previous five years (Survey Question 4e).

Of 200 respondents, 98.0 percent claimed they understood the importance of good nutrition for "health, especially for children and women" (Survey Question 4b), and 75.4 percent of 203 respondents said there had been no malnourished child under five in their communities over the last five years (Survey Question 4c). Of the 16.3 percent answering "yes" to this question, the highest numbers were in Jashore and Cox's Bazar.

5a.2. "Increased awareness, supply, and solvency":[19] When asked to identify the reasons for adopting an improved, more diverse, livestock-based diet, 26 of the 40 FGD respondents (65.0 percent) stated "awareness raising," 10 (25.0 percent) stated "increased income," and 4 (10.0 percent) stated

[19] This is a quotation from a KII conducted by Dr. Raihan with a CA in Batiaghata, Khulna, on April 18. In the team's field study, two or more of these reasons were frequently given for adopting an improved, more diverse, livestock-based diet: awareness of what a diet is, a local supply of items for an improved diet, and ability to pay for such items from the local market if milk is not sourced from own farm production.

"increased availability of milk-related foods" (FGD Question D1). Farmer respondents were particularly pleased that the knowledge of food processing they had gained through the training enabled them to prepare a greater range of food items from their milk and that family members now consume 120g/day of meat, knowing it to be beneficial to their nutrition and health.

5a.3. Community agents: CAs play an important role in SBCC as community organizers and spreaders of new information and skills gained from LSPs and others. These social mobilizers have proven to be as important agents of change as LSPs. CAs tend to be young and enthusiastic, some still students or working part-time, and are responsible for 30–50 groups of farmers (25–30 farmers per group), six per *upazila* (the same number as the LSPs under the Activity). CAs often "graduate" to become LSPs. However, CAs under the Activity were poorly trained and organized and rewarded with only a stipend from the Activity; this underpayment does not motivate them, raising the question of their sustainability as a cadre. The full potential for this cadre has yet to be realized.

5a.4. Imams as champions of livestock, hygiene, and nutrition: Imams have proven an important conduit for SBCC in the community—not just on livestock, hygiene, and nutrition but also to promote vaccinations and advocate against child marriage—through sermons at Friday prayers. Imams are proven social gatekeepers. The Activity organized workshops for religious leaders to sensitize them in these technical matters. It is not sufficient just to provide training to women farmers on the importance of human nutrition as women do not traditionally have the right support from men in their families to ensure that good food reaches all family members. Having imams influence those men during Friday prayers helps overcome this challenge. In FGDs conducted by the COP, women reported beneficial behavioral change in the family because of imams having spoken to their husbands. The Deputy COP says that more capacity building for imams and other local leaders is still needed with messages on nutrition and hygiene linked to verses in the holy Quran. During an ET field interview, an imam advised that "teachers and political leaders should also be coached as champions." For example, village elders would be another useful asset to tap. This will create the enabling environment for increased consumption of milk and meat. The COP and Deputy COP say that the religious apex body, the Islamic Foundation, has been very supportive and that the Activity works closely with it. The Foundation teamed up with district-level members to devise an expansion plan to include additional mosques in 2021, with 14,000 mosques now targeted for imam sensitization and training.

5a.5. Nutrition coordination committees (NCCs): NCCs are not functional at *upazila* level. During ET field visit discussions, many DLS staff had no knowledge of these committees (perhaps because they were at *upazila* level or new to a district posting). The team understands that *upazila* NCCs, though mandated at GOB policy level, have yet to be initiated on the ground. These committees have great potential as agents of behavior change related to diet. During the KII with USAID, the AOR explained that NCCs' role is to listen, collaborate, and provide a platform to share information. They are a learning horizon and sustainable. These committees are scheduled to meet monthly.

The national NCC, comprising 18 ministry and other members, was formed in 2017 after the National Nutrition Action Plan was formulated. COVID-19-related restrictions have stopped all NCC meetings. A well-functioning district NCC in Jessore has enabled the Activity to work well with DLS, developing two videos that were circulated to other districts. This district NCC also developed an evidence-based plan for nutrition, including livestock. District NCCs are chaired by the District Commissioner.

5b. Coordination with Other Donor-Funded Nutrition Activities in Implementing Nutrition SBCC

5b.1. Livestock and Dairy Development Project: A close collaborative link was developing between the Activity and a recent startup, the World Bank–supported Livestock and Dairy Development Project (LDDP) working through DLS, with a $500 million loan, though the latter's implementation delay due to

COVID-19-related restrictions halted the collaboration.[20] The link between the two was facilitated because LDDP's Chief Technical Officer was the Activity's focal person within DLS, and the COP was involved in consultations with LDDP staff sharing the Activity's LSP business model before LDDP rolled out. The Activity's recommendations for activities to be included in LDDP were well considered, along with suggestions on mutual support between LDDP and the Activity.

The first year of rollout in 2020 coincided with the COVID-19 pandemic, which delayed staff recruitment. During the first six months of its operation, LDDP had recruited one LSP per *upazila* livestock office, with 400 recruited in total. At least 25 of these LSPs were already working for the Activity in its mandated area and they lent support to LDDP. LDDP/Ministry of Livestock and Fisheries (MoLF) asked the Activity for assistance in marketing. The Activity helped LDDP identify producer groups and shared the focal points of 1,000 Activity groups. Furthermore, the Activity COP interacted in many meetings with LDDP's Team Leader, who was open to suggestions. The COP gave a PowerPoint presentation that pointed out the need for animal identification to confer disease risk mitigation.

The Activity worked with the Cereal Systems Initiative for South Asia (CSISA) Activity of CIMMYT, the EcoFish Program of World Fish Center, the Ujjiban Program of Johns Hopkins University, the Bangladesh Nutrition Activity implemented by Abt Associates, the Local Works Activity implemented in the ZOR, and the Rice and Diversified Crops Activity implemented by ACDI/VOCA. However, the ET did not find these associated actions mentioned by any of its respondents.

Conclusions

5a. Nutrition Messaging and Generating Awareness

Awareness creation on livestock and nutrition issues has proven extremely effective as communities are eager to accept positive changes in livelihoods. Solutions to most technical challenges facing rural communities are available but remain in books, manuals, and universities. The reasons they are not being applied are socioeconomic and cultural. CAs are important social mobilizers at village household level. At the social institutional level, imams and the Islamic Foundation have proven an excellent modality to bring about behavior change; at the government institutional level, the NCCs have a strong potential role to play that has yet to be put into practice. Yard meetings and nutritional campaigns proved to be effective. Once COVID-19-related restrictions are lifted, a diversified approach could include courtyard drama sessions. Lectures aided by flipcharts alone did not have a strong impact.

5b. Coordination with Other Donor-Funded Nutrition Activities in Implementing Nutrition SBCC

Engaging with LDDP was significant and as good as it could have been under COVID-19-related delays.[21] Little output has been achieved thus far, however, in SBCC.

CROSSCUTTING ISSUES

4.6 EVALUATION QUESTION 6

Findings

6. Leveraging Private Sector Investment and Developing Public-Private Partnerships

6.1. Public–private sector relationships: The relationship between private organizations and the public sector (DLS, BLRI, ministries, local administrations) was often uneasy. There was a lack of trust

[20] LDDP will improve agricultural productivity and market access of 2 million smallholder household farmers and small and medium-scale agro-entrepreneurs. The project will stimulate growth and enable a sustainable, inclusive, and safe development of livestock value chains in Bangladesh. It will also address some upcoming issues of the livestock sector such as food safety, environmental pollution and climate change, and animal welfare. A livestock knowledge platform will be developed to provide information and support the sector's development (https://www.worldbank.org/en/news/loans-credits/2018/12/06/bangladesh-livestock-and-dairy-development-project).

[21] However, the World Bank is not a donor, as the wording in EQ 5b specifies, but a bank charging interest for this massive loan.

between the public and private parties though both felt the need for fruitful collaboration. The differing modus operandi of each stakeholder group hindered cooperation and neither felt obligated to cooperate. One senior DLS official said, "There may be a lack of interest from the Government officials" and there is a "lack of proper approach by the private organizations." A second official said, "Not everyone gives time." When asked to identify challenges in promoting PPPs under the Activity, 3 of 24 respondents cited lack of understanding between parties, another 3 the lack of common interest between parties, 2 that investment alone is insufficient, and another 2 the lack of policy to promote PPPs (KII Question 6.1).

6.2. Public sector expectations: Government sector officials wish to engage heavily in planning and execution of foreign-funded development initiatives, especially where possible impact on the community is high.

6.3. District NCCs: District NCC membership lacks representation of the private sector or other entities that could provide loans or external investment in district livestock enterprises, especially chilling centers, secondary dairy product manufacture, and livestock markets.

Conclusions

6. Leveraging Private Sector Investment and Developing Public-Private Partnerships

Collaboration on livestock enterprise between the public and private sectors was undermined by the sectors' contrasting attitudes and protocols. District and *upazila* NCCs are a means to foster such PPP relationships as long as the private sector membership in them can be agreed by Government and the *upazila* NCCs can be activated. Strong integrated efforts are needed to secure domestic and foreign investment in dairy and beef enterprises in southern Bangladesh, as has happened in the north.

4.7 EVALUATION QUESTION 7

Findings

7. Integrating Gender into Activity Interventions to Promote Women's Leadership in New Market Opportunities

7.1. Social engineering feat: There is overwhelming evidence that the Activity has pulled off a successful social engineering feat through using livestock to transform rural women's fortunes. Women in villages consider dairy livestock farming a business opportunity that can easily be managed while staying at home. Survey, FGD, and KII responses give testimony to this.

An average of 73.2 percent of 198 survey respondents said that the Activity had promoted gender sensitivity in the community, the response being particularly strong in Jhenaidah (93.8 percent) and Satkhira (90.6 percent) (Survey Question 6a). Of 199 respondents, 92.9 percent said that women had participated in the Activity to a "great" or "moderate" extent (Survey Question 6b), and 92.1 percent of 202 respondents said that women were involved in decision making at home and for livestock business-related activities to a "great" or "moderate" extent (Survey Question 6c).

All 38 FGD groups (mixed female and male) declared that under the Activity, LSPs approached women and men equally, women became livestock managers, and women became more active in the livestock market (FGD Questions E1–E3). When asked to identify the Activity's benefits to women in addition to better diets and more farm income that they control, 23.6 of respondents replied "increased women's decision-making power," 18.2 percent "increased family income," 13.6 percent "increased women's empowerment," 10.0 percent "increased women's self-dependency," 8.2 percent "increased women's mobility," 7.3 percent "increased women's social status/dignity," 5.5 percent "increased women's awareness," 5.5 percent "increased equal rights for men and women," 4.5 percent "increased women's savings," and 3.6 percent "increased connectivity with Government officials" (FGD Question E4).

7.2. Increased female engagement: The Activity has increased female engagement as livestock farmers and entrepreneurs. Usually, women and men together negotiate and agree on whether a cow should be sold and at what price, but now women alone often make such a decision. Though it is

sometimes difficult for a woman to venture to a distant market to make a sale, often a buyer comes to the woman's family home and negotiates the price. Women feel that they contribute more to the family's well-being, earn more respect from their male family members, and are in control of the returns from milk and calf sales. This constitutes a true gender transformation at village level in favor of women, in pursuit of equity with men. "Women are more respected, richer, and happier," said one respondent.

However, this shift should not be viewed as leading to "marginalization of men.'" The latter have their own traditional role in the rural division of labor—namely, managing the arable side of the family's farming activities, labor-intensive rice and other cash crop cultivation in particular, and running small businesses. Many rural males work as migratory workers in large cities with better pay, while women take care of their households and livestock. The male partner of a family seems happy enough to bestow the duty of taking care of family livestock on the female partner. Without exception, in ET discussions with respondents in the field, all agreed that women who have become gainfully employed in livestock activities are highly regarded by their male family members as it both saves men work and provides an incremental source of family income. Rendering the livestock component of the farming system profitable rather than merely "subsistence" is seen by men in the family as an excellent advance that has their full backing. Income earning has become something in which both men and women can participate. Moreover, men expressed the view that they no longer needed to leave their own businesses to tend to the daily milking and feeding of the family livestock anymore and could dedicate themselves to making their own businesses profitable, as the women were doing with the cattle.

From discussions in the field, the ET concluded that most livestock farmers in the Activity area are now women. "Livestock has reduced women's poverty," said a doctor from Satkhira Sadar in a field interview. Women can now contribute to paying children's school fees and other essential household expenditures, a change that women state earns them great respect from their husbands, which they did not have before the Activity. Their opinions are now more valued. And as women can collect the money from milk and calf sales and decide how to spend it, they can also allocate some to their personal and medical requirements rather than having to beg from their husbands as before. Women have been empowered by the Activity and play a greater role in decision making on family livestock.

All 32 respondents asked said the Activity had been effective in increasing women's role in family agribusiness decision making (KII Question 7.2), and 24 of 26 respondents (92.3 percent) said that there had been a shift in household responsibility related to livestock as a result of the Activity (KII Question 7.3). When asked what other impacts women had experienced from having more income and/or consuming more nutritious food, 18 of 40 responses from 26 respondents (45.0 percent) identified "financial and social status/empowerment," 15.0 percent "important part of family decision making," 12.5 percent each "improved diet/health awareness" and "better child health/education," 7.5 percent "more women entrepreneurs/job opportunities," 5.0 percent "women leadership/networking in business," and 2.5 percent "gender-based violence decreased" (KII Question 7.4).

Resistance to women operating as AI technicians/LSPs can arise as men believe that women cannot easily move about in rural areas. However, such entrenched resistance can be overcome. For instance, a manager of Livestock Services and Training, BRAC Artificial Insemination Enterprise, explained in his KII with the ET team that he arranges for the successful women AI technicians working in the field to encourage and convince newly trained "graduates" of the work's value and the high earning potential. The community is approached in this discussion so that it will support its women AI technicians to work for the good of all. It is vital that the family of the woman technician also supports her.

7.3. Women livestock entrepreneurs: Increased female livestock entrepreneurship constitutes a major step forward. One such entrepreneurial activity is cultivating fodder not just for the homestead cattle but as a source of planting material (seeds or "cuttings") for sale to other livestock farmers. The Borlaug Institute's visiting team observed, however, the extent to which women could increase the land area for this was limited because of the many traditional household tasks competing for their time. Section

Finding EQ3c.6 above has cited how SMEC has negotiated with its partner Asia Bank to facilitate women's eligibility for loans with minimum collateral requirements. See Annex 21 for success stories of women's entrepreneurship.

7.4. LSP training affirmative action: In its training program at three universities (e.g., Patuakhali University, Barisal), the Activity has prioritized women as trainees for LSPs/AI technicians. For example, a five-day training for 19 women AI trainees emphasized cattle and goats. Training comprised theory classes interspersed with practical sessions, explanation of AI (advantages, limitations, and techniques), and general livestock management and health. After the training, each AI technician started work as an LSP in her home area, charging $4–5 per insemination, having bought the semen straw from BRAC AI for $2.5. Veterinary drugs are sold by the technician too, with a markup. With these income streams, a woman LSP can make up to 20,000Tk a month, on a par with some government officers' salaries. Technicians are free to call their lead tutor to discuss any problems they encounter. After six months in the field, technicians need a 10-day refresher training.

Similar programs at Rajshahi University trained 23 women LSPs in April 2018 and 25 women in March 2020 in livestock management, health, and breeding, and Chattagram Veterinary and Animal Sciences University in Chittagong held one training in March 2020 for 17 women LSPs (mainly from Cox's Bazar) in animal health and production and farm management. Unfortunately, opportunities for training LSPs under the Activity were restricted in part by university closures in 2020–2021 because of COVID-19-related restrictions (see Annex 20 for more detail on university training of women LSPs).

Conclusions

7. Integrating Gender into Activity Interventions to Promote Women's Leadership in New Market Opportunities

Women in rural communities are the prime beneficiaries of livestock enterprises as they are now more involved than their male family members in livestock rearing. Women and their husbands welcome this social evolution as a means for women to earn an income while staying at or close to home. Gender-related success stories that the ET witnessed demonstrate that gender integration in the sector is sustainable. One Activity goal and result was for women to have been brought into the mainstream of livestock production, empowering them socioeconomically by giving them control of resources and decision making, rather than their merely feeding and watering the animals. The Activity has also proactively brought women into the sector as service providers.

5.0 RECOMMENDATIONS

This Final Performance Evaluation has identified the strengths and weaknesses of the Livestock and Nutrition Activity. In this report, the ET has presented its findings, conclusions, and lessons learned from this six-year Activity. Derived from these it has devised a set of recommendations that would build on the strengths of the Activity currently being completed while addressing a number of issues that the ET considered were slowing the Activity's intended outcomes and impact.

The recommendations cited below represent a longlist menu of actionable Activity options for USAID to consider as it *identifies* and then *formulates* a follow-up project to the Livestock and Nutrition Activity (2015–2021). Such identification and formulation constitutes the next step for USAID if it intends to mount a follow-up Activity. *The FPE was not part of that formulation but a precursor to it.* The ET believes that the generic activities to be selected for the follow-up action are included in the recommendations below.

The longlisted activities need to be reduced to a shortlist; this selection is for USAID to decide in concert with any consultants it requires to help formulate the project. Formulation would require first that the recommendations below are prioritized within the theme that USAID management will decide. For sure not all recommendations would have a place in the follow-up project; there are too many of them, and they would not all be coherent for the selected specific objective(s). The scope of the follow-up activity

would, of course, be budget-led, this setting limits for the project. USAID will identify this budget and the period over which the follow-up project would last. USAID would then choose the project formulation team, presumably through a tendering process.

Once the consultants have been selected, there would then follow a consultation period between them and USAID, in which priority actions it has decided would be fleshed out in terms of implementation. The formulation consultants would then be tasked to devise the stakeholder mix, using the strengths of the system that has been set up under the 2015–2021 Activity. For any livestock activity, DLS and BLRI should be involved in the formulation process, in the interests of capacity building and post-project sustainability, for both GOB planners and implementers. The mix of livestock farmers, GoB, LSPs, CAs, and the private sector is envisaged as continuing as before. Involvement of both the private sector and LSPs is the core of the LSP market-based livestock business development model espoused in the Livestock and Nutrition Activity (2015–2021) and should also continue. The formulation consultants will address the issues raised by the ET in terms of where the follow-up project needs to be sited, where to continue with earlier actions, and where to start anew (see Annex 22).

The new SOW and project documentation would detail how the stakeholders would work in concert to achieve the goals, objectives, and selected activities of the follow-up. *For instance, if the formulation consultants decide that Livestock Productivity Recommendation 1a.1 below is selected as a follow-up activity and USAID were to agree to this, namely that distribution of planting material of high-yielding fodder is prioritized, the project document would detail where and how this would be done and by whom. Starting with the demand side, decisions will be needed on the target areas where the cooperating farmers will be, their numbers, and the training that may be needed to enable them to make the best use of this material, and not least the availability of land where the planting material will be planted. The source of the planting material (the supply side) would need to be researched to see how much is currently available and to what extent the supply needs to be bolstered, if at all. Thirdly, the means of its distribution to the farmers will need detailing. The BLRI is already distributing planting material, but the throughput is too small currently to have a significant impact on fodder production in southwest Bangladesh. Private sector transporters are highly likely to be needed. The extent to which this can happen will be determined by the budget that USAID avails to this component and the whole follow-up activity.*

In summary, the recommendations below represent a menu of priority actions suggested by the ET. USAID may select from these according to the complexion that it wishes the follow-up activity to embody. The formulation consultants will then flesh out the shortlisted component actions in a budget-led manner.

5.1 LIVESTOCK PRODUCTIVITY

EQ1a 1. As indicated in italics under Section 5.0 above, the follow-up Activity could prioritize distribution of planting material of high-yielding fodder types/varieties, especially "Pakchung" Napier, that have proven suitable for "sweet" soils in the FTF area's agro-ecological conditions. Negotiation with BLRI and DLS will be needed to scale up distribution mechanisms to reach remote areas that thus far have been neglected (see Annex 22, point 1). This will have budgetary implications.

EQ1a 2. The follow-up Activity could promote/distribute Napier 3 (and equivalent types/varieties) for cultivation on saline soils and lowlands subject to floods. BLRI and the International Center for Biosaline Agriculture in Dubai are sources of other saline-tolerant species/varieties of grass, legumes, and shrubs/trees (in addition to the Activity's work on saline tolerance with the International Rice Research Institute (IRRI)). Demonstration plots should be prepared with the help of BLRI and DLO/ULO offices to encourage famers to adopt such varieties. Farmer/LSP training should also be provided with the help of BLRI and DLS.

EQ1a 3. The follow-up Activity could provide oversight and drive to produce more fodder (and corn-based silage) for cattle feed during the lean season (see also Recommendation EQ 3a.2 below). In collaboration with district/*upazila* livestock and other local government offices, plan and arrange to develop local fodder markets to support fodder entrepreneurs, thereby increasing the ready availability

of fodder when it is most needed. Village *haats* (market areas that operate on alternate days of a week) could be used with the help of local authorities and leaseholders. Techniques for fodder preservation currently advocated by BLRI should be disseminated by DLS. A proper database should be maintained through DLO offices on the actual land used, amount of fodder produced, and farmers involved in fodder cultivation.

EQ1b 1. The follow-up Activity could contract the Borlaug Institute to conduct independent annual reviews of the status of fodder production and use of supplementary feed in the FTF area and provide recommendations and training. Follow-up on recommendations should be monitored and institutions/individuals held to account.

EQ1b 2. The follow-up Activity could commission an investigation to address BLRI' and DLS's failure (noted by the Borlaug Institute) to work together, to find a solution to better harness synergies and deliver a more coherent service to smallholder livestock farmers. The study must identify ways to counter GOB suspicions toward NGOs (see Lesson Learned number 4, Annex 22). In general, the follow-up Activity should closely involve representatives from development partners during the planning and execution of major program initiatives (e.g., fodder planting material distribution, LSP/farmer training). During program execution, appropriate notification and involvement of DLS field officers, together with BLRI, agribusiness private sector managers, veterinarians, and university specialists, is essential for successful and sustainable rollout. To foster coordination, the Activity should establish an advisory Technical Working Group comprising these partners and hold regular TWG meetings.

EQ2a 1. To facilitate recognition of LSP status and function, together with GOB, the follow-up Activity could commission a task assessment of what FTF LSPs should and should not legally do. This could be done in collaboration with the FTF Bangladesh Policy LINK Agricultural Policy Activity (2019–2024). Also, the prospective IP could conduct a training needs assessment to upgrade LSPs' skills in discharging these tasks/duties (theory and hands-on practical; on-the-job); plan and conduct the training; adjust and roll out the planned but largely unfulfilled LSP training program (2015–2021) once COVID-19-related restrictions have lifted. This recommendation addresses an apparent policy-practice gap.[22] The immediate training for current Activity LSP training should last at least two months. Ideally, all LSPs should undertake two *years* of veterinarian compounder training, if they are to continue to act as para-veterinarians, though this is an unrealistic aspiration because of a lack of institutional programs.

EQ2a 2. The follow-up Activity could recruit and train more LSPs, if budget allows, to supplement those already recruited by the previous Activity. More LSPs are needed, especially to assist DLS in marginalized *upazilas* of the FTF area. The current Activity "one-stop service" could ideally be extended to every union in a targeted district, with each LSP attached to these service centers so that farmers can receive better service. The affirmative action in recruiting female LSPs should be continued because they are more effective in linking with livestock farmers, who are usually female. The need for this type of training was voiced by the LSPs. This two-month LSP training could be provided by several institutions as follows, using a curriculum designed by them and agreed by DLO offices:

1. Universities that provide DVM degree (see summary KII reports with three veterinary university institutions in Annex 20)
2. Veterinary training institutes
3. Private para-vet training centers

[22] The National Livestock Development Policy (2007) cites a catalogue of suboptimal features within the subsector, including (under Section 4.3, Veterinary Services and Animal Health) that "vaccination is done in a haphazard manner without any strategic plan for controlling the targeted diseases." Despite LSPs' active and important role in servicing the national herd, the policy implies that only graduate veterinarians are entitled to administer veterinary drugs. DLS appears to turn a blind eye to LSPs failing to observe this policy by providing disease diagnosis, treatment, and prevention services that would not otherwise be available to farmers because of DLS staff and funding limitations. This gap between policy and practice clearly deserves and requires urgent government and parliamentary attention. Other policy gaps requiring address are noted in Recommendation EQ6.4 below.

4. Trainings organized by the DLS Extension Division

Even regional training centers for LSPs could be established by private entrepreneurs or local NGOs under the Bangladesh Technical Education Board (BTEB) to make the training program sustainable. **EQ2a 3.** The follow-up Activity could further customize the SHUDOKKHO mobile application to make it more user friendly and link it if possible with the DLS database. First, the prospective IP could commission an independent evaluation of its effectiveness, rollout, and impact to inform the customization. This could be done in coordination with the FTF Bangladesh Digital Agriculture Activity.

EQ3a 1. The follow-up Activity could establish and oversee a multisectoral working group to promote the supply and demand of supplementary feed (multinutrient) blocks. This group should comprise DLS, private sector, veterinary professors, LSPs, CAs and farmer representatives. More advocacy is required on supply (from commercial source or household manufacture) and demand of urea-free blocks. Champions and social mobilizers, *demonstrations*, and videos put out on social media are needed to enlighten rural farmers on this highly cost-effective practice and the many benefits that can accrue.[23] Micronutrient block pilots are needed across the FTF area and study tours to areas in which usage is common (e.g., in Faridpur, where 60 percent of farmers use them, and Sadarpur, where 20–30 percent of farmers use them).[24] Local entrepreneurs and sellers could be trained and supported to establish a good supply chain for quality feed ingredients. A system of quality checks and certification for feed ingredients could be established in collaboration with BLRI, DLS, and universities to prevent adulteration.

EQ3a 2. The follow-up Activity could advocate for and facilitate greater storage of dry grass/leguminous hay to cover the lean period and stabilize milk production and marketing and cattle health over the year. Keeping milk yields stable over the year is a requirement for a strong secondary milk product market to develop in the south, which offers as much promise of incremental income to farmers as producing fodder. This requires a longer planning horizon by farmers, with incremental fodder grown, dried, and stored ahead of the lean season. Similarly, incremental demand and supply of lean season feed silage needs advocacy. A plan is needed involving BLRI and other entities that have skills and a commercial track record of silage making and use in northern Bangladesh and urban environments to see how silage can be marketed in southern villages, with a profit for all concerned.

EQ3a 3. The follow-up Activity could encourage milk processing to prepare for a time when milk supply exceeds demand or when milk collection services to village locations intermittently fail (see Recommendations EQ 3b.1, 3c.1 and 3c.2 below for more detail).

EQ3a 4. The follow-up Activity could promote beef cattle fattening to address the shortfall in meat, especially at religious festivals such as Eid-ul-Azha (see Finding EQ 3a above). Fattening of goats could also be emphasized. The national AI program should be extended to remote villages of each district with the help of BRAC AI Enterprise and DLS (AI) to upgrade the local stock of cattle. Farmers should be trained to take proper care of male calves of dairy cattle to produce dairy beef.

EQ3a.5. The follow-up Activity could conduct study tours for key champions to the north of Bangladesh. Productivity of improved breeds is far greater in the north than in the south. Study tours for livestock sector stakeholder representatives from the south to selected sites in the north would enable the visitors to ascertain gaps in the way they conduct their livestock business that limit their profitability. Visit sites should include the chilling centers set up under the USDA-funded Bangladesh Dairy Enhancement Project.

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[23]How to make these blocks at homestead level is to be located on the web, for instance on the Kenya Agricultural Research Institute website (https://www.kalro.org/fileadmin/publications/brochuresII/How_to_make_mineral_blocks.pdf), and (under Sindh Province, Pakistan conditions, in which the current ET team leader was involved) on the following weblink https://www.youtube.com/watch?v=Q6rDusEp25I&t=13s

[24]Revealed in FGDs conducted by Rehan Uddin with groups of LSPs on April 17 and 18, respectively.

EQ3.a 6. The follow-up Activity could prioritize marginalized districts (such as Barishal and Chattogram) and *upazilas*, namely those that have low-level livestock productivity and human nutrition indicators and/or were omitted or received late attention during the (2015–2021) Livestock and Nutrition Activity. Such prioritization should be done by inspection of available surveys on livestock and nutrition indicators; discussions with DLS/Ministry of Planning and local government officials, District Nutrition Coordination Committees, etc. The resulting analysis could, for example, promote fodder production in districts such as Cox's Bazar where local breed cattle predominate and livestock productivity and human stunting indicators are of most concern. During the Activity thus far, greater fodder production has increased milk production, leading to more home consumption for all family members, including children below two years of age once they have weaned, thereby preventing stunting within the crucial "1,000-day" window; beyond this point, only around 15 percent of the condition is amenable to correction.

EQ3b 1. Promote milk processing: The follow-up Activity could conduct more training in modern and hygienic milk processing through hiring local trainers (especially from the Dairy Science Departments of universities) to enthuse farmers in producing high-quality milk and upgrading the skills of local entrepreneurs already involved in or wishing to become involved in milk processing (see Annex 21 for such a success story—Riaz Uddin in Cox's Bazar—and Recommendations EQ 3c and EQ6 below). The follow-up Activity could help such entrepreneurs extend their linkage to premium markets (especially in large cities) and advertise/sell their products to digital markets. Quality control, cold chain, certification, traceability, and branding could be promoted with the help of local NGOs and universities. The follow-up Activity could also encourage farmers of any given region to form cooperatives for the ease of getting service and marketing their produce.

EQ3c 1. The follow-up Activity could promote better networking between farmers and local milk processors by contacting potential investors, arranging processing fairs and conferences, and making a financing plan (see also Recommendations EQ 6.2 & 6.3 below). Emphasis should be given to establishing a proper cold chain from farms to markets through developing awareness and providing technical support. Financial institutions could be approached to provide credits to entrepreneurs/farmers to purchase cooling tanks/deep freezers/commercial refrigerators to preserve milk, meat, and dairy products.

EQ3c 2. The follow-up Activity could train milk processors in business methods, accounting, labeling, branding, packaging, and marketing, using local trainers. Spot demonstrations and proper circulation of success stories would be useful tools. This will strengthen their businesses, making them more competitive and profitable and increasing employment and wealth opportunities and better human nutrition. Entrepreneurship training under the Activity provided a good start in developing integrated farming enterprises and local processors and marketers.

EQ3c 3. The follow-up Activity could commission a comparative study to determine the relative success of credit products offered through Activity partners, how they improved business performance, and which may be scaled up for the maximum impact.

EQ3c 4. The follow-up Activity could set up a policy advocacy unit within itself to improve the enabling environment for livestock and hence nutrition in Bangladesh. This unit could work with MoLF to create awareness among Parliamentarians of the value that new policy measures can have in transforming the livestock sector. This could be done in collaboration with the FTF Bangladesh Policy LINK Agricultural Policy Activity (2019–2024). An Activity weakness to date has been not engaging leading local experts in the dairy sector and marketing as advisors, which would have strengthened sustainable rollout and smoothed the way with Government. An upscaling of the Activity provides an opportunity to correct this omission.[25]

[25] Policy advocacy is urged elsewhere in this report in the context of LSPs' role (Recommendation EQ2a above), *upazila* NCC mobilization (Recommendations EQ5a.4 & EQ6.1), and encouraging investment (Recommendation EQ6.4).

EQ3c 5. The follow-up Activity could render the LSP business model more effective: First, promote better understanding between LSPs and Government officials. The LSPs should proactively build rapport with both farmers and Government veterinarians. Second, as LSPs come from diverse educational and trade backgrounds, their foundation training should include all essential subjects, such as fodder cultivation, animal husbandry, primary health care for livestock, agro-processing, extension techniques, internet literacy, and leadership. LSPs need at least four weeks of training. Third, increase the number of LSPs for every *upazila*: one LSP for 200–300 farmers could be an effective ratio. Train and engage female LSPs. Finally, extend one-stop-service points run by LSPs to cover every village in the ZOI and ZOR, that would involve developing ever closer ties between LSPs and private sector suppliers and marketers. All these imperatives could be secured through discussion, negotiation, planning, training, deployment, on-the-job mentoring and encouragement, and oversight of the whole. LSPs should be more closely attached to the DLOs/ULOs so that good working relationships can prosper. Holding quarterly meetings with DLOs/ULOs and LSPs could benefit both parties. The follow-up Activity could facilitate both initiatives.

5.2 HOUSEHOLD CONSUMPTION

EQ4a 1. The follow-up Activity could commission a study by a cultural/ social anthropologist to explore options to improve processed meat acceptability, which could increase demand. [26] In Bangladesh, no such anthropological study within the general population has been done so far, related to processed meat products for rural communities; the FPE survey engaged only with some specific stakeholder groups who were involved with the Activity. Seeking value addition to meat is a worthy goal, which could have a large impact on encouraging beef production, improving human nutrition, creating and diversifying rural employment, and increasing incomes. Trainings on meat processing and frozen/bakery products that contain meat could be arranged for prospective entrepreneurs. Universities and local vocational training institutes could be involved in developing modules and facilitating such training.

EQ4a 2. The follow-up Activity could promote better hygiene during meat handling, especially at slaughtering facilities. Also essential are at farm level - good hygiene practice during milking by farmers (e.g., cleaning of udder and utensils, rejection of first strips of milk, good cattle management after milking, etc.) and post-harvest milk handling by both farmers and dealers (e.g., proper cooling, clean hands, proper transportation, cleaning of utensils and instruments, quick microbial tests, etc.). Training in such could be provided by DLS regional offices, NGOs and local training institutes/Universities, and industrial partners like PRAN, Akij, Milk Vita, BRAC, etc. As already started by the Activity under evaluation, a campaign for hygienic milking and handling should be undertaken widely through distribution of leaflets, manuals, posters, short videos on the local TV network, etc. All livestock farmers and milk handlers should gradually become involved in this process over a period of 4-5 years to improve the overall quality of milk. Training programs should include more practical demonstrations and hands-on practice.

EQ4b 1. Establishing milk collection points and cold chains: Through diligent enquiry and advocacy, the follow-up Activity could identify investors and promote expansion of the sparse network of formal market chilling centers/cold chains in southern Bangladesh, enabling better preservation of milk and milk products at rural level and thereby longer shelf life and increased sales. This could be done in coordination with the FTF Bangladesh Agricultural Infrastructure Development Activity. This investment's profitability can be demonstrated through making a business case (see also Recommendation EQ 6.2 and 6.3 below). The number of chilling centers already developed under the Activity under Akij and PRAN is not sufficient. The number should be increased proportional to the volume of milk produced in a given region. Within a given region, milk distribution could be promoted by the follow-up Activity through linking farmers with

[26] In some other developing countries, processed meat products are in high demand—dry shredded meat (*dambu-nama)* in Nigeria, for instance, and dried meat strips (*biltong*) in South Africa. These means of preserving cooked meat have proven useful as nutrient-dense commodities when people travel and as a reserve against potential hard times. Demonstrations have been tried in rural Bangladesh, yet with only limited success, as indicated under Findings EQ 4a.

local milk processors. Moreover, some entrepreneurs who already own milk chilling centers could be further developed through training and being linked with investors.

EQ4b 2. The follow-up Activity could invigorate links with the Islamic Foundation to enhance rollout to more mosques and scale up the excellent rollout of messaging thus far, particularly targeting men and boys at Friday prayers. Share more technical information with the imams through training to improve their impact (see also Recommendation EQ 5a.1 below). Priests from Hindu temples could also be involved as a significant portion of the community follows the Hindu religion. Imams and priests should be encouraged to address the issues at least once a week.

5.3 BEHAVIOR CHANGE

EQ5a 1. The follow-up Activity could support imams' and the Islamic Foundation's facilitation for SBCC. This could be coordinated in collaboration with the ongoing Bangladesh Nutrition Activity. The Activity can harness social media to increase geographic coverage of the imams' messages. This will help socially institutionalize the nutrition SBCC role imams play in the community (see Finding EQ 5a.4 and Recommendation 4b.2). Though many farmers interviewed during the ET's field phase were from the Hindu community, the ET met no Hindu priest who was involved in SBCC; it is probable that there could be interest in priests serving as BC messengers, and this could be pursued by the follow-up Activity. Inquiries could also be pursued with other community opinion leaders who could add their voices to nutrition SBCCs, such as madrassa/schoolteachers, to supplement the advisories of imams, LSPs, and CAs. These teachers should themselves first be trained in human nutrition by trained teachers on a weekly basis. An adolescent nutrition forum can be formed in each school in the catchment area.

EQ5a 2. The follow-up Activity could promote other SBCC modalities. This could be coordinated in collaboration with the ongoing Bangladesh Nutrition Activity. The usage of smartphones is still limited, with button mobile phones more widely used in rural areas. Internet is also rather expensive and connectivity often poor, so Facebook and YouTube are not commonly used. Local cable operators could broadcast relevant materials as viewers of television are widespread in urban and semi-urban locations, and TV seems to be more effective than community radios in rural Bangladesh. Although the modality is highly appropriate, community radio covers a very limited area and is not available in all districts; there are very few in the Activity area, including Teknaf, Cox's, Barguna, Bhola, Hatiya (Noakhali), Rajshahi, Kustia, and Patuakhali.

Nutrition fairs offer another messaging outlet at scale at district and *upazila* levels in collaboration with government and NGO partners, which would likely have a good impact on community awareness. These fairs can include exhibits of nutritious food, demonstrations of nutrition-sensitive farming and personal hygiene, film and drama shows, and debate competitions for adolescents.

When COVID-19-related restrictions are relaxed, the school drama group modality may offer another way to significantly influence young people's behavior.[27] Training and general interchange between Activity staff and target communities were cited in Finding 5a.1 as being the ways in which FPE respondents had experienced nutritional SBCCs, and this should continue in a follow-up activity. There should be a comprehensive SBCC strategy with specific behavior change indicators for each segment of the target population and each variable (such as meat hygiene). Community Nutrition Days can be organized as a campaign on a quarterly basis at community/union levels.

EQ5a.3. The follow-up Activity could commission a social/nutritional anthropologist to make CAs sustainable post-Activity by devising payment-in-kind from their communities for the services they render,

[27]Drama and video making were part of the Activity's original plan, using BRAC's specialists, but BRAC was retired as a major implementing partner early in the Activity's life. These modalities have proven a cost-effective means of sharing knowledge and practices in many countries, such as Malawi. Also in that country, school drama groups have proven popular, with protagonists pitched against each other, one representing the old way of thinking and the other representing a modern medical approach.

including SBCC.[28] This could be coordinated in collaboration with the ongoing Bangladesh Nutrition Activity. This requires social networking within communities and encouragement from imams to whom communities respond. SBCC training for CAs is essential.

EQ5a 4. The follow-up Activity could render *upazila* NCCs functional with private sector inclusion. Strong advocacy with GOB is required on this policy issue (see also Recommendation EQ 6.1 below). The follow-up Activity should provide technical and capacity-building support to NCCs to strengthen their coordination function. Community Nutrition Support groups could be formed at union level, involving the local government authority to engage the community. Nutrition should be a regular agenda item in Union Parishad coordination meetings, with the follow-up Activity supporting the Union Parishad to hold such meetings regularly.

EQ5a 5. The follow-up Activity could enable incremental income generation through livestock farming must remain a strong rationale in follow-up action (see Finding 5a 2 above), as ability to pay is a necessary enabling factor for diversification of diets with milk and meat products.

EQ5b 1. The follow-up Activity could bolster links with LDDP to harness synergy with any SBCC initiatives it may have.

EQ5b 2. USAID managers to proactively seek collaboration with other donor programs. As the undoubted lead donor partner in Bangladesh in relation to improved nutrition linked to livestock farming, USAID should reach out to other donors in the country to both influence their development programs and harvest useful ideas from theirs. The British and EU nutrition-related assistance programs seem to hold the most promise in this regard. Partner organizations (local NGOs) of the Palli Karma-Sahayak Foundation (PKSF) could also be included as they are undertaking several livestock production–related activities.

5.4 CROSSCUTTING ISSUES

EQ6.1. To better institutionalize the LSP market-oriented business model, the follow-up Activity could press GOB to mobilize *upazila* NCCs, thereby implementing current government policy. At policy amendment level, advocate for private sector membership in these committees, enabling dairy processing and financing partners to participate. This is necessary to foster GOB ownership of the Activity's business development model. Livestock farmer representatives should be *upazila* NCC members too. Membership of national and district NCCs should be similarly expanded to render them more useful.

EQ6.2. Developing livestock business cases: The follow-up Activity could commission a study to formulate pre-investment livestock business cases with gross margin analyses, creating a menu to attract GOB and private/corporate investors and to provide a basis for fully fledged business plans (see Liberia case study in Annex 21). Such a generic study has not been done in Bangladesh, as far as the ET knows, though individual entrepreneurs have conducted specific market analyses on which to base their business development plans. FAO and UNIDO would be useful international organization partners in this component action (see footnote 14). University business studies departments could be involved in this type of study.

EQ6.3. The follow-up Activity could proactively seek investors (domestic and from the diaspora community) through innovative inquiry and link them with the business cases formulated in accordance with Recommendation EQ6.2 and the Liberia Case Study. By setting up an investment forum on the web, linking with the Dhaka Chamber of Commerce and Industry, and other methods, acquaint and match potential investors with the developed business opportunities identified above. A possible investment opportunity is the establishment of more local cattle markets for beef and dairy animals. Livestock markets

[28]There is a precedent for this in Western Nepal (Gulmi and Argakhanchi districts) with Village Animal Health Workers and Village Extension Workers elected by the community who act as intermediaries between communities and the District Livestock and Agricultural Offices.

are common in many regions, operating weekly or biweekly. Though women are selling cows to buyers coming to their homes, sales would be facilitated with more local cattle markets close to villages that women could easily visit. Moreover, as quality fodder is highly tradeable—more remunerative than growing rice—it would be better to have fodder marketplaces too (specialized fodder *haats* [bazaars] in market areas).[29] The follow-up Activity could facilitate formation of farmers' cooperatives for selling livestock and fodder. These cooperatives could establish fodder/livestock markets with the help of local government. In each village/*upazila* there are open fields used for weekly farmers' markets, which could easily be used as a fodder market. The follow-up Activity could encourage entrepreneurial interest in establishing modern slaughtering facilities at local *haats*/community markets to encourage proper slaughtering of animals and hygienic disposal of waste, with the help of NGOs and with collaboration from the Ministry of Local Government, Rural Development, and Cooperatives.

EQ6.4. Highlight livestock policy issues with GOB. The follow-up Activity could employ policy specialists to promote policy issues with GOB through Parliament's agricultural/livestock committee and the relevant ministries, to improve the livestock sector enabling environment—for example, to address livestock diseases, market animal-based livestock feeds, promote "cold chains," clarify cattle breeding policy, and incentivize the private sector.[30] All these issues lend themselves to intervention through the follow-up Activity mobilizing national dairy and beef industry policy specialists to work with Parliament, DLS, and the Ministry of Planning.

EQ7.1. The follow-up Activity could record and broadcast gender success case studies. Arrange professionally made video documentaries of women at work (with their own voice-overs, not a journalist's voice).[31] Examples of the many successes uncovered during the evaluation include that of training 19 female AI technicians at Patuakhali University and their subsequent deployment as LSPs and that of Jessore Dairy, in which women work with processing machinery, an unusual occurrence thus far in southern Bangladesh. Three success stories citing women specifically are included in Annex 21 below. It would be instructive also to highlight women's success at obtaining credit (e.g., through SMEC and Bank Asia) (Finding 3c.6 above). These stories could encourage other women to follow suit in becoming livestock entrepreneurs, growing their dairy herd, or engaging in a beef-fattening enterprise. These videos can be broadcast on the Chattogram regional TV channel, for instance, and in community centers (resource centers) where they exist.

EQ7.2. The examples in Recommendation EQ 7.1 and similar success stories can also be recorded by the follow-up Activity on social media and covered by community radio or TV to broadcast proof that gender integration is sustainable. Study tours could be arranged to such success sites too for local leaders from the follow-up Activity target area communities so they may be charged with enthusiasm on

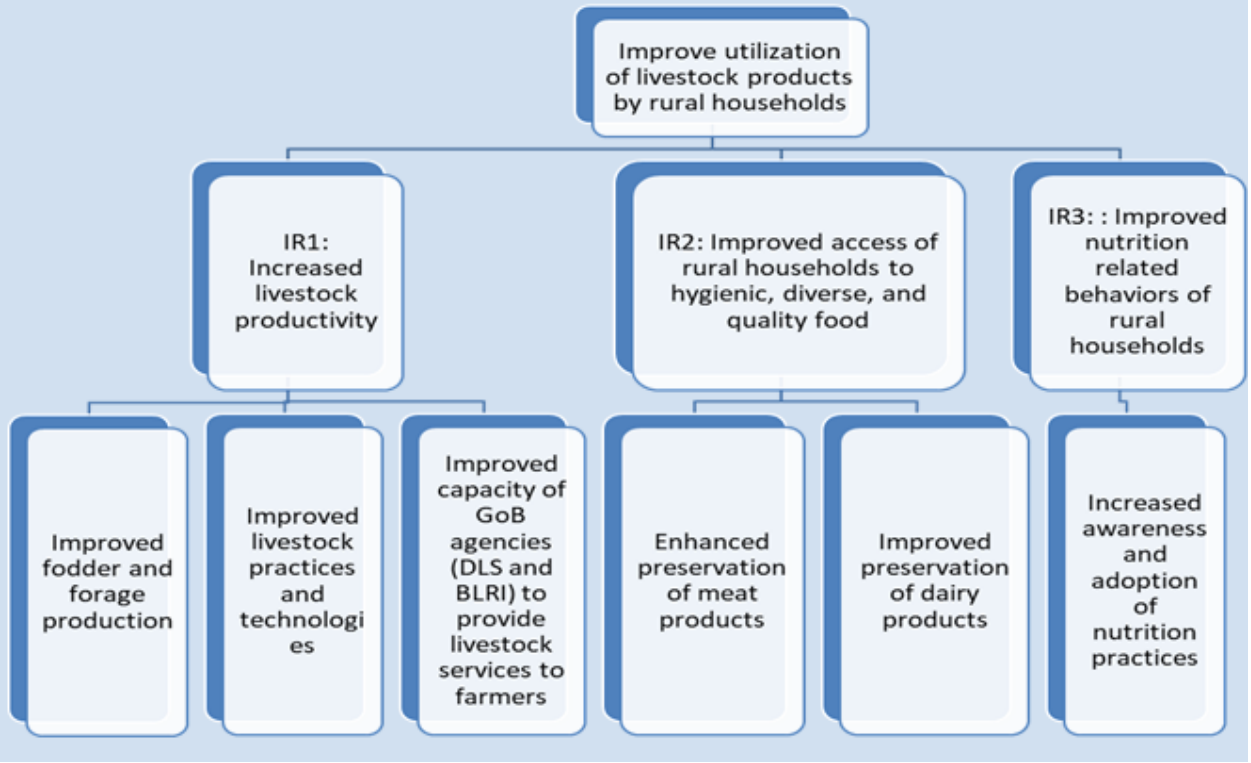
[29] In the context of Evaluation Question 6.3, a relevant market investment "success story" from Liberia is presented in Annex 21.

[30] Livestock diseases have huge economic consequences but significant policy gaps, such as limited vaccine supply and quality control of the veterinary drugs available prevent these diseases from being addressed. Policy advocacy is much needed on livestock disease surveillance, control, and quarantine as disease is a disincentive for serious investment in cold chains, slaughtering facilities, and other infrastructure. Foot and Mouth Disease (FMD) and mastitis concerns were frequently mentioned in field interviews. Questions must be answered on how best to control animal-borne diseases that may then jump to humans (COVID-19 is apparently a case in point) and how best to mobilize a network of veterinary workers to minimize risk for farmers.

[31] The reference video for this compelling *genre* is Molly Dineen's "Hilary Hook: Home from the Hill," first screened on UK's BBC 2 TV in 1987. That this video was made 30 years ago is immaterial. Its value is in the then-novel technique employed, of letting the subjects themselves create the narrative rather than its message being impersonalized by a development professional who is not intimately involved with the narrative. The crucial element of trust has first to be built between the film director and the subject(s) who will be the film "stars" to put her/him/them at ease such that the end product will be compelling and meaningful. Viewers in the activity target areas will far better engage with this local vernacular narrative and be beneficially influenced by it. Subtitles in English should be provided so that viewers unfamiliar with local languages and dialects can follow the narrative. This was done in the youtube video on Multi-nutrient blocks in Pakistan (see Recommendation EQ3.1a).

achievability of gender integration, to increase their support for project initiatives. These local leaders could be elected members of local government, government officials, school/madrasa teachers, religious leaders, community elders, LSPs from new activity areas, lead livestock farmers/fodder cultivators, university students, educated youths or local political party leaders.

ANNEX I: LIVESTOCK AND NUTRITION ACTIVITY RESULTS FRAMEWORK



Annex 2: Scope of Work

Tasking Request S025: Livestock Production for Improved Nutrition (Livestock and Nutrition) Activity Final Performance Evaluation

Date of Request:

October 5, 2020

Description of Activity:

This is a final performance evaluation for the Feed the Future Bangladesh Livestock Production for Improved Nutrition (LPIN) Activity, hereafter referred as the Livestock and Nutrition Activity. The Activity is being implemented by ACDI/VOCA.

The Livestock and Nutrition Activity aims to increase nutritional outcomes by enhancing livestock productivity and income generation of rural households in the FTF Zone of Influence (ZOI) and Zone of Resilience (ZOR).[32]

The Activity consists of three key components:

Component 1: Increased livestock productivity through increased access to better livestock management techniques and primary animal health care services.

The Livestock and Nutrition Activity increases livestock productivity by improving farmers' knowledge on proper animal husbandry practices and ensuring available livestock services around farming communities. The Activity works with a variety of market actors to increase farmers' access related to livestock productivity issues including quality feed, fodder and forage materials, animal health care services, breed improvement through artificial insemination techniques and better farm management practices, *etc.* The Activity partners with Bangladesh Livestock Research Institute (BLRI) and Department of Livestock Services (DLS) to increase the supply of forage and fodder materials through improved research capacity, increased distribution of planting materials, and better utilization for animal health and nutrition. The Activity promotes a cadre of Local Service Providers (LSPs) to ensure available livestock services around farming communities in collaboration with local livestock officials and private sector partners.

Component 2: Improved access of rural households to hygienic, diverse, and quality food to enhance nutrition and health status, especially of women and children.

The Livestock and Nutrition Activity works on improving the preservation and utilization of meat and milk products at both the household and commercial level. The Activity builds the capacity of farmers and processors for diversification and preservation of livestock products that help to increase dietary diversity at the household level by increasing availability of food products through improving quality and shelf-life of the products. The Activity also improves the hygienic knowledge, practices and food safety issues on the supply side through capacity building of farmers, milk collectors, and processors, *etc.*

Component 3: Improved nutrition-related behaviors of rural households

The Activity improves the nutritional status of farming households with an emphasis on women and children through an integrated approach of nutrition behavior change messaging at various stages along the value chain and collaborating with local partners and existing programs to emphasize complementarities to support cohesive and consistent interventions with common nutrition indicators.

[32] The Zone of Influence (ZOI) consists of 21 southwestern districts of Bangladesh under Barisal Division (Barisal, Bhola, Jhalokati, Pirojpur, Barguna, Patuakhali), Dhaka Division (Faridpur, Gopalganj, Madaripur, Rajbari, Shariatpur), and Khulna Division (Jessore, Jhenaidah, Magura, Narail, Bagerhat, Khulna, Satkhira, Chuadanga, Meherpur, Kustia), and the Zone of Resilience (ZOR) has two districts: Cox's Bazar and Bandarban under Chattogram Division.

Please see attached the Activity Program Description for more details.

The total estimated amount (TEA) for the Livestock and Nutrition Activity is $10,900,000 and the duration is June 15, 2015–June 14, 2021.

Research Questions:

This final performance evaluation will seek to answer the following research questions:

1.a. To what extent has the Livestock and Nutrition Activity increased livestock fodder production and processing (in hectares and volume), and utilization by livestock farmers (in number of farmers and season of the year)?

1.b. What has been the Activity's success in building the capacity of the Department of Livestock Services (DLS) and Bangladesh Livestock Research Institute (BLRI) in the areas of research, production, and distribution of improved fodder materials?

2.a. How successful has the Activity been in building the capacity of Livestock Service Providers (LSP) to be the trainers of trainers for livestock farmers and other livestock value chain actors?

2.b. What have been the major constraints and opportunities with respect to developing and establishing the LSP business model? Based on the Activity's performance, how sustainable will this model be beyond the life of the Activity?

3. How successful has this Activity been in increasing the productivity of local and cross breeds of cattle in terms of milk yield per cow for dairy cows, and days to achieve market weight and increase in market weights for beef cattle?

4.a. How successful has the Activity been in promoting increased household consumption of different meat products as well as promoting hygiene and food safety standards at the point of meat handling and processing?

4.b. How successful has the Activity been in promoting increased household consumption of dairy products and increased sales of surplus milk in both formal and informal markets?

5.a. How successful has the Activity been in promoting nutrition messaging and generating nutrition awareness among the targeted beneficiaries? What have been the most effective means/approaches by the Activity to drive individual, household, and community consumption of nutritious and safe diets?

5.b. How effective was the Activity in coordinating, collaborating, and leveraging resources with other donor-funded nutrition activities in implementing behavioral change communication on nutrition in order to overcome the barriers to the adoption of nutrition related behaviors?

6. How successful has the Activity been in leveraging private sector investment and developing public-private partnerships? What have been some of the challenges in forming partnerships?

7. How effective was the Livestock and Nutrition Activity in integrating or incorporating gender in its interventions? How successful has it been in promoting women's leadership in new market opportunities?

Geographic Coverage:

The evaluation will cover 21 districts in the FTF ZOI within Dhaka, Khulna, and Barisal divisions, and Cox's Bazar district in FTF ZOR in the Chattogram division.

Dates of performance and timeline:

Expected start date is o/a January 5, 2021 with field work commencing o/a January 15, 2021.

Team Composition/Qualifications of Consultants:

USAID recommends a three-person team for undertaking this evaluation. The team will include a Team Leader/Evaluation Specialist, a Livestock Specialist, and a Nutrition Specialist.

Team Leader/Evaluation Specialist (International):

The Team Leader will:

- Have a Master's degree or higher degree in any field of Agriculture, Economics, Business Administration, or Monitoring and Evaluation
- Have at least 10 years of significant international experience in evaluating projects with focus on agribusiness, market development, public-private partnerships, and value-added agriculture enterprises for USAID or other international development agencies
- Have significant experience in designing quantitative and qualitative surveys/studies/evaluations
- Have knowledge of USAID Feed the Future programming, USAID regulations and systems, performance monitoring and evaluation guidance, evaluation policy, gender policy, *etc.*

The Team Leader will provide overall leadership for the team, and s/he will finalize the evaluation design, coordinate activities, arrange periodic meetings, consolidate individual input from team members, and coordinate the process of assembling the findings and recommendations into a high quality document. The Team Leader will possess good organizational and teambuilding skills. S/he must demonstrate cultural sensitivity, particularly when interacting with a range of stakeholders. S/he will lead the preparation and presentation of the key evaluation findings and recommendations to the USAID/Bangladesh team and the major stakeholders. S/he will have excellent communications and writing skills in English.

Livestock Specialist (National):

The Livestock Specialist will:

- Have a minimum of a bachelor's degree in Animal Science
- Have at least 10 years of experience working in the areas of cattle (beef and/or dairy) production value chains, especially with smallholder farmers
- Strong understanding of Bangladesh livestock production practices and markets
- Have significant knowledge and experience in evaluations and/or assessments of projects with similar scopes
- Have experience with market systems approach and value chain projects
- Have strong analytical skills
- Have strong oral/writing communication skills in English

The Livestock Specialist will provide technical assistance in the evaluation of the Activity. S/he will actively participate in the desk review of materials and assist the Team Leader in developing methodologies, Work Plans, and report outlines. S/he will assist the Team Leader in setting and conducting interviews with relevant stakeholders. S/he will participate in team meetings, site visits, and drafting the report. S/he will also participate in presenting the report to USAID or other stakeholders and be responsible for addressing pertinent comments provided by USAID/Bangladesh or other stakeholders.

Nutrition Specialist (National):

The Nutrition Specialist will:

- Have a minimum of a bachelor's degree in nutrition science or Public Health
- Have at least 10 years of experience working in the areas of nutrition sensitive agriculture programming and nutrition communications
- Have significant knowledge and experience of integrating nutrition in development interventions
- Strong understanding and experience of nutrition communications and Social and Behavioral Change Communication (SBCC) tools and materials
- Have strong oral/writing communication skills in English

The Nutrition Specialist will be responsible for providing technical assistance in the evaluation of the Activity. S/he will actively participate in the desk review of materials and assist the Team Leader in developing methodologies, Work Plans and report outlines. S/he will assist the Team Leader in setting up and conducting interviews with relevant stakeholders. S/he will participate in all meetings, site visits, and drafting the report. S/he will also participate in presenting the report to USAID or other stakeholders and be responsible for addressing pertinent comments provided by USAID/Bangladesh or other stakeholders.

Deliverables:

The evaluation team will provide deliverables as per the USAID Bangladesh standard evaluation requirements.

ANNEX 3: EVALUATION QUESTIONS AND SUB-QUESTIONS

Evaluation Criteria	Key EQs	Respondent Level	Sub-EQs	OECD-DAC Criteria Addressed[33]
Component 1: Productivity	1.a. To what extent has the Livestock and Nutrition Activity increased livestock fodder production and processing (in hectares and volume), and utilization by livestock farmers (in number of farmers and season of the year)?	Livestock farmers	1. Was low fodder availability a constraint on your ruminant productivity before the LPIN Activity started (especially milk yield per day, growth rate, offtake weight, number of progenies per year, number of ruminants you can raise)?	R
			2. Did the increased knowledge you received from LPIN help you improve your ruminant productivity? How?	R, E, I
			3. What were the quantitative gains you noticed (extra liters milk per day, amount of secondary processed products, *etc.*)?	I, E
			4. Were GOB and/or LSPs the vehicles of these improvements? Explain how.	S, I
			5. How much extra fodder did you produce (volume or hectarage)?	I, S
			6. Which type of fodder sourced through LPIN have you found best?	I, S
			7. Will these gains continue in perpetuity after program end in June 2021?	S, I, E
			8. Do you have your own land on which to grow the extra fodder, or do you harvest from common land? If your own land, how much extra land?	E
			9. Have you undertaken training under LPIN? Describe the benefits.	S, E
		LSPs,[34] District MOFL (District & Upazila Livestock Officers)	1. How has the LPIN Activity enabled you to improve farmers' fodder supply and profitability (supply of planting material, training, delivery of feed to farmgate, marketing their fodder production, number of farmers contacted/participating in production)?	S, I, E
			2. Describe any training that you provided to farmers.	E, I
			3. What type of fodder planting material has been most in demand? Why (palatability, yield response of the ruminants, fodder growth rate)?	S, I
			4. What has been the percentage increase in hectarage of fodder grown (in this District), year by year since 2015?	S, I
			5. What has been the percentage increase in tonnage of tradeable fodder (in this District), year by year since 2015?	S, I
			6. Has an upper limit in area and tradeable tonnage now been reached in some/all of the eight Districts?	S, I
		Training institutions	1. How has the LPIN Activity enabled you to help farmers increase their fodder supply and processed meat/milk products?	R, E

[33] R = Relevance; E = Effectiveness; S = Sustainability; I = Impact.

[34] LSPs include CSOs.

Evaluation Criteria	Key EQs	Respondent Level	Sub-EQs	OECD-DAC Criteria Addressed[33]
			2. Describe the training courses you have given under LPIN, and how many farmers trained per year?	E
			3. What was the result of training in terms of adoption of new fodder types (increased hectarage, ruminant productivity increase)?	S, I, E
			4. What was the result of training in terms of increase in volume/value of meat/milk processed products?	S, I, E
	1.b. What has been the Activity's success in building the capacity of the DLS and BLRI in the areas of research, production, and distribution of improved fodder materials?	MOFL Central – DLS & BLRI	1. How has the LPIN Activity enabled you to help farmers increase their fodder supply?	S, R, E
			2. How have you benefited institutionally in terms of capacity building under LPIN (research, production, and distribution)?	S, R, I
			3. How have you benefited under LPIN from training by the Borlaug Institute?	R, I
	2.a. How successful has the Activity been in building the capacity of LSPs to be the trainers of trainers for livestock farmers and other livestock value chain actors?	LSPs & District MOFL (District & Upazila Livestock Officers)	1. How has the LPIN Activity benefited you in terms of capacity building (training, networking growth of your organization)?	S, I, E
			2. Describe the training of trainers (TOT) capacity uplift you have received.	I
			3. How many farmers and fodder value chain trainees have you logged per year since 2015?	I
			4. What has been the result of this capacity building in terms of amount of fodder produced and related increase in ruminant productivity (number of fodder producers, ruminant milk and carcass yield, profitability of enterprise, proportion of farmers venturing into secondary production of yoghurt, cheese, *etc.*)?	E, I
	3a. How successful has this (fodder) Activity been in increasing the productivity of local and cross breeds of cattle in terms of milk yield per cow for dairy cows, and days to achieve market weight and increase in market weights for beef cattle?	Livestock farmers; MOFL Central; private sector	1. How has increased access to fodder improved your farming enterprise profitability?	S, R, I, E
			2. Is it more profitable to provide fodder to local breed cattle or crossbreeds?	R, I, E
			3. Please express benefits in terms of increased milk yield/day; improved quality of milk; reduced time for beef cattle to reach maturity; better fertility (calves per year per cow); better tolerance to disease.	S, I, E
			4. Have you ever tried MNBs as a dietary supplement for your ruminants, with or without more fodder? Discuss.	S, R, I, E

Evaluation Criteria	Key EQs	Respondent Level	Sub-EQs	OECD-DAC Criteria Addressed[33]
	3b. How successful has the Activity been in increasing secondary production of value-added meat and dairy products?[35]	LSPs& MOFL Central	1. What has been the uptake of the initiative to increase secondary processing/production of **meat** products (weight and value increase per year)?	R, I, E
			2. What has been the uptake of the initiative to increase secondary processing/production of **milk** products (weight and value increase per year)?	R, I, E
	3.c. What have been the major constraints and opportunities with respect to developing and establishing the LSP business model? Based on the Activity's performance, how sustainable will this model be beyond the life of the Activity?[36]	LSPs, District & Upazila Livestock Officers (MOFL), MOFL Central – DLS & BLRI	1. Is credit readily available to individual farmers or groups in relation to increasing fodder production and developing the meat and dairy value chains?	S, E
			2. Is land availability or accessibility for smallholders the apex constraint on increasing fodder hectarage?	R
			3. Is profitability an issue (high production/transportation costs or ability of buyers to purchase fodder)?	S
			4. What are the constraints and opportunities for increased production and marketing of processed **meat** products?	S
			5. What are the constraints and opportunities for increased production and marketing of processed **milk** products?	S
			6. Are LSPs interested to continue training farmers after the end of the project, and farmers still interested to learn?	S, I
			7. Is the LPIN business model sustainable post-Activity? If not, why not?	S, R, I, E

[35] 3b is a new EQ added by the ET.

[36] On the basis of inspection, 2b of the given EQs has been renumbered as 3c.

Evaluation Criteria	Key EQs	Respondent Level	Sub-EQs	OECD-DAC Criteria Addressed[33]
Component 2: Household Consumption	4.a. How successful has the Activity been in promoting increased household consumption of different meat products as well as promoting hygiene and food safety standards at the point of meat handling and processing?	LSPs, Livestock farmers, District & Upazila level nutrition committees, CNAs, Processors	1. How has household consumption of processed meat products changed downstream of increased production as a result of LPIN, year on year since 2015 (type and weight increase)?	R, I
	4.b. How successful has the Activity been in promoting increased household consumption of dairy products and increased sales of surplus milk in both formal and informal markets?		1. How has household consumption of processed milk products changed downstream of increased production as a result of LPIN, year on year since 2015 (type and weight increase)?	R, I
			2. Has any child been identified as undernourished (severe acute malnutrition/moderate acute malnutrition [SAM/MAM] cases) over the past three years at the household level?	I, E
			3. At what level has meat and milk consumption increased at the family level (volume/ weight per week)?	I, E
			4. What are the food safety challenges for meat and milk processing at the village level?	S
Component 3: SBCC	5.a. How successful has the Activity been in promoting nutrition messaging and generating nutrition awareness among the targeted beneficiaries? What have been the most effective means/approaches by the Activity to drive individual, household, and community consumption of nutritious and safe diets?	Livestock farmers, LSPs, MOFL Central & District, District & Upazila level nutrition committees, Religious leaders (Imams)	1. How successful has the Activity been in promoting nutrition messaging and generating nutrition awareness among the targeted beneficiaries?	R, I
			2. What are the key nutritional messages disseminated/promoted by the project to family and community, and how?	E, S, I
			3. Provide examples of barrier categories (social norms/gender) that are proving most resistant to change.	S, I
			4. What have been the *most* effective SBCC interventions by the Activity to drive individual, household, and community consumption of nutritious and safe diets?	I, S, E

Evaluation Criteria	Key EQs	Respondent Level	Sub-EQs	OECD-DAC Criteria Addressed[33]
			5. What have been the *least* effective SBCC interventions by the Activity to drive individual, household, and community consumption of nutritious and safe diets?	I, S, E
			6. What enablers/facilitators/champions have proven themselves valuable during LPIN (Community radio/radio clubs, Mullahs, traditional leaders, sports stars, media personalities, *etc.*) ?	S, I
			7. What are the significant behavioral changes which have occurred at family level over the past three years (*e.g.*, adopting/adapting practices, in hygiene and preservation)?	I, S
	5.b. How effective was the Activity in coordinating, collaborating and leveraging resources with other donor funded nutrition activities in implementing SBCC on nutrition in order to overcome the barriers to the adoption of nutrition-related behaviors?	LSPs, District & Upazila level nutrition committees, donor community	1. What has LPIN done in association with other donors/projects to inquire about barriers at household level to adopting beneficial nutritional BC, and how these barriers may be overcome?	S, I
			2. What synergy, if any, has there been with other donors in the drive to promote beneficial BC with regard to household nutrition?	I
Cross-Cutting Issues	6. How successful has the Activity been in leveraging private sector investment and developing **PPPs**? What have been some of the challenges in forming partnerships?	MOFL, Beneficiaries, including LSPs, farmers and other value chain actors, private entities (banks, micro-finance institutions, input companies, and beneficiaries who received loan/financial resources due to Activity facilitation)	1. What have been the challenges in promoting PPPs under LPIN?	S, R
			2. List the successes and failures.	S
			3. What are the common ingredients of success stories which can be scaled up to future PPPs?	S, R, I, E
			4. Is there a better alternative to PPPs in promoting nutritional interventions?	S, I
			5. Private sector investment is better assured when bankable profitable business cases can be made—was this done under LPIN?	I, S, E

Evaluation Criteria	Key EQs	Respondent Level	Sub-EQs	OECD-DAC Criteria Addressed[33]
	7. How effective was the Livestock and Nutrition Activity in integrating or incorporating **gender** in its interventions? How successful has it been in promoting women's leadership in new market opportunities?	MOFL (District & sub-District), Livestock farmers, LSPs, women AI technicians, women; District & Upazila level nutrition committees; entrepreneurs	1. How effective are LSPs at providing extension services to women farmers under LPIN?	S, E
			2. How effective has LPIN been at the household and market level in increasing women's role in family agribusiness decision-making?	S, I, E
			3. Was there a shift in household responsibility to women for livestock and related income generation under LPIN?	S, I, E
			4. Are there other impacts that women experienced from having increased income and/or consumption of more nutritious food as a result of adopting knowledge and skills from LPIN?	I, E, S

ANNEX 4: METHODOLOGY

EVALUATION TOOLS

The evaluation combined qualitative and quantitative data collection methodologies. The analytical approach comprised six phases, in accordance with the FPE timeline (Annex 4): (1) desk review, (2) in-briefing with USAID, (3) fieldwork/data collection, (4) presentation of preliminary evaluation findings to USAID, (5) data synthesis and analysis, and (6) report writing. The evaluation methodology addressed gender balance by ensuring more than 50 percent representation of women as respondents in the focus group discussions (FGDs) and surveys.[37]

Internal Activity-related documents were provided to ME&A by USAID in January and relayed to the Team Leader, who immediately started reviewing them. These documents were later passed to the two national consultants for their review once the candidates were approved by USAID. The Team Leader augmented this reading list with documents sourced from the Web, including the USAID/Bangladesh Country Development Cooperation Strategy (CDCS) together with general websites relevant to Bangladesh agriculture and livestock. The list of documents and websites reviewed is provided in Annex 5.

The Team Leader formulated a draft stakeholder analysis (Annex 6) based on the Activity documentation, including the list of key contacts supplied by USAID for the locations within the eight survey districts and 15 subsumed upazilas in the sampling frame selected by USAID (Annex 7). The key actors to be interviewed included LSPs, community agents (CAs), livestock farmers, and Government staff at central and decentralized levels.

The field inquiry methods included key informant interviews (KIIs), FGDs, and a general survey. The KII and FGD questions were guided by the given EQs and sub-questions devised by the ET, and research assistants took notes at both KIIs and FGDs. The response sheets were written up electronically the same day to avoid loss of detail from memory fade and unintended recall bias. The national specialists checked these sheets for inaccuracies and forwarded them to the Team Leader for him to check and lodge queries as necessary. The general survey was conducted by self-administered questionnaires given to members of each FGD group (which comprised five to six people of the same designation) just before each FGD.[38] The detailed blank data collection instruments are included in Annex 8.

Key Informant Interviews: The first of the 59 KIIs was with USAID. This KII was followed by interviews with GOB representatives—specifically, senior Department of Livestock Services (DLS) and Bangladesh Livestock Research Institute (BLRI) staff at central level—and with decentralized officials in upcountry districts who had partnered with the Activity, especially district and upazila livestock officers. The Team Leader conducted 11 remote interviews, including with ACDI/VOCA, the Borlaug Institute, four private sector entities[39] that have partnered with Activity implementation, three universities that have trained LSPs,[40] and mPower Social Enterprise Ltd. The distribution of KII duties across the ET is shown in Annex 9.

Focus Group Discussions: In each of the eight districts targeted, the ET conducted 38 FGDs with groups of LSPs, CAs, and livestock farmers. Each FGD had five to six respondents to enable triangulation of information on the Activity's impact in the community. The FGDs followed best-practice protocols using a standardized set of questions, constituting the FGD Guide. It was agreed with ACDI/VOCA that

[37]The percentage of females in KIIs was constrained by the contact list provided by USAID, which had only one female, that of a district livestock officer), among the 65 potential candidates.

[38] These cited methods of inquiry/data collection were augmented by direct observation.

[39] SME Corporation, BRAC Dairy and Food Project, BRAC AI Enterprise, ACI-Godrej.

[40] Veterinary faculties at Rajshahi, Patuakhali, and Chattogram.

its personnel would not attend the FGDs so that responses would not be influenced by the implementer's presence.

General Survey: The two national consultants on the ET arranged that all FGD participants complete a self-administered survey in Bangla. All questions had multiple precoded multiple-choice answer options to enable quick, easy data aggregation daily. The consultants handled local challenges that arose from respondents' limited literary/numerical capability. Although these survey data are not statistically significant, they help triangulate information gathered through other methods of inquiry and add more texture and reality to data analysis and usefulness. The distribution of survey respondents by district is shown in Annex 10.

SAMPLING AND FIELDWORK

Of the 31 *upazilas* targeted by the Activity, USAID selected 15 across eight districts as the sampling frame and provided a list of key stakeholders by name, designation, and contact number. ACDI/VOCA management facilitated arrangements for ET meetings with many of these 200+ stakeholders.

Following USAID's approval of the work plan on March 17, the two national team members and research assistants began their in-country assignments based on the Evaluation Design Matrix (by question) that the ET had formulated (Annex 11). The evaluation was conducted in Dhaka City and eight districts in Barisal, Khulna, and Chattogram Division (specifically in Cox's Bazar District), where the Livestock and Nutrition Activity has worked most intensively.

Starting on March 21, the national ET staff mobilized, separating into two sub-teams to cover the eight districts—Khulna, Satkhira, Jashore, Jhinaidah, Faridpur, Rajbari, Barisal, and Cox's Bazar—and 15 *upazilas* in the sampling area. The schedule was planned to last three weeks. The National Livestock Specialist and one research assistant collected data in Dhaka City and Khulna, Satkhira, Jashore, and Jhinaidah, while the national Nutrition Specialist and the second research assistant (together with the BMEL Monitoring and Evaluation [M&E] Specialist) collected data in Faridpur, Rajbari, Barisal, and Cox's Bazar.

The data collection tasks proceeded according to plan until April 4, when GOB announced a COVID-19-related lockdown, and the ET returned to Dhaka. The following week was spent rearranging the schedule, with ACDI/VOCA's help, to accommodate remote interviews. Resumption of interviews and surveys on April 12 proved challenging owing to poor mobile phone connectivity and the illiteracy of many in the farming community. The interviews were completed on April 19. Distribution of questionnaires according to gender and face-to-face/remote modality is shown in Annexes 12 and 13, respectively. The overall sample distribution by location and instrument category is shown below (Table 2).

Table 2. Final Evaluation Sample Distribution by Location and Category

Name of District	KII	FGD	GS	Total
Khulna	6	6	35	47
Satkhira	6	6	32	44
Jashore	6	7	34	47
Jhenaidah	3	3	16	22
Cox's Bazar	6	5	28	39
Barishal	6	4	22	33
Faridpur	6	4	21	31
Rajbari	3	3	15	22
Dhaka	13	0	0	12

Table 2. Final Evaluation Sample Distribution by Location and Category				
Other Districts[41]	3	0	0	3
All Districts	**58**	**38**	**203**	**299**

DATA ANALYSIS

The ET computed the survey data by May 11. The analyzed tabulated data are included in Annex 14, and a summary text of the results is discussed in Chapter 4. Starting on May 18 (following the recovery of the BMEL office statistician from COVID-19), the more complex quantitative data from the FGDs and KIIs were analyzed using SPSS Statistics software and represented in tables using descriptive statistics (frequencies and cross-tabulations) (Annexes 15 and 16, respectively). Coding and analysis of the qualitative data were conducted using content analysis to determine the presence of certain words, themes, or concepts in the KII and FGD transcripts to extract maximum value from the data. As part of this transcript content analysis, the text was coded into manageable code categories and sub-categories. Once coding was complete, the ET scrutinized the assembled data for trends and patterns and drew conclusions in response to the general EQs (and sub-questions). Fodder and mPower case studies are presented in Annexes 17 and 18, respectively, and Annex 19 summarizes the contributions of nine of the key Activity partners. Annex 20 is a repository of some Activity success stories.

METHODOLOGICAL LIMITATIONS

Just as the COVID-19 pandemic has this last year presented a serious challenge to the Activity's rollout, it presented a challenge to the Activity's FPE. Team Leader John Ashley could not travel to Bangladesh to participate in the evaluation. Instead, he participated remotely from his base in the UK, linking to his national ET colleagues in Bangladesh daily.

Related to this COVID-19-related restriction on movement of personnel, the two national consultants, Raihan Habib and Rehan Uddin Raju, found that their normal way of interaction with society was restricted too, especially by the lockdown announced by GOB on April 4. The two consultants and USAID showed flexibility in their approach to address such movement and interaction constraints.

Potential bias in answering within a KII or FGD setting due to social norms and gender considerations did not materialize.

Ascribing the findings solely to the Livestock and Nutrition Activity would be unwise. Other ongoing or recently finished programs on fodder and livestock production in the ZOI may have contributed, including the World Bank–supported Livestock and Dairy Development Project (LDDP) run by the Ministry of Agriculture (MoA), the National Agricultural Technology Project (NATP) also run by GOB, the Sustainable Environment Project (SEP) run by several local NGOs and financed by the Palli Karmo-Shahayak Foundation (PKSF), and the SAFAL program run by Solidaridad, Netherlands, all of which also employed LSPs or field staff with similar functions under different designations. The improvement in ZOI livestock productivity may thus be a cumulative effect of all programs in the area.

The lack of a control group of respondents, combined with the COVID-19-related restrictions, also make it difficult to ascribe the positive outcomes and impact described in Chapter 4 solely to the Livestock and Nutrition Activity, though the ET believes that a substantial amount can be so ascribed. Also, the respondent list provided by USAID for data collection through KIIs/FGDs/surveys did not include any general consumers (who were neither producers nor processors). Therefore, the Activity's true impact on the whole community was difficult to assess.

[41] University, Chittagong; University, Rajshahi; Borlaug Institute, USA.

ANNEX 5: EVALUATION TIMELINE AND FIELD PLAN (APRIL 26, 2021)

Task/Deliverable	Tentative Dates
Onboard the study team.	February 7, 2021
ME&A conducts kick-off meeting with TO for introductions, and to go over EQs, timeline, miscellaneous questions, expectations, request additional documents for the desk review, *etc.*	February 8/9, 2021
Desk review and evaluation Work Plan and tools (submitted to BMEL core team prior to departure to Bangladesh)	February 8–19, 2021
ME&A submits draft Work Plan & instruments to USAID.	February 19, 2021
ME&A submits the in-brief presentation to USAID BMEL COR.	February 22, 2021
In-briefing with USAID	March 1, 2021
Revise Work Plan and data collection instruments (with document review and planning meetings) based on USAID feedback.	March 6–11, 2021
Schedule fieldwork, organize fieldwork and logistics.	March 14–18, 2021
Fieldwork/data collection, KIIs, FGDs, and surveys in eight districts	March 20–April 13, 2021
Debriefing, code book development, transcription of field notes, preparation of out-brief presentation, *etc.*	April 18–24, 2021
ME&A submits draft out-brief presentation to USAID/BMEL COR.	May 1, 2021
Out-brief meeting with USAID (including presentation of preliminary findings and summary of fieldwork)	May 5, 2021
Conduct data analysis.	April 23–May 6, 2021
Write the draft (#1) evaluation report.	May 7–28, 2021
ME&A submits draft (#1) evaluation report to USAID.	June 5, 2021 (from USA)
USAID reviews and comments on draft (#1) evaluation report.	June 6–June 15, 2021
Revise draft (#1) evaluation report based on USAID comments/feedback, conduct ME&A quality control process.	June 15–19, 2021
ME&A submits final (draft #2) evaluation report to USAID.	June 19, 2021 (from USA)
Upon USAID clearance of final evaluation report, conduct 508-compliance review process and upload the report to the DEC (and share link with USAID).	TBD (dependent upon USAID approval)

ANNEX 6: LIST OF DOCUMENTS CONSULTED BY THE EVALUATION TEAM

Livestock and Nutrition Activity Agreements

USAID Bangladesh (2015). Cooperative Agreement No.AID-388-A-15-00005. 89 pp. June 3, 2015 (includes Attachment B – Program Description. 25 pp, which was replaced on Dec. 3, 2018 in its entirety, see below)

USAID Bangladesh (2018). Modification of Assistance, AID-388-A-15-00005, (updated) Attachment B (Program Description), December 3, 2018

ACDI-VOCA (2019). Proposed Cost Extension and Expansion of Activities of the Livestock Production for Improved Nutrition (LPIN) Project. Submitted to abakbar@usaid.gov on July 15, 2019. 5pp (modified and accepted by USAID, in the document below:)

USAID (2019). Expansion Intervention, Modification 13, AID-388-A-15-00005, 3 pp (pp. 4-6)

LPIN & BLRI (2016). MOU between LPIN and BLRI. Feb. 14, 2016. 13 pp.

LPIN & DLS (2017). MOU between LPIN and DLS. July 2017. 23 pp.

L & N Activity Annual & Quarterly Reports

ACDI-VOCA, L&N Activity, Annual Reports FY 2015-2020, submitted to USAID (Acrobat)

ACDI-VOCA, L&N Activity, Annual Report Performance Data Table, FY 2017-FY 2020 (XL)

ACDI-VOCA 1st – 3rd Quarterly Reports, L&N Activity, FY 2016-2020, submitted to USAID (Acrobat)

ACDI-VOCA Quarterly Rep, Performance Data Table, FY 2017 Q3 – FY 2020 Q3 (XL)

L & N Activity Mid-Term Performance Reports, ACDI-VOCA

Livestock & Nutrition Mid-Term Outcome Report. Nov. 2018. 22 pp.

COVID-19 Situational Analysis: Effect on household and market systems, 2020. 19 pp.

Gender impact assessment: a study of LPIN's effects on women's decision making, entrepreneurship and control of income. May 2020. 46 pp.

Nutrition impact assessment. May 2020. 12 pp.

Productivity and consumption assessment. July 2020. 11 pp.

L & N Activity Annual Work Plans (ACDI-VOCA)

Year 5 Work Plan, LPIN, Oct. 1, 2019-Sept. 30, 2020.50 pp.

Year 5 Work Plan, LPIN, Oct. 2019-Sept. 2020.XL Gantt chart.

Year 6 Work Plan, LPIN, Oct. 1, 2020-Jun. 14, 2021. 25pp

Year 6 Work Plan, LPIN, Oct. 2020-Jun. 2021.XL Gantt chart.

COVID-19 Work Plan LPIN (MS WORD), May 7, 2020. 12 pp.

Revised L & N Activity MEL Plan

ACDI-VOCA, Livestock & Nutrition Activity, Revised MEL Plan (June 2015-June 14, 2021), Version 5, updated July 2020, 180 pp.

Contacts list for Activity FPE field work (Excel Workbook) from USAID

ME&A documents

ME&A (2020). Tasking Request (Scope of Work).Tasking Request S025 – Livestock Production for Improved Nutrition USAID Bangladesh (2020).LPIN Activity – Final Performance Evaluation. October 5, 2020. 4 pp.

ME&A (2020). Brief Proposal Tasking Request S025: Final Performance Evaluation of Feed the Future Bangladesh Livestock Production for Improved Nutrition (Livestock and Nutrition) Activity. 13 pp.

LPIN-related food security/agriculture documents & websites

A. ACDI/VOCA, USAID, and IFPRI:

1. USAID (2020). Bangladesh Country Development Cooperation Strategy, Dec 2020-25. 39pp.https://www.usaid.gov/sites/default/files/documents/CDCS_Bangladesh-December-2025.pdf

2. IFPRI (2015). Agricultural value chains in the Feed the Future Zone of Influence in Bangladesh: baseline study. March 24, 2015. 39 pp. International Food Policy Research Institute (https://cg-281711fb-71ea-422c-b02c-ef79f539e9d2.s3.us-gov-west-1.amazonaws.com/uploads/2018/03/Bangladesh_Feed_the_Future_Baseline_Country_Report_English.pdf)

3. https://www.feedthefuture.gov/country/bangladesh/

4. USG Interagency and Feed The Future Initiative (2018). Country Plan Bangladesh. May 31, 2018. 24pp (https://cg-281711fb-71ea-422c-b02c-ef79f539e9d2.s3.us-gov-west-1.amazonaws.com/uploads/2018/11/Bangladesh_GFSS_Country_Plan_Public_CLEARED_7.11.18_508_Compliant.pdf)

5. USAID & IFPRI (2012). Bangladesh Feed The Future Zone of Influence Baseline Report, June 2012. 28 pp. Measuring FTF Indicators for Bangladesh: IFPRI Household Survey Results (https://cg-281711fb-71ea-422c-b02c-ef79f539e9d2.s3.us-gov-west-1.amazonaws.com/uploads/2018/03/Bangladesh_Feed_the_Future_Baseline_Country_Report_English.pdf)

6. https://www.usaid.gov/bangladesh/agriculture-and-food-security

7. https://www.acdivoca.org/projects/livestock-production-for-improved-nutrition/

8. https://www.acdivoca.org/2020/08/livestock-service-providers-break-gender-biases-in-bangladesh/

9. https://www.acdivoca.org/2020/02/what-does-it-take-to-improve-nutrition-a-livestock-programs-experience-with-social-and-behavior-change-in-bangladesh/

10. https://www.acdivoca.org/2020/06/open-for-business/

11. ACDI/VOCA (2017). Barrier analysis.FTF Bangladesh LPIN project.USAID. Apr. 2017. 55 pp.

12. ACDI/VOCA (2015). Baseline Report.FTF Bangladesh LPIN project.USAID. Oct. 2015. 78 pp.

13. IFPRI (2013). The status of food security in the FTF Zone and other regions of Bangladesh. Results from the 2011–2012 Bangladesh Integrated Household Survey.USAID. Apr. 2013. 255 pp.

14. ACDI/VOCA and USAID (2018). LPIN Mid-term Outcome Report. Nov. 2018. 22 pp. and data collection tools for FGD (Bangla), KII (LSP, CAs & milk collectors) and Household questionnaire

B. Other:

1. https://www.worldbank.org/en/results/2016/10/07/bangladesh-growing-economy-through-advances-in-agriculture

2. https://www.nationsencyclopedia.com/economies/Asia-and-the-Pacific/Bangladesh-AGRICULTURE.html

3. https://databd.co/stories/an-overview-of-agriculture-in-bangladesh-4185 (2019) http://www.fao.org/asiapacific/perspectives/agricultural-statistics/global-strategy/results-in-the-region/bangladesh/en/

4. http://www.fao.org/asiapacific/perspectives/globally-important-agricultural-heritage-systems/en/

5. Country profile Bangladesh. New Agriculturist (http://www.new-ag.info/en/country/profile.php?a=1834)

6. Yosef, S. et al (2015). Agriculture and Nutrition in Bangladesh: mapping evidence to pathways. Food and Nutrition Bullet 36(4), 387–404. https://journals.sagepub.com/doi/pdf/10.1177/03795721156091 95

7. Floating farms in Bangladesh (https://www.youtube.com/watch?v=c5MKISoubOY)

8. The floating farms of Bangladesh (https://www.youtube.com/watch?v=CONfhrASy44)

ANNEX 7: STAKEHOLDER ANALYSIS

Name of Stakeholder	Role in the Livestock and Nutrition Activity
End Beneficiaries	
Rural farmers and small and medium-sized agribusiness entrepreneurs	Participants and end beneficiaries of the Activity
Implementing Partners	
ACDI/VOCA	Main LPIN implementing partner
BRAC	Conducted baseline study in 2015, *etc*., and training venues (partnership terminated due to poor performance in 2016 – see pp. 2 & 22 Annual Progress Report [APR], 2017)
Borlaug Institute of Texas A&M University	Assisting with fodder lines breeding and selection, and training
Government of Bangladesh (GOB) and other partners	
With respect to LIVESTOCK	
Dept. of Livestock Services (DLS), Ministry of Fisheries & Livestock (MOFL)	*e.g.*, Dairy & Meat Revolution Project, DLS
Bangladesh Livestock Research Institute (BLRI) of MOFL	*e.g.*, Fodder & Forage Research Project, BLRI
District and Upazila Livestock Officers	Adapt and share extension training and materials; identifying land for fodder production through Upazila Committees; deliver CAHW training to LSPs; co-organize Upazila livestock fairs.
FAO-ECTAD (Emergency Center for Transboundary Animal Diseases)	Institutional capacity building support to DLS; shared training and extension materials for CAHWs; support community livestock fairs and model Veterinary clinics
With respect to NUTRITION	
Directorate General of Health Services, Ministry of Health & Family Welfare (MOHFW)	Developing/approving milk/meat food safety SBCC messaging for mass media campaigns
Directorate General of Family Planning, Health Education and Family Welfare Division, MOHFW	Coordination and support
Revitalization of Community Health Care Initiatives in Bangladesh (RCHCIB) Project (Community-Based Health Care [CBHC], Japan International Cooperation Agency [JICA]-assisted)	Coordination and collaboration, nutritional services support to family and community
Bangladesh National Nutrition Council (BNNC)	Coordination and strategic guidance in nutrition promotion
Ministry of Women & Children Affairs	Promote consistent milk/meat nutrition messages, coordinate communication efforts around national events. (*e.g.*, training p. 10, APR 2016)
Institute of Public Health Nutrition (IPHN) – National Nutrition Service (Ministry of Food)	Promote consistent milk/meat nutrition messages using mass media; develop food safety milk/meat SBCC messaging (*e.g.*, training p. 10, APR 2016)
Ministry of Food & Disaster Management (MOFDM)	Developing/approving milk/meat food safety SBCC messaging

Name of Stakeholder	Role in the Livestock and Nutrition Activity
Bangladesh Small & Cottage Industries Corporation (BSCIC)(GOB)	Training (*e.g.*, p. 10, APR 2016)
Dhaka City Corp, Food Hygiene & Sanitary Dept	Training (*e.g.*, p. 10, APR 2016)
International Organizations/Entities with which LPIN collaborates	
USAID/U.S. Government (USG) partners with respect to LIVESTOCK	
Agricultural Extension Support Activity (AESA)	Sharing livestock production training and extension for LSPs, facilitating market and service linkages, joint M&E, *etc.*
Bangladesh Dairy Enhancement Project (BDEP)	United States Department of Agriculture (USDA)-supported initiative, sharing as AESA above
Cereal Systems Initiative for South Asia (CSISA)	Implemented by International Maize and Wheat Improvement Center (CIMMYT), IFPRI, and International Rice Research Institute (IRRI), operating in Rural Innovation Hubs in Bangladesh and other countries in the region; assists LPIN by identifying and testing saline-tolerant forage lines, and promoting rice-based cropping systems
Program for Strengthening Household Access to Resources (PROSHAR)	A USAID-funded program implemented by ACDI/VOCA; LPIN uses its CAHW training for its LSPs, shares beef production training and extension materials (and facilitating market and service linkages, joint M&E)
USAID/USG partners with respect to NUTRITION	
Integrated Agriculture Health-Based Initiative for Improved Food and Nutrition Security (IAHBI)	In selected districts of southern Bangladesh. A USAID-FAO-United Nations International Children's Emergency Fund (UNICEF) joint action aiming to accelerate and improve nutritional outcomes for women and children in 26 sub-districts of Bangladesh. LPIN benefits through joint training for VHWs, SBCC via LSPs and joint M&E
Rice & Diversified Crop Activity (RDC)	Market facilitation
SHIKHA	Infant and young child feeding project, Bangladesh; LPIN benefits through joint training for VHWs on increased meat/milk consumption, improving SBCC messages and joint M&E
Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) project, in Bangladesh (2012–2017), USAID	Project worked in 40 Upazilas (sub-districts) in the USAID FTF ZOI of Barisal and Khulna divisions. It aimed to improve the nutritional status of pregnant and lactating women and children under 2 years of age; LPIN benefits from joint nutrition training for VHWs on milk/meat utilization, developing/delivering food safety SBCCs and joint M&E (*e.g.*, p. 12 2016 APR).
PROSHAR	PROSHAR (as for Livestock above); LPIN benefits from developing/delivering food safety SBCCs and joint M&E.
Others:	
Partner NGOs such as Society Development Committee	Community-level facilitation

Name of Stakeholder	Role in the Livestock and Nutrition Activity
District &Upazila level nutrition committees	Information flow, networking, and coordination
Several public universities	Training by: Bangladesh Agricultural University; Chattogram Veterinary & Animal Science University; Vet & Animal Science Dept., Rajshahi University (p. 12 APR 2018) training; Barishal Veterinary College; Model Veterinary hospitals
Local Division & District community leaders	Champions for community adoption of livestock production and nutrition improvements
Donor partners	
USAID	LPIN Donor
USDA	Financier of Bangladesh Dairy Enhancement Project
Civil Society Organizations (CSOs)[42]	
CARE	CAHW cadre development
Bangladesh Livestock Coordination Group (p. 8, 2016 APR)	Capacity building of Master Trainers
Social enterprises	
mPower Social Enterprise (information and communication technology [ICT]-based)	Formulating training modules
Digital Green (ICT-based)	Formulating training modules
KrishiUtsho Social Enterprise (an offshoot of CARE Bangladesh)	Formulating training modules
Agriculture Input Retailers' Network (AIRN) (Social Enterprise) (emerged from USAID FTF agro-input project implemented by Cultivating New Frontiers in Agriculture (CNFA)	Formulating gender-sensitive training modules[43]
Private Sector/LSPs[44]	
BRAC (Dairy & Food Project)	Commercial dairy sector
Milk Vita output company	Commercial dairy sector
PRAN Dairy	Commercial dairy sector
Akij Food & Beverage Ltd.	Milk and milk-based product processor
Jayhun Dairy	Commercial dairy sector
Prantojon Agro Enterprises Ltd.	NGO agro-food value chain facilitator
PCF Feed Industries	Processed food manufacturer
ACI-GODREJ Agrovet Private Ltd.	Agro-Veterinary supplies marketing—cattle, poultry, fish feed (Joint venture company with ACI Agro Ltd.) marketing company)
Victor Feeds Ltd.	Feed supply, Livestock sector
Novartis Bangladesh	Veterinary drugs
MEGA International Trading Group	Trader in nutritional supplements for livestock *inter alia*
KRISHIBID Feed Ltd	Livestock feed production company

[42]Considered part of LSPs.

[43]The CEO of AIRN has expressed gender-sensitive insights into the barriers faced by women as LSPs of agricultural inputs, which have relevance to livestock feed. (Stern, M. et al, DO 2 Gender Analysis, Feed the Future Bangladesh, pp. 18-19. 43pp [https://pdf.usaid.gov/pdf_docs/PA00THDW.pdf])

[44]Including managers, technicians, milk collectors, *etc.*

Name of Stakeholder	Role in the Livestock and Nutrition Activity
NOURISH Bangladesh	Livestock feed manufacturer
American Dairy Ltd.	AI Services, Livestock sector
Lalteer Livestock Ltd.	AI Services, Livestock sector
BRAC-AI	AI Services, Livestock sector
Consulting companies	
Nielsen (Bangladesh) company conducted the gender study, strategy and action plan in 2016	Value chain and business development
Consiglieri Pvt. Ltd. conducted cattle feed value chain analysis, report in January 2017	Cattle feed
Pathway Consulting conducted the Baseline Study for ACDI/VOCA in 2015 at the start of the LPIN Project (ACDI/VOCA, 2015. Baseline Report for FTF Bangladesh LPIN Project, Dhaka. 78 pp. Oct. 2015)	Baseline study providing indicators against which Activity's achievements may be measured

ANNEX 8: DATA COLLECTION COVERAGE AREAS

District	Upazila
1. Jashore	Jashore Sadar, Jhikargacha
2. Jhenaidah	Kaligonj
3. Satkhira	Satkhira Sadar, Kolaroa
4. Khulna	Dumuria, Batiaghata
5. Barishal	Barishal Sadar, Agailjhara, Ujirpur
6. Cox's Bazar	Cox's Bazar Sadar, Chakaria
7. Faridpur	Faridpur Sadar, Sadarpur
8. Rajbari	Goalanda

ANNEX 9: DATA COLLECTION INSTRUMENTS

KEY INFORMANT INTERVIEW GUIDE

Introduction (KII)

FINAL PERFORMANCE EVALUATION FOR

USAID'S FEED THE FUTURE BANGLADESH LIVESTOCK PRODUCTION FOR IMPROVED NUTRITION (LIVESTOCK and NUTRITION) ACTIVITY

KII Guideline Target group: Secondary Stakeholders with focus on GOB (DLS, BLRI), Private and Donor Community Stakeholders				
Date:	Start Time:		End Time:	
Location:	Upazila:		District	
Respondent's category:	1. GOB 2. Researcher 3. Producer 4. Marketer 5. Educationist 6. Trainer 7. DLS 8. BLRI	Sex: 1. Male 2. Female 3. Third Gender	Age:	Education:
Respondent's Name:				
Affiliation and Position:				
Organization				
Interviewed by:				
Note taker:				
Facilitator:				

Informed consent KII

Thank you for making the time to talk with us today. My name is _____ and my colleague's name is _____. We work for ME&A and are conducting an evaluation of the USAID-funded "Feed the Future Bangladesh Livestock Production for Improved Nutrition Activity (Livestock and Nutrition)" project Activity implemented by ACDI/VOCA. This Activity has been going on in southern Bangladesh for the last six years, although it is soon to close. USAID has asked my organization (ME&A) to request your opinion on it. You and/or your organization have been recommended to us as one of the key stakeholders able to provide expert insights on this topic. Your participation in this interview is voluntary. I would like to ask you some questions to have some information from you regarding the livestock services-related Activity. Your views will inform our recommendations about future USAID programming in Bangladesh. We encourage you to be as candid as possible. There are no right or wrong answers to the questions. Whatever you say will be helpful to us. Would you kindly agree to participate in this interview? It will take about one hour.

Confidentiality

Before we begin, I want to let you know that any information or examples we gather during this interview will not be attributed to you personally. Your privacy will be protected; we will not include your name or any information that would make it possible for anyone to identify you when they read our report. We also ask that what we discuss today remains with us alone, and you do not share with others when we have gone.

My colleague and I will take notes to make sure we do not miss any important points you make. This tape recorder will make sure I do not miss what you tell me (**Show the recorder to the respondent**). Your information and opinion is very important to us.

Right to ask questions and report concerns

You have the right to ask questions about this evaluation and to have those questions answered by us before, during or after the interview. Do you have any questions for me at this time?

If you have any questions about the evaluation at a later stage feel free to send an e-mail to the Bangladesh Monitoring, Evaluation, and Learning Activity Chief of Party, John Roscoe, at: jroscoe@engl.com

Consent

You are free to not respond to any of our questions or to stop the interview at any time.

Do you agree to participate in this interview today? Yes No

[IF THE RESPONDENT SAYS "YES," BEGIN INTERVIEW. IF HE/SHE SAYS "NO," END INTERVIEW]

Questions		Responses	Remarks
Component 1: Attachment			
EQ1. How did the LPIN Activity involve you, and to what extent was the capacity of LPIN increased to promote livestock production and hygiene/nutrition awareness and practice in the community?			
As you know, the LPIN Activity builds on a long history of support from USAID to establish food and nutritional security for the population living in the southern coastal regions of Bangladesh, and to make public services more accessible to this particular community. The Activity has three main objectives: **Objective 1**: Increased livestock productivity through increased access to better livestock management techniques and primary animal health care services. **Objective 2**: Improved access of rural households to hygienic, diverse, and quality food to enhance nutrition and health status, especially of women and children. **Objective 3**: Improved nutrition-related behaviors of rural households.			
1.1	When you think about the activities of the LPIN, to what extent did its activities raise awareness about the nutritional requirement for livestock and modern farm practices?		
1.2	Can you tell me about your first time engagement with the LPIN Activity?		

	Questions	Responses	Remarks
1.3	What is your role in the LPIN Activity?	1. Volunteer 2. Project staff 3. DLS staff 4. BLRI staff 5. Marketer/Processor 6. Supplier 7. Consumer 8. Distributor 9. Entrepreneur 10. Trainer 11. Researcher	
1.4	What is the type of organization/work that you do?	1. GOB 2. DLS 3. BLRI 4. Research 5. Education institution 6. Production factory 7. Marketing agency 8. Trainer for livestock farmer 9. Trainers for fodder producer 10. Trainers for milk/meat processor 11. Trainer for livestock health 12. Trainer for hygiene/nutrition 13. Trainer for business linkage 14. LSPs/ entrepreneurs 15. Others (please specify) _____	
1.5	What type of training have you provided to the LPIN Activity?	1. Livestock farming 2. Fodder cultivation & preservation 3. Milk/meat processing 4. Livestock health services 5. Community hygiene/nutrition 6. Business linkage 7. Others (please specify) _____	
1.6	How many training you have provided? (Number of trainings)		

Questions		Responses	Remarks
1.7	What type of training you have provided?	1. Training for livestock farmer 2. Training for fodder producer 3. Training for milk/meat processor 4. Training in livestock health 5. Training in hygiene/nutrition 6. Training in business linkage 7. Others (please specify) _____	
1.8	To what extent have you supported capacity building within the Activity?	1. No extent at all 2. Some extent 3. Moderate extent 4. Great extent	
1.9	To what extent are you confident to continue your activities after the Activity ends?	1. Not confident at all 2. Somewhat confident 3. Fairly confident 4. Extremely confident	
Productivity			
EQ1.a. To what extent has the LPIN Activity increased livestock fodder production and processing (in hectares and volume), and utilization by livestock farmers (in number of farmers and season of the year)?			
1a.1	How has the LPIN Activity enabled you to improve farmers' fodder supply and profitability (supply of planting material, training, delivery of feed to farmgate, marketing their fodder production, number of farmers contacted/ participating in production)?	District MOFL (District & Upazila Livestock Officers)	S, I, E
1a.2	Describe any training that you provided to farmers.	District MOFL (District & Upazila Livestock Officers)	E, I
1a.3	What type of fodder planting material has been most in demand? Why (palatability, yield response of the ruminants, fodder growth rate)?	District MOFL (District & Upazila Livestock Officers)	S, I
1a.4	What has been the percentage increase in hectarage of fodder grown (in this District), year by year since 2015?	District MOFL (District & Upazila Livestock Officers)	S, I
1a.5	What has been the percentage increase in tonnage of tradeable fodder (in this District), year by year since 2015?	District MOFL (District & Upazila Livestock Officers)	S, I

Questions		Responses	Remarks
1a.6	Has an upper limit in area and tradeable tonnage now been reached in the some/all of the eight Districts?	District MOFL (District & Upazila Livestock Officers)	S, I
1a.1	How has the LPIN Activity enabled you to help farmers increase their fodder supply and processed meat/milk products?	Training institutions	R, E
1a.2	Describe the training courses you have given under LPIN, and how many farmers trained per year?	Training institutions	E
1a.3	What was the result of training in terms of adoption of new fodder types (increased hectarage, ruminant productivity increase)?	Training institutions	S, I, E
1a.4	What was the result of training in terms of increase in volume/value of meat/milk processed products?	Training institutions	S, I, E
EQ1.b. What has been the Activity's success in building the capacity of the DLS and BLRI in the areas of research, production, and distribution of improved fodder materials?			
1b.1	How has the LPIN Activity enabled you to help farmers with their fodder supply?	MOFL Central – DLS & BLRI	S, R, E
1b.2	How have you benefited institutionally in terms of capacity building under the LPIN Activity (research, production and distribution)?	MOFL Central – DLS & BLRI	S, R, I
1b.3	How have you benefited under the LPIN Activity from training by the Borlaug Institute?	MOFL Central – DLS & BLRI	R, I
EQ2.a. How successful has the Activity been in building the capacity of LSPs to act as trainers for livestock farmers and other livestock value chain actors?			
2a.1	How has the LPIN Activity benefited you in terms of capacity building (training, networking, outreach)?	District MOFL (District & Upazila Livestock Officers), Private sector	S, I, E
2a.2	Describe the TOT uplift you have received.	District MOFL (District & Upazila Livestock Officers), Private sector	I
2a.3	How many farmers and fodder value chain trainees have you logged?	District MOFL (District &Upazila Livestock Officers), Private sector	I

	Questions	Responses	Remarks
2a.4	What has been the result/outcome in terms of amount of fodder produced and related increase in ruminant productivity (number of fodder producers, ruminant milk and carcass yield, profitability of enterprise, proportion of farmers venturing into secondary production of yoghurt, cheese, sweetmeat, *etc.*)?	District MOFL (District & Upazila Livestock Officers), Private sector	E, I
`EQ3a. How successful has this (fodder) Activity been in increasing the productivity of local and cross breeds of cattle in terms of milk yield per cow for dairy cows, and days to achieve market weight and increase in market weights for beef cattle?			
3a.1	How has increased access to fodder affected your farming enterprise profitability?	GOB – DLS & BLRI; livestock farmers; entrepreneurs/private sector	S, R, I, E
3a.2	Is it more profitable to provide fodder to local cattle or to cross-bred cattle?	GOB – DLS & BLRI; livestock farmers; entrepreneurs/private sector	R, I, E
3a.3	Please express benefits in terms of increased milk yield/day; improved quality of milk; reduced time for beef cattle to reach maturity; better fertility (calves per year per cow); better tolerance to disease.	GOB – DLS & BLRI livestock farmers; entrepreneurs/private sector	S, I, E
3a.4	Have you ever tried MNBs as a dietary supplement for your ruminants, with or without more fodder? Discuss.	GOB – DLS & BLRI; livestock farmers; entrepreneurs/private sector	S, R, I, E
EQ3b. How successful has the Activity been in increasing secondary production of value-added meat and dairy products?			
3b.1	What has been the uptake of the initiative to increase secondary processing/production of meat products (weight and value increase per year)?	GOB – DLS & BLRI; LSPs/entrepreneurs/private sector	R, I, E
3b.2	What has been the uptake of the initiative to increase secondary processing/production of milk products (weight and value increase per year)?	GOB – DLS & BLRI; LSPs/entrepreneurs/private sector	R, I, E
EQ3c. What have been the major constraints and opportunities with respect to developing and establishing the LSP business model? Based on the Activity's performance, how sustainable will this model be beyond the life of the Activity?			
3c.1	Is credit readily available to individual farmers or groups in relation to increasing fodder production and developing the meat and dairy value chains?	DLS; MOFL District and sub-District level; LSPs	S, E

	Questions	Responses	Remarks
3c.2	Is land availability or accessibility for smallholders the apex constraint on increasing fodder acreage?	DLS; MOFL District and sub-District level; LSPs	R
3c.3	Is profitability an issue (high production/ transportation costs or ability of buyers to purchase fodder)?	DLS; MOFL District and sub-District level; LSPs	S
3c.4	What are the constraints and opportunities for increased production and marketing of processed meat products?	DLS; MOFL District and sub-District level; LSPs	S
3c.5	What are the constraints and opportunities for increased production and marketing of processed milk products?	DLS; MOFL District and sub-District level; LSPs	S
3c.6	Is the LPIN business model sustainable post-Activity? If not, why?	DLS; MOFL District and sub-District level; LSPs	S, R, I, E
COMPONENT 2: HOUSEHOLD CONSUMPTION			
EQ4.a. How successful has the Activity been in promoting increased household consumption of different meat products as well as promoting hygiene and food safety standards at the point of meat handling and processing?			
4a.1	How has household consumption of processed meat products changed downstream of increased production as a result of LPIN, year on year since 2015 (type and weight increase)?	Livestock farmers, CNAs, LSPs, District &Upazila level nutrition committees	R, I
EQ4.b. How successful has the Activity been in promoting increased household consumption of dairy products and increased sales of surplus milk in both formal and informal markets?			
4b.1	How has household consumption of processed milk products changed downstream of increased production as a result of LPIN, year on year since 2015 (type and weight increase)?	Livestock farmers, CNAs, LSPs, District & Upazila level nutrition committees	R, I
4b.2	Has any child been identified as undernourished (SAM/MAM cases) over the past three years at the household level?	Livestock farmers, CNAs, LSPs	I, E
4b.3	At what level has meat and milk consumption increased at the family level (volume/weight per week)?	Livestock farmers, CNAs, LSPs, District & Upazila level nutrition committees	I, E
4b.4	What are the food safety challenges for meat and milk processing at the village level?	Livestock farmers, CNAs, LSPs, District & Upazila level nutrition committees	S
COMPONENT 3: BEHAVIORAL CHANGE			

Questions		Responses	Remarks
EQ5.a. How successful has the Activity been in promoting nutrition messaging and generating nutrition awareness among the targeted beneficiaries? What have been the most effective means/approaches by the Activity to drive individual, household, and community consumption of nutritious and safe diets?			
5a.1	How successful has the Activity been in promoting nutrition messaging and generating nutrition awareness among the targeted beneficiaries?	GOB – DLS, BLRI; livestock farmers; LSPs District & Upazila level nutrition committees	R, I
5a.2	What are the key nutritional messages disseminated/promoted by the Activity to family and community, and how?	GOB – DLS, BLRI; livestock farmers; LSPs, District & Upazila level nutrition committees	E, S, I
5a.3	Provide examples of barrier categories (social norms/gender) that are proving most resistant to change.	GOB – DLS, BLRI; livestock farmers; LSPs, District & Upazila level nutrition committees	S, I
5a.4	What have been the *most* effective SBCC interventions by the Activity to drive individual, household, and community consumption of nutritious and safe diets?	GOB – DLS, BLRI; livestock farmers; LSPs, District & Upazila level nutrition committees	I, S, E
5a.5	What have been the *least* effective SBCC interventions by the Activity to drive individual, household, and community consumption of nutritious and safe diets?	GOB – DLS, BLRI; livestock farmers; LSPs, District & Upazila level nutrition committees	I, S, E
5a.6	What enablers/facilitators/champions have proven themselves valuable during LPIN (community radio/radio clubs, Mullahs, traditional leaders, sports stars, media personalities, *etc.*)?	GOB – DLS, BLRI; livestock farmers; LSPs, District & Upazila level nutrition committees	S, I
5a.7	What are the significant behavioral changes which have occurred at family level over the past three years (e.g., adopting/adapting practices, in hygiene and preservation)?	GOB – DLS, BLRI; livestock farmers; LSPs, District & Upazila level nutrition committees	I, S
EQ5b. How effective was the Activity in coordinating, collaborating, and leveraging resources with other donor-funded nutrition activities in implementing SBCC on nutrition in order to overcome the barriers to the adoption of nutrition-related behaviors?			
5b.1	What has LPIN done in association with other donors/projects to inquire about barriers at household level to adopting beneficial nutritional BC, and how these barriers may be overcome?	GOB (IPHN), donor community	S, I

Questions		Responses	Remarks
5b.2	What synergy, if any, has there been with other donors in the drive to promote beneficial BC with regard to household nutrition?	GOB (IPHN), donor community	I
Component 4: Cross-Cutting Issues			
EQ6. How successful has the Activity been in leveraging private sector investment and developing PPPs? What have been some of the challenges in forming partnerships?			
6.1	What have been the challenges in promoting PPPs under LPIN Activity?	MOFL (District level); LSPs	S, R
6.2	List the successes and failures.	MOFL (District level); LSPs	S
6.3	What are the common ingredients of success stories which can be upscaled to future PPPs?	MOFL (District level); LSPs	S, R, I, E
6.4	Is there a better alternative to PPPs in promoting nutritional interventions?	MOFL (District level); LSPs	S, I
6.5	Private sector investment is better assured when bankable profitable business cases can be made—was this done under LPIN?	MOFL (District level); LSPs	I, S, E
EQ7. How effective was the Livestock and Nutrition Activity in integrating or incorporating gender in its interventions? How successful has it been in promoting women's leadership in new market opportunities?			
7.1	How effective are LSPs at providing extension services to women farmers under LPIN?	MOFL (District & sub-District level), Livestock farmers	S, E
7.2	How effective has LPIN been at household and market level in increasing women's role in family agribusiness decision-making?	MOFL (District & sub-District level), Livestock farmers	S, I, E
7.3	Was there a shift in household responsibility for livestock and related income generation under LPIN?	MOFL (District & sub-District level), Livestock farmers	S, I, E
7.4	Are there other impacts that women experienced from having increased income and/or consumption of more nutritious food as a result of adopting knowledge and skills from LPIN?	MOFL (District & sub-District level), Livestock farmers	I, E, S
R = Relevance; E = Effectiveness; S = Sustainability; I = Impact			

Signature of Facilitator _____ Date: _____

Signature of Record Keeper _____ Date: _____

--End--

INTRODUCTION (FGD)

FINAL PERFORMANCE EVALUATION FOR

USAID'S FEED THE FUTURE BANGLADESH LIVESTOCK PRODUCTION FOR IMPROVED NUTRITION (LIVESTOCK and NUTRITION) ACTIVITY

FOCUS GROUP DISCUSSION GUIDE

FGD Guideline Target group: Primary Stakeholders (livestock farmers) and Secondary Stakeholders with focus on Local Service Providers (LSPs), Community Agents (CAs)				
Date:	Start Time:		End Time:	
Location:	Upazila:		District:	
Respondent's category:	1. LSP 2. CA 3. Farmer	1. Male 2. Female	Age:	Education:
Number of Respondents:				
Respondent's Name:				
Affiliation and Position:				
Interviewed by:				
Note taker:				
Facilitator:				

Informed Consent FGD

Thank you for making the time to talk with us today. My name is _____ and my colleague's name is _____. We work for ME&A and are conducting an evaluation of the USAID funded "Feed the Future Bangladesh Livestock Production for Improved Nutrition Activity (Livestock and Nutrition)" project Activity implemented by ACDI/VOCA. This Activity has been going on in southern Bangladesh for the last six years, although it is soon to close. USAID has asked my organization (ME&A) to request your opinion on it. You have been recommended to us as one of the key stakeholders able to provide expert insights on this topic. Your participation in this interview is voluntary. I would like to ask you some questions to know some information from you regarding the livestock services-related Activity. Your views will inform our recommendations about future USAID programming in Bangladesh. We encourage you to be as candid as possible. There are no right or wrong answers to the questions. Whatever you say will be helpful to us. Would you kindly agree to participate in this discussion? It will take about an hour, and I hope you will enjoy it.

Confidentiality

Before we begin, I want to let you know that any information or examples we gather during this discussion will not be attributed to you personally. Your privacy will be protected; we will not include your name or any information that would make it possible to identify you in the report. We also ask that what we discuss today remains here with us.

My colleague and I will take notes to make sure we do not miss any important points you make! This tape recorder will make sure I do not miss what you tell me (**Show the recorder to the respondent**). Your information and opinion is very important to us.

Right to Ask Questions and Report Concerns

You have the right to ask questions about this evaluation and to have those questions answered by us before, during or after the interview. Do you have any questions for me at this time?

If you have any questions about the evaluation at a later stage feel free to send an e-mail to the Bangladesh Monitoring, Evaluation and Learning Activity Chief of Party, John Roscoe, at: jroscoe@engl.com

Consent

You are free to not respond to any of our questions or to stop the interview at any time.

Do you agree to participate in this discussion today? Yes No

[IF THE RESPONDENT SAYS "YES," BEGIN THE DISCUSSION. IF HE/SHE SAYS "NO," END IT]

SUMMARY PROMPT SHEET FOR FARMER FGDs (relating to Annex 4)

-	-	-
Question No	**Fodder**	**Short Answer**
A1	Was fodder amount a constraint on your ruminant livestock before LPIN?	
A2	If yes, how did LPIN help you?	
A3	Was government or an LSP involved?	
A4	Did you grow more, buy more, or collect from wild?	
A5	What was the benefit to your farm of more fodder?	
A6	Do you have a preferred type of fodder?	
A7	Is it for local or improved breeds?	
A8	Will you continue using more fodder post-Activity?	
A9	Have you received better attention from LSPs under LPIN?	
A10	Have you ever tried giving MNBs to your ruminants?	
	Milk & Meat, Primary and Secondary Products	
B1	Have more of these been produced under LPIN?	
B2	Which and why?	
B3	Are these consumed in the households producing them and/or sold?	
B4	For processors: What type of trainings and technical knowledge did you receive on processing supported by the Activity?	
B5	How have you applied this knowledge?	
B6	Did it impact your business/income?	
	Household Consumption	
C1	Has your household's consumption of milk and meat (or their secondary products) increased under LPIN?	
C2	Is this increased consumption because of the extra fodder availability?	
C3	Has this improved your family's health (especially women and children?	
	Behavioral Change	
D1	What were the reasons that caused you to change your diet?	
D2	How did you hear the dietary messages?	

-	-	-
D3	Do you believe in those messages?	
D4	Did you receive messages on food safety or hygiene?	
D5	Will your family continue with the better diet and hygiene post-Activity?	
D6	Could there be reasons for you not continuing?	
	Gender Equity	
E1	Under LPIN, do LSPs approach women as well as men in the village?	
E2	Have more women become livestock business managers under LPIN, selling whole animals, meat, milk, processed products, and fodder?	
E3	Are women more active in the livestock market because of LPIN?	
E4	Are there other benefits that LPIN has brought to women in addition to better diets and more farm income which they control?	
	General	
F1	Did LPIN help your livelihoods and health?	
	Your Comments and Questions About LPIN	
G	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	

Signature of Facilitator _____ Date: _____

Signature of Record Keeper _____ Date: _____

--End--

General Survey Questionnaire

Date:	Place	Upazila	District	
Name of Participant (optional)		Sex	Age	
Participants category	1. LSP 2. CA 3. Farmer			
Signature				

Q. No	Questions	Responses	Remarks
1. Productivity/Attachment with Project/Intervention			
a.	Do you consent willingly to participate in the survey?	Yes No	
b.	What is your involvement/role with Livestock and Nutrition Activity?	Volunteer Regular staff CA LSP Producer Marketer Supplier Consumer Distributor Promoter Entrepreneur Community group member	
c.	At what level are you satisfied with the support you received from the LPIN Activity?	Not satisfied at all Somewhat satisfied Fairly satisfied Extremely satisfied	
d.	To what extent has your livestock productivity increased with support from the Activity intervention?	No extent at all Some extent Moderate extent Great extent	
2. Capacity Building			
a.	To what extent has the LPIN Activity supported you in building your capacity?	No extent at all Some extent Moderate extent Great extent	
b.	To what extent are you satisfied with the training you received from the Activity?	Not satisfied at all Somewhat satisfied Fairly satisfied Extremely satisfied	
c.	To what extent did the training build your capacity?	No extent at all Some extent Moderate extent Great extent	
d.	To what extent do you feel confident to carry out your activities after the Activity closes?	Not confident at all Somewhat confident Fairly confident Very confident	

Q. No	Questions	Responses	Remarks
3. Livestock Productivity			
a.	To what extent do you think that the productivity of livestock increased over the past five years?	No extent at all Some extent Moderate extent Great extent	
b.	To what extent are you satisfied with the support from LPIN Activity for increasing livestock productivity?	Not satisfied at all Somewhat satisfied Fairly satisfied Extremely satisfied	
c.	Are you satisfied with improved access to market for your livestock products over the past five years?	Not satisfied at all Somewhat satisfied Fairly satisfied Extremely satisfied	
d.	Are you satisfied with the increase in fodder production and supply for the livestock over the past five years?	Not satisfied at all Somewhat satisfied Fairly satisfied Extremely satisfied	
e.	To what extent do you think the LPIN Activity has increased livestock fodder production and processing?	No extent at all Some extent Moderate extent Great extent	
f.	To what extent do you think has the LPIN Activity increased livestock fodder utilization by livestock farmers?	No extent at all Some extent Moderate extent Great extent	
g.	How successful do you think the LPIN Activity has been in building your capacity to train livestock farmers and other livestock value chain actors?	Not successful at all Somewhat successful Fairly successful Extremely successful	
h.	Based on the Activity's performance, how sustainable do you think the LSP business model will be beyond the life of the Activity?	Not sustainable at all Somewhat sustainable Fairly sustainable Extremely sustainable	
i.	How successful do you think this Activity has been in increasing the productivity of local and cross breeds of cattle in terms of milk yield per cow for dairy cows, and days to achieve market weight and increase in market weights for beef cattle?	Not successful at all Somewhat successful Fairly successful Extremely successful	
4. Nutrition Information			
a.	Do you know about "nutrition"?	Yes No Don't know	
b.	Do you understand the importance of good nutrition for our health, especially for children and women?	Yes No Don't know	

Q. No	Questions	Responses	Remarks
c.	Has any malnourished child under 5 been found in your community during the past five years?	Yes No Don't know	
d.	Has there been any SAM case in your community during the past five years?	Yes No Don't know	
e.	Did you find the Activity's nutrition messages useful?	Not useful at all Somewhat useful Fairly useful Extremely useful	
f.	Did you receive any information education communication (IEC) materials from the LPIN Activity?	Yes No Don't know	
g.	Did you find those IEC materials useful?	Not useful at all Somewhat useful Fairly useful Extremely useful	
5. Behavioral Changes in Terms of Food and Personal Hygiene			
a.	Do you know the benefits of hand washing?	Yes No Don't know	
b.	Do you and your family members practice proper hand washing?	Yes No Don't know	
c.	To what extent have food habits changed/improved in your family over the past five years?	No extent at all Some extent Moderate extent Great extent	
d.	To what extent has meat and milk consumption increased in your family over the past five years?	No extent at all Some extent Moderate extent Great extent	
6. Gender			
a.	Did you find the LPIN Activity promoted gender sensitivity in the community?	Yes No Don't know	
b.	To what extent have women participated in LPIN activities?	No extent at all Some extent Moderate extent Great extent	
c.	To what extent were women involved in decision-making at home and for livestock business-related activities?	No extent at all Some extent Moderate extent Great extent	
7. Sustainability			
a.	According to your understanding, to what extent has the LPIN Activity made positive changes to your community?	No extent at all Some extent Moderate extent Great extent	

Q. No	Questions	Responses	Remarks
b.	To what extent will those changes remain after the end of the Activity?	No extent at all Some extent Moderate extent Great extent	
c.	At what extent has the Activity established linkage between your community and GOB departments?	No extent at all Some extent Moderate extent Great extent	
d.	To what extent has the Activity established partnerships with other stakeholders like private sector, marketers, donor agencies, *etc.*?	No extent at all Some extent Moderate extent Great extent	
e.	To what extent do you think this partnership will continue after the Activity ends?	No extent at all Some extent Moderate extent Great extent	
Thank you for your participation in this survey!			

ANNEX 10: LIST OF KII PARTICIPANTS INTERVIEWED BY THE ET

No.	Name	Position	Organization
Donor/Development Organizations			
JA/ RUR/ RH	Mohammad Nuruzzaman Farzana Yasmeen	AOR, L & N Activity MEL Chief	Economic Growth Office, USAID, Dhaka
ACDI/VOCA (Lead Implementing Partner)			
JA/ RUR/ RH	Nurul Siddiquee Md. Kamruzzaman Iqbal Ahmed, Mohammad Abdusalam, Salim	COP Deputy CoP& Head of Nutrition Head of M&E Livestock lead Private sector lead	ACDI/ VOCA, Livestock & Nutrition Activity, Lead implementer
Co-Implementing Partner			
JA	Dr. Steve Whisenant Dr. Maad Rawendoozi	Fodder & Management Specialists	Borlaug Inst of Agric Res, Texas A & M University, USA
Government of Bangladesh/Research Organizations			
RUR			
1	Dr. Ashim Baran Sen	ULO, Jhilongza, Cox's BazarSadar	ULO office (besides District Livestock Office), Jhilongza, Cox's Bazar DLS
2	Dr. Supan Nandi	ULO,Chakaria,Cox's Bazar	ULO Office, Chakaria, Cox's Bazar, DLS
3	Md. Nurul Islam Talukder	ULO, Goalando	ULO office, Goalando, Department of Livestock Services(DLS)
4	Dr. Nurullah Md. Ahsan	Ditrict Livestock Officer (DLO), Faridpur	Department of Livestock Services(DLS), Faridpur
5	Dr. Prodip Kumar Biswas	ULO, BarishalSadar	Department of Livestock Services(DLS), Barishal
6	Dr. Ashutosh Roy	Upzilla Livestock Officer (ULO), Agailjhara	Department of Livestock Services(DLS)
7	Dr. S.M. Mannan	Veterinary doctor and ULO, In Charge, FaridpurSadar	Department of Livestock Services (DLS), Faridpur
RH			
8	Dr. Mohammad Shahidul Islam	DLO, Satkhira District	Department of Livestock Services (DLS)
9	Dr. Joydev Kumar Singh	ULO, SatkhiraSadar	DLS
10	Dr. Tapaneswar Roy	ULO, Jhikargacha, Jashore District	DLS
11	Dr. Shaffiul Alam	ULO, JashoreSadar, Jashore District	DLS
12	Dr. ASM Atiquzzaman	ULO, Kaligonj, Jhenaidah District	DLS
13	Dr. Bankim Kumar Halder	ULO, Batiaghata, Khulna District	DLS

No.	Name	Position	Organization
14	Dr. Mahmuda Sultana	ULO, Dumuria, Khulna District	DLS
15	ABM Khaleduzzaman	Assistant Director (Farm), DLS Head Office	DLS
16	Dr. Bhabotosh Kanti Sarker	Deputy Director AI and Fodder (ex-DLO DR), DLS Head Office	DLS
17	Dr. Nathu Ram Sarker	Ex-Director General	Bangladesh Livestock Research Institute (BLRI)
Religious Leaders			
RUR			
1	Md.Abdus Salam	Imam (Religious Leader)	Khorulia Ghatpara Jame Mosjid, Khorulia, Cox's Bazar Sadar
2	Moulana Mohammad Shohidul Islam	Imam (Religious Leader), Center Director, Islamic Foundation	Daulatdia Railway Jame Mosque, Shadad Memberpara, Daulatdia
3	Maulana Mizanur Rahman	Religious Leader, Principal, Educationist	Islamia Madrasha, Ratanpur, Agoiljhara
RH			
4	Moula. Abdul Monayem	Imam	Ashannagar Jame mosque, Ashannagar, Jalalabad, Kolaroa, Satkhira
5	Md. Sirajul Islam	Imam	Mazerpara Jame Mosjid, Khamamundiya, Raygram, Kaligonj, Jhenaidah
6	Md. Shahidul Islam	Imam	Tipna Pochimpara Jame Masjid, Dumuria, Khulna
Private Sector			
RUR			
1	Manik Ghosh	Owner, dairy processor (SME)	ManikMishtannoBhandar, Gosh Potti,Pourosova, Goalando
2	Md. Nurul Islam	Cattle Trader	Tangamari, Hatkrishnopur, SadarpurUpazila, Faridpur
3	Khondokar Hamidul Islam	Director Operations, SDC office, Sadarpur	Society Development Committee (SDC), Microfinance institute, SDC office, SadarpurUpazila, Faridpur
4	Md. Selim Reza	Professional Service Manager (PSM),large Animal Health Company	Reneta, Faridpur
5	Tauhedul Islam Shahazada	SME Dairy Processor and Marketer, Owner, Prantojon	Rajumiar Pool, Battala, Barishal
6	Md. Faisal Ahmed Barkat	Dairy processor, Owner, Variety Shop	Amtala, Barisal Sadar, Barishal
7	Mir Kashem Ali	SME Dairy Processor, Owner, Nirapod Pranijat Ponno Corner	Nirapod Pranijat Ponno Karner, Basudebpur, Pourosova, Faridpur Sadar

No.	Name	Position	Organization
8	Furkanul Islam	Sr. Program Officer, ACI Godrej (Pvt.) Limited	ACI Godrej (Pvt.) Limited, Chakaria, Cox's Bazar
9	Md. Kafil Uddin	Producer and Marketer, Dairy product	Chokoria, Cox's Bazar
10	Md. Riaz Uddin	Milk Processor and Marketer	Cox's Bazar Sadar
11	Liton Pandey	**Dairy Processor**, Shaymol Sondha Mistanno Vander	Shaymol Sondha Mistanno Vander, SME. Baropaika, Agoiljhara
JA			
12	Mr. Hridoy Islam	Project-in-Charge	SME Corporation
13	Dr. Md Harun-Or-Rashid	Deputy General Manager, Milk Collection & Production Services	BRAC Dairy and Food Project
14	Dr. Md. Matiur Rahman	Manager, Livestock Services & Training	BRAC Artificial Insemination Enterprise
15	Dr. Debashis Paul	Head of Sales and Marketing	ACI-Godrej
16	Shah Md. Mushfiqur Rahman	Director of e-Agriculture	mPower Social Enterprise
RH			
17	Md. Shariful Gazi	SME dairy processor	Abir Mistanno Vhander, Bhantra, Bazar, Bhantra, Jalalabad, Kolaroa, Satkhira
18	Md. Kamrul Hasan	SME dairy processor	Jayhoun Dairy Shop, Labonir more, Satkhira
19	Sree Sumon Kumar Ghush	SME dairy processor	Barbakpur New Ghosh Dairy, Milk processor, Godkhali, jhikargacha, Jashore
20	Riaz Mehmud Khan (Pavel)	SME dairy processor	Jashore Dairy, Chuadanga bus stand, Jashore
21	Md. Robiul Islam,	Regional Manager, large dairy processor	Brac Dairy & Food Project, Jhikargacha,Jashore
22	Md. Mosleh Uddin,	Chief Operating Officer,l arge dairy processor	Akij Foods and Beverage, Dhaka
23	Md. Morad Ali	Large dairy processor	Akij Foods and Beverage, Dumuria, Khulna
24	Md. Sahin Mahmud	Field representative/ trainer, ICT company	mPower, Dumuria, Khulna
25	Md. Mahadi Faisal	Head of Business,Private retail company	Shwapno, ACI, Dhaka
26	Dr. Iftekhar Masud Prodhan	Project Manager, Private animal health service provider	Community Based Dairy Veterinary Foundation (CDVF), Sadar, Satkhira
27	Taimur Hossain	Private financial service provider	SME Corporation, Pallbari more, Sadar, Jashore
28	Md. Showkot Ali	Private financial service provider	SME Corporation, Barobazar, Kaligonj, Jhenaidah
29	Md. Mofizur Rahman	Private financial service provider	SME Corporation, Batiaghata, Khulna
Universities			

No.	Name	Position	Organization
JA			
1	Professor Md. Fakruzzaman	Professor, Faculty of Animal Science & Veterinary Medicine	Patuakhali S & T University, Barishal
2	Professor Md. Jalal Uddin Sarder	Professor, Department of Veterinary & Animal Sciences	University of Rajshahi
3	Dr Md. Inkeyas Uddin	Senior Scientific Officer, Poultry Research and Training Center – PRTC	Chattagram Veterinary and Animal Sciences University (CVASU), Chittagong
JA= Dr. John Ashley RH = Dr. Raihan Habib RUR = Rehan Uddin Raju			

ANNEX 11: CATEGORY OF DATA COLLECTION TOOLS AND NUMBER OF RESPONDENTS AND LOCATIONS[45]

Study Method	Tools	Respondent Categories	Number of Respondents Per Location	Locations	Total Number of Respondents/ Participants
KII[46]	• Guided by a structured question format, though not all questions on it were asked of any given individual • Each KII took 40-60 minutes. • Audio and notes were taken.	USAID, Government high officials/directors, public institutions, three national universities, private sector companies (e.g., Akij, Swapno, PRAN, Aciagro), mPower social enterprise	13 1 1 1	Dhaka Chattogram Patuakhali Rajshahi	16
		Government officials; District and Upazila Livestock Officers, small and medium-sized enterprises (SMEs), BRAC, Akij, ACI, private partner, Dairy firm, Feed company, Religious leaders, Beef cattle tradersetc	6 6 6 6 3 6 3 6	Barisal Cox's Bazar Faridpur Jashore Jhinaidah Khulna Rajbari Satkhira	42
KII Total					**58**
FGD	• Guided by a semi-structured question guide • Each FGD took around 40-60 minutes. • Each FGD group comprised 5-6 participants. • Audio and notes were taken.	Community Agents (CAs)	6 5 6 11 4 11 4 11	Barisal Cox's Bazar Faridpur Jashore Jhinaidah Khulna Rajbari Satkhira	58
		LSPs	5 12 8 10 6 12 6 11	Barisal Cox's Bazar Faridpur Jashore Jhinidah Khulna Rajbari Satkhira	70

[45]This Table is informed by the contact list provided by USAID Bangladesh.

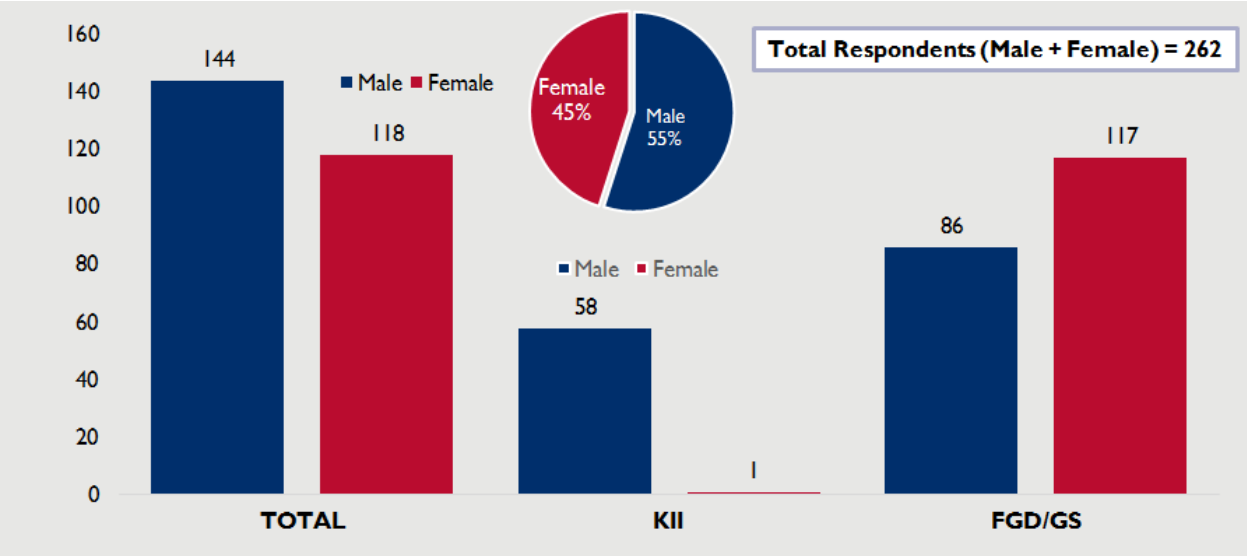
[46] The great majority of KIIs were conducted by the ET national staff, face to face, during the first 2 weeks of the field phase (though by phone remotely during Week 3 of the field phase). KIIs with eleven entities, including USAID and ACDI/VOCA, were conducted remotely by the Team Leader, all being stakeholders who have a good command of English.

Study Method	Tools	Respondent Categories	Number of Respondents Per Location	Locations	Total Number of Respondents/ Participants
		Livestock Farmers	11 11 6 13 6 12 6 10	Barisal Cox's Bazar Faridpur Jashore Jhinaidah Khulna Rajbari, Satkhira	75
FGD Total					**203**
Mini Survey	Structured questionnaire, with multiple-choice questions (self-administered on paper) Each survey took about 30 minutes	CAs	6 5 6 11 4 11 4 11	Barisal Cox's Bazar Faridpur Jashore Jhinaidah Khulna Rajbari Satkhira	58
		LSPs	5 12 8 10 6 12 6 11	Barisal Cox's Bazar Faridpur Jashore Jhinidah Khulna Rajbari Satkhira	70
		Livestock Farmers	11 11 6 13 6 12 6 10	Barisal Cox's Bazar Faridpur Jashore Jhinaidah Khulna Rajbari Satkhira	75
Mini Survey Total					**203**

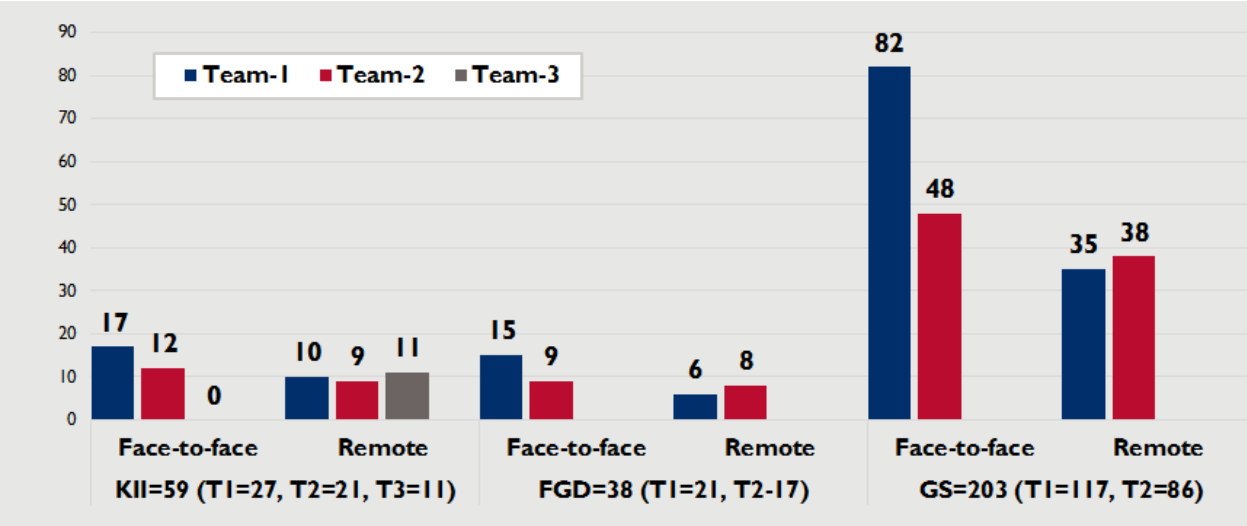
ANNEX 12: EVALUATION DESIGN MATRIX BY QUESTION

Evaluation Question	Desk Review	KII	FGD	Survey
Productivity				
1a (fodder production)	+	+	+	+
1b (capacity building DLS & BLRI)	+	+	-	-
2a (LSPs as ToT)	-	+	+	+
3a (local or cross-breed cattle)	+	+	+	+
3b (meat & milk processing)	+	+	+	-
3c (LSP model sustainability)	+	+	-	-
Household Consumption				
4a (meat & hygiene/safety)	+	+	+	+
4b (dairy consumption and sale)	+	+	+	+
Behavioral Change				
5a (BCC success)	+	+	+	+
5b (other donors)	+	+	-	-
Cross-cutting Issues				
6 (PPP)	+	+	-	-
7 (gender)	+	+	+	+

ANNEX 13: DISTRIBUTION OF STAKEHOLDER RESPONDENTS BY GENDER



ANNEX 14: DISTRIBUTION OF KII, FGD, AND SURVEY SESSIONS BY MODALITY (FACE TO FACE OR REMOTE)



ANNEX 15: GENERAL SURVEY FINDINGS

Table-1.1: Distribution survey participants' sex by participant category								
Sex	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Male	52	74.3	17	29.3	17	22.7	86	42.4
Female	18	25.7	41	70.7	58	77.3	117	57.6
Total	**70**	**100.0**	**58**	**100.0**	**75**	**100.0**	**203**	**100.0**
Level of significance: χ^2=0.000; df=2; p=0.000								

Table-2.1: Distribution survey participants' age in years by participant category								
Age in years	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
<18 years	0	0.0	0	0.0	0	0.0	0	0.0
18-22	0	0.0	8	13.8	2	2.7	10	4.9
23-27	5	7.1	17	29.3	8	10.7	30	14.8
28-32	21	30.0	12	20.7	23	30.7	56	27.6
33-37	11	15.7	8	13.8	21	28.0	40	19.7
38-42	11	15.7	11	19.0	7	9.3	29	14.3
43-47	7	10.0	1	1.7	5	6.7	13	6.4
48-52	9	12.9	1	1.7	5	6.7	15	7.4
53-57	2	2.9	0	0.0	2	2.7	4	2.0
58-62	3	4.3	0	0.0	1	1.3	4	2.0
63-67	0	0.0	0	0.0	0	0.0	0	0.0
68 and Above	1	1.4	0	0.0	1	1.3	2	1.0
Total	**70**	**100.0**	**58**	**100.0**	**75**	**100.0**	**203**	**100.0**
Mean (SD)	***38.56 (10.17)***		***30.43 (7.15)***		***35.52 (9.19)***		***35.11 (9.55)***	
Mode	***28***		***25***		***35***		***35***	

Table-3.1: Distribution survey participants' educational status by participant category								
Educational status	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No formal education	1	1.6	0	0.0	1	1.5	2	1.1
Up to 5 class	2	3.1	0	0.0	6	9.2	8	4.4
6- 9 class	4	6.3	4	7.5	16	24.6	24	13.2

S.S.C	20	31.3	12	22.6	32	49.2	64	35.2
H.S.C	21	32.8	21	39.6	7	10.8	49	26.9
Graduate	12	18.8	11	20.8	3	4.6	26	14.3
Post-Graduate	4	6.3	5	9.4	0	0.0	9	4.9
Total	**64**	**100.0**	**53**	**100.0**	**65**	**100.0**	**182**	**100.0**

Table-1.c.1: Distribution survey participants' satisfaction level on support received from LPIN project by participant category

Level of satisfaction	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Not satisfied at all	1	1.4	0	0.0	0	0.0	1	0.5
Somewhat satisfied	1	1.4	0	0.0	2	2.7	3	1.5
Medium satisfied	27	38.6	28	48.3	37	50.0	92	45.5
Fully satisfied	41	58.6	30	51.7	35	47.3	106	52.5
Total	**70**	**100.0**	**58**	**100.0**	**74**	**100.0**	**202**	**100.0**

Table-1.d.1: Distribution livestock productivity increase level due to LPIN project intervention by participant category

Level of increase	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No extent at all	1	1.4	0	0.0	1	1.3	2	1.0
Some extent	6	8.7	1	1.8	9	12.0	16	8.0
Moderate extent	37	53.6	28	49.1	32	42.7	97	48.3
Great extent	25	36.2	28	49.1	33	44.0	86	42.8
Total	**69**	**100.0**	**57**	**100.0**	**75**	**100.0**	**201**	**100.0**

Table-2.a.1: Distribution capacity increase level due to LPIN project intervention by participant category

Level of increase	**LSP**	**CA**	**Farmer**	**All**

	Number	Percent	Number	Percent	Number	Percent	Number	Percent
No extent at all	0	0.0	0	0.0	0	0.0	0	0.0
Some extent	4	5.7	1	1.7	9	12.0	14	6.9
Moderate extent	31	44.3	28	48.3	31	41.3	90	44.3
Great extent	35	50.0	29	50.0	35	46.7	99	48.8
Total	**70**	**100.0**	**58**	**100.0**	**75**	**100.0**	**203**	**100.0**

Table-2.b.1: To what extent are you satisfied with the training you received from the project?								
Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Not satisfied at all	0	0.0	0	0.0	0	0.0	0	0.0
Somewhat satisfied	2	2.9	0	0.0	1	1.3	3	1.5
Fairly satisfied	17	24.3	15	25.9	26	34.7	58	28.6
Extremely satisfied	51	72.9	43	74.1	48	64.0	142	70.0
Total	**70**	**100.0**	**58**	**100.0**	**75**	**100.0**	**203**	**100.0**

Table-2.c.1: To what extent did the training build your capacity?								
Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No extent at all	1	1.4	0	0.0	0	0.0	1	0.5
Some extent	4	5.8	3	5.2	10	13.3	17	8.4
Moderate extent	29	42.0	27	46.6	34	45.3	90	44.6
Great extent	35	50.7	28	48.3	31	41.3	94	46.5
Total	**69**	**100.0**	**58**	**100.0**	**75**	**100.0**	**202**	**100.0**

Table-2.d.1: To what extent do you feel confident to carry out your activities after the project closes								
Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**

Not confident at all	1	1.4	1	1.7	0	0.0	2	1.0
Somewhat confident	1	1.4	3	5.2	4	5.3	8	3.9
Fairly confident	20	28.6	22	37.9	24	32.0	66	32.5
Very confident	48	68.6	32	55.2	47	62.7	127	62.6
Total	**70**	**100.0**	**58**	**100.0**	**75**	**100.0**	**203**	**100.0**

Table-3.a.1: To what extent do you think that the productivity of livestock increased over the past five years?

Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No extent at all	1	1.4	0	0.0	0	0.0	1	0.5
Some extent	15	21.7	9	15.5	14	19.7	38	19.2
Moderate extent	27	39.1	24	41.4	29	40.8	80	40.4
Great extent	26	37.7	25	43.1	28	39.4	79	39.9
Total	**69**	**100.0**	**58**	**100.0**	**71**	**100.0**	**198**	**100.0**

Table-3.b.1: To what extent are you satisfied with the support from LPIN Activity for increasing livestock productivity?

Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Not satisfied at all	0	0.0	0	0.0	0	0.0	0	0.0
Somewhat satisfied	2	3.0	0	0.0	7	9.3	9	4.5
Fairly satisfied	19	28.8	20	34.5	18	24.0	57	28.6
Extremely satisfied	45	68.2	38	65.5	50	66.7	133	66.8
Total	**66**	**100.0**	**58**	**100.0**	**75**	**100.0**	**199**	**100.0**

Table-3.c.1: Are you satisfied with improved access to market for your livestock products over the past five years?

Response	**LSP**	**CA**	**Farmer**	**All**

	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Not satisfied at all	0	0.0	0	0.0	0	0.0	0	0.0
Somewhat satisfied	4	6.2	4	6.9	7	9.3	15	7.6
Fairly satisfied	31	47.7	25	43.1	43	57.3	99	50.0
Extremely satisfied	30	46.2	29	50.0	25	33.3	84	42.4
Total	**65**	**100.0**	**58**	**100.0**	**75**	**100.0**	**198**	**100.0**

Table-3.d.1: Are you satisfied with the increase in fodder production and supply for the livestock over the past five years?

Response	LSP		CA		Farmer		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Not satisfied at all	0	0.0	0	0.0	0	0.0	0	0.0
Somewhat satisfied	10	14.5	6	10.3	10	13.3	26	12.9
Fairly satisfied	17	24.6	11	19.0	16	21.3	44	21.8
Extremely satisfied	42	60.9	41	70.7	49	65.3	132	65.3
Total	**69**	**100.0**	**58**	**100.0**	**75**	**100.0**	**202**	**100.0**

Table-3.e.1: To what extent do you think the LPIN Activity has increased livestock fodder production and processing)?

Response	LSP		CA		Farmer		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
No extent at all	0	0.0	0	0.0	1	1.4	1	0.5
Some extent	6	8.7	4	6.9	2	2.8	12	6.0
Moderate extent	33	47.8	27	46.6	35	48.6	95	47.7
Great extent	30	43.5	27	46.6	34	47.2	91	45.7
Total	**69**	**100.0**	**58**	**100.0**	**72**	**100.0**	**199**	**100.0**

Table-3.f.1: To what extent do you think has the LPIN Activity increased livestock fodder utilization by livestock farmers?								
Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No extent at all	0	0.0	0	0.0	1	1.4	1	0.5
Some extent	4	5.7	2	3.4	3	4.1	9	4.5
Moderate extent	32	45.7	26	44.8	31	41.9	89	44.1
Great extent	34	48.6	30	51.7	39	52.7	103	51.0
Total	**70**	**100.0**	**58**	**100.0**	**74**	**100.0**	**202**	**100.0**

Table-3.g.1: How successful do you think the LPIN Activity has been in building your capacity to train livestock farmers and other livestock value chain actors?								
Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Not successful at all	1	1.5	0	0.0	1	1.8	2	1.1
Somewhat successful	6	9.0	4	6.9	7	12.5	17	9.4
Fairly successful	33	49.3	31	53.4	35	62.5	99	54.7
Extremely successful	27	40.3	23	39.7	13	23.2	63	34.8
Total	**67**	**100.0**	**58**	**100.0**	**56**	**100.0**	**181**	**100.0**

Table-3.h.1: Based on the Activity's performance, how sustainable do you think the LSP business model will be beyond the life of the Activity?								
Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Not sustainable at all	1	1.5	0	0.0	0	0.0	1	0.5
Somewhat sustainable	8	11.9	6	10.5	7	10.9	21	11.2
Fairly sustainable	18	26.9	16	28.1	10	15.6	44	23.4
Extremely sustainable	40	59.7	35	61.4	47	73.4	122	64.9

Total	**67**	**100.0**	**57**	**100.0**	**64**	**100.0**	**188**	**100.0**

Table-3.i.1: How successful do you think this Activity has been in increasing the productivity of local and cross breeds of cattle in terms of milk yield per cow for dairy cows, and days to achieve market weight and increase in market weights for beef cattle?

Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Not successful at all	4	5.7	1	1.7	1	1.4	6	3.0
Somewhat successful	2	2.9	0	0.0	5	7.1	7	3.5
Fairly successful	35	50.0	25	43.1	34	48.6	94	47.5
Extremely successful	29	41.4	32	55.2	30	42.9	91	46.0
Total	**70**	**100.0**	**58**	**100.0**	**70**	**100.0**	**198**	**100.0**

Table-4.a.1: Do you know about "nutrition"?

Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Yes	64	91.4	55	94.8	68	90.7	187	92.1
No	2	2.9	0	0.0	1	1.3	3	1.5
Don't know	4	5.7	3	5.2	6	8.0	13	6.4
Total	**70**	**100**	**58**	**100**	**75**	**100**	**203**	**100**

Table-4.b.1: Do you understand the importance of good nutrition for our health, especially for children and women?

Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Yes	67	95.7	58	100.0	72	100.0	197	98.5
No	3	4.3	0	0.0	0	0.0	3	1.5
Don't know	0	0.0	0	0.0	0	0.0	0	0.0
Total	**70**	**100**	**58**	**100**	**72**	**100**	**200**	**100**

Table-4.c.1: Is there any malnourished child under 5 found in your community during the past five years?

Response	**LSP**	**CA**	**Farmer**	**All**

	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Yes	14	20.0	15	25.9	13	17.3	42	20.7
No	50	71.4	37	63.8	55	73.3	142	70.0
Don't know	6	8.6	6	10.3	7	9.3	19	9.4
Total	**70**	**100**	**58**	**100**	**75**	**100**	**203**	**100**

Table-4.d.1: Is there any SAM case in your community during the past five years?

Response	LSP		CA		Farmer		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Yes	2	2.9	9	15.5	2	2.7	13	6.5
No	54	78.3	39	67.2	56	75.7	149	74.1
Don't know	13	18.8	10	17.2	16	21.6	39	19.4
Total	**69**	**100**	**58**	**100**	**74**	**100**	**201**	**100**

Table-4.e.1: Did you find the project's nutrition messages useful?

Response	LSP		CA		Farmer		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Not useful at all	7	10.1	4	6.9	6	8.1	17	8.5
Somewhat useful	6	8.7	4	6.9	6	8.1	16	8.0
Fairly useful	11	15.9	10	17.2	20	27.0	41	20.4
Extremely useful	45	65.2	40	69.0	42	56.8	127	63.2
Total	**69**	**100.0**	**58**	**100.0**	**74**	**100.0**	**201**	**100.0**

Table-4.f.1: Did you receive any information education communication (IEC) materials from the LPIN project?

Response	LSP		CA		Farmer		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Yes	51	76.1	35	60.3	40	58.0	126	64.9
No	10	14.9	17	29.3	18	26.1	45	23.2
Don't know	6	9.0	6	10.3	11	15.9	23	11.9
Total	**67**	**100**	**58**	**100**	**69**	**100**	**194**	**100**

Table-4.g.1: Did you find those IEC materials useful?

Response	LSP		CA		Farmer		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Not useful at all	7	10.1	4	7.0	5	8.2	16	8.6
Somewhat useful	13	18.8	10	17.5	19	31.1	42	22.5
Fairly useful	13	18.8	14	24.6	15	24.6	42	22.5
Extremely useful	36	52.2	29	50.9	22	36.1	87	46.5
Total	**69**	**100.0**	**57**	**100.0**	**61**	**100.0**	**187**	**100.0**

Table-5.a.1: Do you know the benefits of hand washing?

Response	LSP		CA		Farmer		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Yes	68	97.1	58	100.0	71	95.9	197	97.5
No	2	2.9	0	0.0	1	1.4	3	1.5
Don't know	0	0.0	0	0.0	2	2.7	2	1.0
Total	**70**	**100**	**58**	**100**	**74**	**100**	**202**	**100**

Table-5.b.1: Do you and your family members practice proper hand washing?

Response	LSP		CA		Farmer		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Yes	66	94.3	56	96.6	68	91.9	190	94.1
No	2	2.9	0	0.0	3	4.1	5	2.5
Don't know	2	2.9	2	3.4	3	4.1	7	3.5
Total	**70**	**100**	**58**	**100**	**74**	**100**	**202**	**100**

Table-5.c.1: To what extent have food habits changed/improved in your family over the past five years?

Response	LSP		CA		Farmer		All	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
No extent at al	0	0.0	0	0.0	0	0.0	0	0.0
Some extent	9	12.9	3	5.2	11	14.9	23	11.4
Moderate extent	27	38.6	19	32.8	32	43.2	78	38.6

Great extent	34	48.6	36	62.1	31	41.9	101	50.0
Total	**70**	**100.0**	**58**	**100.0**	**74**	**100.0**	**202**	**100.0**

Table-5.d.1: To what extent has meat and milk consumption increased in your family over the past five years?

Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No extent at al	1	1.4	1	1.7	0	0.0	2	1.0
Some extent	8	11.4	3	5.2	5	6.8	16	8.0
Moderate extent	19	27.1	16	27.6	27	37.0	62	30.8
Great extent	42	60.0	38	65.5	41	56.2	121	60.2
Total	**70**	**100.0**	**58**	**100.0**	**73**	**100.0**	**201**	**100.0**

Table-6.a.1: Did you find the LPIN project promoted gender sensitivity in the community?

Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Yes	45	65.2	45	77.6	47	66.2	137	69.2
No	11	15.9	6	10.3	5	7.0	22	11.1
Don't know	13	18.8	7	12.1	19	26.8	39	19.7
Total	**69**	**100**	**58**	**100**	**71**	**100**	**198**	**100**

Table-6.b.1: To what extent have women participated in project activities?

Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No extent at al	1	1.4	0	0.0	2	2.8	3	1.5
Some extent	5	7.1	2	3.4	4	5.6	11	5.5
Moderate extent	21	30.0	25	43.1	31	43.7	77	38.7
Great extent	43	61.4	31	53.4	34	47.9	108	54.3
Total	**70**	**100.0**	**58**	**100.0**	**71**	**100.0**	**199**	**100.0**

Table-6.c.1: To what extent were women involved in decision-making at home and for livestock business-related activities?								
Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No extent at al	0	0.0	0	0.0	0	0.0	0	0.0
Some extent	6	8.6	1	1.7	9	12.2	16	7.9
Moderate extent	31	44.3	32	55.2	41	55.4	104	51.5
Great extent	33	47.1	25	43.1	24	32.4	82	40.6
Total	**70**	**100.0**	**58**	**100.0**	**74**	**100.0**	**202**	**100.0**

Table-7.a.1: According to your understanding, to what extent has the LPIN project made positive changes to your community?								
Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No extent at al	0	0.0	0	0.0	0	0.0	0	0.0
Some extent	4	5.7	1	1.7	1	1.4	6	3.0
Moderate extent	37	52.9	37	63.8	42	60.9	116	58.9
Great extent	29	41.4	20	34.5	26	37.7	75	38.1
Total	**70**	**100.0**	**58**	**100.0**	**69**	**100.0**	**197**	**100.0**

Table-7.b.1: To what extent will those changes remain after the end of the project?								
Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No extent at al	1	1.4	0	0.0	0	0.0	1	0.5
Some extent	8	11.4	7	12.1	2	2.9	17	8.6
Moderate extent	25	35.7	18	31.0	27	39.1	70	35.5
Great extent	36	51.4	33	56.9	40	58.0	109	55.3
Total	**70**	**100.0**	**58**	**100.0**	**69**	**100.0**	**197**	**100.0**

Table-7.c.1: At what extent has the project established linkage between your community and GOB departments?								
Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No extent at al	2	2.9	1	1.7	0	0.0	3	1.6
Some extent	9	13.0	6	10.3	8	13.6	23	12.4
Moderate extent	32	46.4	30	51.7	30	50.8	92	49.5
Great extent	26	37.7	21	36.2	21	35.6	68	36.6
Total	**69**	**100.0**	**58**	**100.0**	**59**	**100.0**	**186**	**100.0**

Table-7.d.1: To what extent has the project established partnerships with other stakeholders like private sector, marketers, donor agencies, etc.?								
Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No extent at al	8	11.9	1	1.7	2	3.4	11	6.0
Some extent	9	13.4	5	8.6	4	6.8	18	9.8
Moderate extent	38	56.7	33	56.9	30	50.8	101	54.9
Great extent	12	17.9	19	32.8	23	39.0	54	29.3
Total	**67**	**100.0**	**58**	**100.0**	**59**	**100.0**	**184**	**100.0**

Table-7.e.1: To what extent do you think this partnership will continue after the project ends?								
Response	**LSP**		**CA**		**Farmer**		**All**	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
No extent at al	0	0.0	1	1.7	0	0.0	1	0.6
Some extent	2	3.3	3	5.2	0	0.0	5	2.8
Moderate extent	24	39.3	23	39.7	20	35.1	67	38.1
Great extent	35	57.4	31	53.4	37	64.9	103	58.5
Total	**61**	**100.0**	**58**	**100.0**	**57**	**100.0**	**176**	**100.0**

Perceived usefulness by the participants of the L & N Activity

This Annex 14 contains the analyzed data from the General Survey responses, in tabular form. The key points from this have been integrated into the Findings (Chapter 4 above), drawing out key features of the respondents' answers to the questions, and the most important district-specific findings. 8 districts were covered by the survey, with approximately 200 respondents per question. As revealed in answers to Question 1b of the survey, the respondents have the following roles in the Activity roll-out, and their geographical distribution is shown:

role	**percent (of 203 respondents)**	**Geographical distribution**
CA	25.1	All districts except Jhenaidah and Rajbari
LSP	34.0	All districts
Producer	28.1	All districts except Jashore
Marketer	5.9	Jhenaidah and Rajbari only
Consumer	3.4	Jashore only
Community group member	3.4	Jashore only
	100 percent	

Most of the respondents (87.2 percent) were LSPs, Producers (farmers) or Community Agents. Engagement with LSPs was in all 8 districts, with producers in all 8 except Jashore, and CAs in all 8 districts except Jhenaidah and Rajbari.

In answer to General Survey Question 1c "At what level are you satisfied with support you received from the Activity", the following District-wise responses were given.

	Khulna	Satkhira	Jashore	Jhenaidah	Cox's Bazar	Barisha l	Faridpur	Rajbari	Total (percent)
percent Satisfaction-ion level									
Not Satisfied	0	0	0	0	0	0	0	0	0
Somewhat	0	0	0	0	0	4.5	9.5	0	2.5
Medium	45.7	59.4	35.3	56.3	25.0	27.3	57.1	73.3	45.3
Fully	54.3	40.6	64.7	43.8	67.9	68.2	33.3	26.7	52.2
									100

Across the districts, there was overwhelming level of medium to full satisfaction amongst the 203 respondents with what the Activity had provided. A mean figure of 52.2 percent of the total respondents were fully satisfied and 45.3 percent were medium satisfied (97.5 percent total). None of the respondents was not satisfied. Within the fully satisfied respondent group, the range was from 68.2 percent in Barishal to 26.7 percent in Rajbari. There was a clear response across the answers and categories that the L & N Activity had been appreciated.

ANNEX 16: FOCUS GROUP DISCUSSION FINDINGS

Theme	Evaluation Question and sub-questions	
Productivity	**EQ1a. To what extent has the Activity increased livestock fodder production and processing (in hectares and volume), and utilization by livestock farmers**	
A.1 Was fodder amount a constraint on your ruminant livestock before LPIN?	Number	Percentage
Yes	36	94.7
No	2	5.3
Total	38	100.0
A.2 If yes, how did the Activity help you?	Number	Percentage
Training	24	66.7
Information	10	27.8
Grass cutting	2	5.6
Total	36	100.0
A.3. Was government or an LSP involved?	Number	Percentage
Only LSP	9	23.7
LSP and Gov.	29	76.3
Total	38	100.0
A.4 Did you grow more, buy more, or collect from wild?	Number	Percentage
Collect from wild	37	97.4
Blank	1	2.6
Total	38	100.0
A.5 What was the benefit to your farm of more fodder?	Number	Percentage
Increased milk production	30	78.9
200 % increased milk production	3	7.9
150 % increased milk production	1	2.6
50 % increased milk production	1	2.6
20-25% increased milk production	1	2.6
Blank	2	5.3
Total	38	100.0
A.6 Do you have a preferred type of fodder?	Number	Percentage
Pakchung	23	60.5
Napiar	15	39.5
Total	38	100.0
A.7 Is it for local or improved breeds?	Number	Percentage
Foreign	34	89.5
No response	4	10.5
Total	38	100.0
A.8 Will you continue using more fodder post-project?	Number	Percentage
Yes	36	94.7
No	0	0.0

	Blank	1	2.6
	Do not know	1	2.6
	Total	38	100.0
	A.9 Have you received better attention from LSPs under LPIN?	Number	Percentage
	Yes	24	63.2
	No response/Blank/NA	14	36.8
	Total	38	100.0
	A.10 Have you ever tried giving MNBs to your ruminants?	Number	Percentage
	Yes	9	23.7
	No	29	76.3
	Total	38	100.0

Theme	**Evaluation Question and sub-questions**	
Primary products resulting from increased fodder	**EQ 3a. How successful has this (fodder) Activity been in increasing productivity in terms of milk yield per cow, days to achieve market weight and increase in off take weight for beef cattle?**	
B.1 Have more of these been produced under the Activity?	Number	Percentage
Yes	38	100.0
No	0	
Total	38	100.0
B.2 Which? (multiple responses)	Number	Percentage
Yogurt	19	24.7
Ghee	11	14.3
Butter	10	13.0
Cheese	10	13.0
Rice pudding	8	10.4
Sweetmeat	14	18.2
Meat	5	6.5
Total	77	100.0
Why? (multiple responses)	Number	Percentage
Due to more milk production	13	31.7
Due to awareness raising	8	19.5
Due to improved fodder	16	39.0
Cross bed cows	4	9.8
Total	41	100.0

Theme	**Evaluation Question and sub-questions**	
Secondary products resulting from increased fodder	**EQ 3b. How successful has the Activity been in increasing secondary production of value-added meat and dairy products?**	
B.1 Have more of these been produced under LPIN?	Number	Percentage
Yes	38	100.0

No	0	
Total	38	100.0
B.2 Which and why? (Multiple responses)	Number	Percentage
Yogurt	19	24.7
Ghee	11	14.3
Butter	10	13.0
Cheese	10	13.0
Rice pudding	8	10.4
Sweetmeat	14	18.2
Meat	5	6.5
Total	77	100.00
Why (Multiple responses)	Number	Percentage
Due to more milk production	13	31.7
Due to awareness raising	8	19.5
Due to improved fodder	16	39.0
Cross bed cows	4	9.8
Total	41	100.0
B.3 Are these consumed in the households producing them and/or sold?	Number	Percentage
Consumed at HHs	15	39.5
Consumed and sale	23	60.5
Total	38	100.0

Theme	**Evaluation Question and sub-questions**
Sustainability of LSP market development business model	**EQ3.c. What have been the major constraints and opportunities with respect to developing and establishing the LSP business model? Based on the Activity's performance, how sustainable will this model be beyond the life of the Activity?**

A.9 Have you received better attention from LSPs under LPIN?	Number	Percentage
Yes	24	
No response/Blank/NA	14	
Total	38	100.0

Theme	**Evaluation Question and sub-questions**
Household consumption of meat	**EQ 4a. How successful has the Activity been in promoting increased consumption of primary & secondary meat products, and better hygiene**

B.1 Have more of these been produced under LPIN?	Number	Percentage
Yes	38	100.0
No	0	
Total	38	100.0
B.2 Which and why? (multiple responses)	Number	Percentage
Yogurt	19	24.7

Ghee	11	14.3
Butter	10	13.0
Cheese	10	13.0
Rice pudding	8	10.4
Sweetmeat	14	18.2
Meat	5	6.5
Total	77	100.0
Why (multiple responses)	Number	Percentage
Due to more milk production	13	31.7
Due to awareness raising	8	19.5
Due to improved fodder	16	39.0
Cross bred cows	4	9.8
Total	41	100.0
B.3 Are these consumed in the households producing them and/or sold?	Number	Percentage
Consumed at HHs	15	39.5
Consumed and sale	23	60.5
Total	38	100.0
B.4 For processors: What type of trainings and technical knowledge did you receive on processing supported by the Activity?	Number	Percentage
Milk processing	6	54.5
Yogurt/Ghee/Butter preparation	5	45.5
Total	11	100.0
B.5 How have you applied this knowledge? Did it impact your business/income?	Number	Percentage
Yes	11	100.0
No	0	
Total	11	100.0
Impact	Number	Percentage
Income increased	3	27.3
Milk consumption increased	1	9.1
Able prepare different milk product	3	27.3
New business generated	3	27.3
Awareness raising	1	9.1
Total	11	100.0

Theme	**Evaluation Question and sub-questions**
Household consumption of milk	**EQ 4b. Increased consumption of dairy products, and increased sale of surplus milk**

	Number	**Percentage**
C.1 Has your household's consumption of milk and meat (or their secondary products) increased under the Activity? Yes	38	100.0

C.2 Is this increased consumption because of the extra fodder availability? Yes	38	100.0
Citation		
Previously we got only 1-2 kg milk per day from one cow, because of unavailability of fodder		
Due to availability of fodder the productivity of our livestock has improved, and we are getting more milk and meat now		
Due to greater availability of fodder, our milk production significantly increased while milk production cost decreased, as compared with that before 2017		
C.3 Has this improved your family's health (especially women and children)? Yes	38	100.0

Theme	**Evaluation Question and sub-questions**	
Behavior change	**EQ5.a.How successful has the Activity been in promoting nutrition messaging and generating nutrition awareness among the targeted beneficiaries? What have been the most effective means/approaches by the Activity to drive individual, household, and community consumption of nutritious and safe diets?**	
D.1 What were the reasons that caused you to change your diet? (Multiple responses)	Number	Percentage
Awareness raising	26	65.0
Due to increase of income	10	25.0
Increase milk related foods availability	4	10.0
Total	40	
D.2 How did you hear the dietary messages? (multiple responses)	Number	Percentage
LSP	3	2.8
CA	16	14.8
LPIN	18	16.7
Poster	16	14.8
Leaflet	10	9.3
Training program	31	28.7
Communication from the Mosque/Imam	7	6.5
Community meeting/courtyard meeting	7	6.5
Total	108	100.0
D.3. Do you believe in those messages?	Number	Percentage
Yes	38	100.0
No response	0	
Total	38	100.0
D.4 Did you receive messages on food safety or hygiene?	Number	Percentage
Yes	38	100.0
No response	0	
Total	38	100.0

D.5 Will your family continue with the better diet and hygiene post-Program?	Number	Percentage
Yes	38	100.0
No response	0	
Total	38	100.0
D.6 Could there be reasons for your not continuing?	Number	Percentage
No/Not applicable	38	100.0
Yes	0	
Total	38	100.0

Theme	Evaluation Question and sub-questions
Cross cutting issues (Gender and women's engagement)	EQ7.How effective was the Livestock and Nutrition Activity in integrating or incorporating gender in its interventions? How successful has it been in promoting women's leadership in new market opportunities?

	E.1 Under LPIN, do LSPs approach women as well as men in the village?	Number	Percentage
	Gender equity present	38	100.0
	Not present gender equity	0	
	Total	38	100.0
	E.2 Have more women become livestock business managers under LPIN, selling whole animals, meat, milk, processed products, fodder?	Number	Percentage
	Yes	38	100.0
	No response	0	
	Total	38	100.0
E.3 Are women more active in the livestock market because of LPIN? (Multiple responses)		Number	Percentage
Yes		38	
No response		0	
More than past		15	
20-30% increased		2	
80% increased		1	
Total		56	100.0
	E.4 Are there other benefits that LPIN has brought to women in addition to better diets and more farm income which they control? (Multiple responses)	Number	Percentage
	Increased family income	20	18.2
	Increased women savings	5	4.5
	Increased women mobility	9	8.2
	Increased women awareness	6	5.5
	Increased connectivity with Govt. Officials	4	3.6
	Increased women decision making power	26	23.6
	Increased women empowerment	15	13.6

	Increased equal rights (men and women)	6	5.5
	Increased women self-dependency	11	10.0
	Increased women social status/dignity	8	7.3
	Total	110	100.0

General Comments and suggestions

F.1 Did LPIN help your livelihoods and health?	Number	Percentage
Yes	38	100.0
No	0	0.0
Total	38	100.0
G: Your Comments and Questions About LPIN (Multiple responses)	Number	Percentage
Training	26	
Milk Market	9	
Continue	14	
Need more fodder cutting	2	
Loan	2	
Monthly honored	5	
Require Skill AI	2	
EMD Vaccine	2	
Information	3	
Supply chain	1	
Require more LSP	11	
Total	77	

ANNEX 17: KII FINDINGS

Theme Questions and Sub-questions	Response	Percent
Fodder Productivity		
EQ1a. To what extent has the Activity increased livestock fodder production and processing (in hectares and volume), and utilization by livestock farmers		
1.a.1 How has the LPIN Program enabled you to improve farmers' fodder supply and profitability (supply of planting material, training, delivery of feed to farm gate, marketing their fodder production, number of farmers contacted/ participating in production)? District MOFL (District & Upazila Livestock Officers)	Number	Percent
Fodder production has increased 61 decimal to 180 decimal.	1	5.9
LPIN provided training, created marketing opportunity, technical support for production of product.	3	17.6
LPIN provided support in fodder production, supplying cutting to farmers	5	29.4
LPIN Linked them with ULO office for cutting	2	11.8
LPIN helped us to reduce feed cost through fodder cultivation	3	17.6
LPIN helped us to develop and maintain linkage with farmers	2	11.8
Milk production and growth of animals were much less before LPIN	1	5.9
TOTAL	17	100.0
1.a.2 Describe any training that you provided to farmers. District MOFL (District & Upazila Livestock Officers)	Number	Percent
Fodder production	7	15.6
Animal health	11	24.4
Nutrition	5	11.1
Diseases	4	8.9
Feeding	4	8.9
Farming	4	8.9
Silage preparation	1	2.2
Modern dairy management	6	13.3
Vaccination	3	6.7
TOTAL	45	100.0
1.a.3 What type of fodder planting material has been most in demand? Why (palatability, yield response of the ruminants, fodder growth rate)? District MOFL (District & Upazila Livestock Officers)	Number	Percent
Packchong	16	47.1
NAPIER	10	29.4
German	4	11.8
Para	4	11.8
TOTAL	34	100
1.a.4 What has been the percentage increase in hectarage of fodder grown (in this District), year by year since 2015? District MOFL (District & Upazila Livestock Officers	Number (n=17)	Percent
Increased almost 60% over the years	1	6.3
15 percent increased	3	18.8
Approx. 70% increased	1	6.3
80% increase over the past 5 years.	1	6.3
Since 2015 the land for fodder cultivation is increasing by 25% annually	1	6.3
10% annually	1	6.3

20% annually	2	12.5
Increased significantly annually	6	37.5
TOTAL	16	62.5
1.a.5 What has been the percentage increase in tonnage of tradable fodder (in this District), year by year since 2015? District MOFL (District & Upazila Livestock Officers)	Number	Percent
15-20% increase annually	4	25.0
30-35% increase annually	1	6.3
40-50% increase annually	1	6.3
80% increase over the past 5 years.	1	6.3
50-60% achieved	3	18.8
Achieved our target every year	2	12.5
Only around 10% has been achieved	1	6.3
No idea	3	18.8
TOTAL	16	100.0
1.a.6 Has an upper limit in area and tradable tonnage now been reached in the some/all of the eight Districts? District MOFL (District & Upazila Livestock Officers)	Number	Percent
Chokoria we reached the yearly target of production of fodder	2	12.5
20-30 percent	3	18.75
50-60 percent	5	31.25
Around 10 percent	1	6.25
Not enough	2	12.5
TOTAL	13	81.3
Training Information		
1.a.7 How has the LPIN Program enabled you to help farmers increase their fodder supply and processed meat/milk products?	Number	Percent
LPIN provided training to farmers on fodder production and supplied cuttings to ULO.	6	50.0
Through Training program	4	33.3
LPIN providing information	1	8.3
Linkage building	1	8.3
TOTAL	12	100.0
1.a.8 Describe the training courses you have given under LPIN, and how many farmers trained per year?	Number	Percent
Provided training to 7,245 participants regarding fodder and nutrition.	1	9.1
40 trainings provided to 1,000 participants in total.	1	9.1
40 trainings provided to 1,000 participants. Out of those, about 800 ware farmer	1	9.1
1200 farmers trained during past two years	1	9.1
125 farmers were trained on fodder cultivation methods	1	9.1
240 farmers were provided with training on animal health management	2	18.2
750-900 farmers, CAs and LSPs got training on fodder cultivation and animal rearing	1	9.1
150 farmers were trained	2	18.2
1000 farmers trained during past three years	1	9.1
TOTAL	11	100
1.a.9 What was the result of training in terms of adoption of new fodder types (increased hectarage, ruminant productivity increase)?	Number	Percent

Fodder production increased about 30%, land for fodder cultivation highly increased.	2	16.7
Number of fodder cultivators increased by 30-40%	1	8.3
Fodder production increased tremendously	1	8.3
Farmers are producing a new variety of fodder	3	25.0
Increased fodder production has fostered productivity of livestock	2	16.7
They are now cultivating fodder in their land which was not used previously.	3	25.0
TOTAL	12	100

1.a.10 What was the result of training in terms of increase in volume/value of meat/milk processed products?	Number	Percent
Increased milk production 504 liter to 1400 liter over the years.	1	11.1
Milk and meat production increased significantly.	3	33.3
Meat production increased by 15-20% compared with May 2019	1	11.1
Milk production increased by 40% compared with May 2019	1	11.1
Both milk and meat production increased significantly	1	11.1
Production cost has reduced	1	11.1
System loss and post-harvest loss have reduced by 15%	1	11.1
TOTAL	9	100

Theme Questions and Sub-questions	Response	Percent
Capacity development		
EQ1.b. What has been the Activity's success in building the capacity of the Department of Livestock Services (DLS) and Bangladesh Livestock Research Institute (BLRI) in the areas of research, production, and distribution of improved fodder materials?		
1.b.1 How has the LPIN program enabled you to help farmers with their fodder supply?	Number	Percent
Provided cutting	7	31.8
Provided training	6	27.3
Provided technical support	2	9.1
Provided logical support	1	4.5
Networking (farmers, with ULO)	3	13.6
Prepared demo plot – 3	3	13.6
TOTAL	22	100.0
1.b.2 How have you benefited institutionally in terms of capacity building under LPIN program (research, production and distribution)?	Number	Percent
Training for farmers, LSPs, livestock production activity management, ULO staffs	5	38.5
Training for 12 BLRI scientists in Dhaka	1	7.7
Training for 40 chilling center staff, and 60 managers for a private company in Khulna	1	7.7
Progeny show to identify best cattle for DLS, Gov. in Dhaka	1	7.7
Helped GoB vaccination program in Satkhira and Jessore	2	15.4
Not received training	3	23.1
TOTAL	13	100.0
1.b.3 How have you benefited under LPIN program from training by the Borlaug Institute?	Number	Percent
Knowledge and experience sharing by BLRI	2	18.2
Training to DLO, ULO, technical issues	2	18.2
No idea	1	9.1
Don't know about Borlaug Institute.	2	18.2
Not received training	4	36.4
TOTAL	11	100.0
EQ2.a.How successful has the Activity been in building the capacity of Local Service Providers (LSPs) to act as trainers for livestock farmers and other livestock value chain actors?		
2.a.1 How has the LPIN program benefited you in terms of capacity building (training, networking, outreach)?	Number (n=18)	Percent
Training	8	30.8
Networking	8	30.8
Outreach	3	11.5
Skill development	2	7.7
Tools / technical support	2	7.7
Awareness raising	1	3.8
Other	2	7.7
TOTAL	26	100.0
2.a.2 Describe the TOT uplift you have received.	Number	Percent

Not received ToT	4	44.4
Dairy production and husbandry	1	11.1
Other training/refresher	4	44.4
TOTAL	9	100.0
2.a.3 How many farmers and fodder value chain trainees have you logged?	Number	Percent
<100 farmers/person	2	11.8
101-500 farmers/person	4	23.5
501 and above farmers/person	8	47.1
50 farmers for value chain	1	5.9
Not remember	2	11.8
TOTAL	17	100.0
2.a.4 What has been the result/outcome in terms of amount of fodder produced and related increase in ruminant productivity (number of fodder producers, ruminant milk and carcass yield, profitability of enterprise, proportion of farmers venturing into secondary production of yoghurt, cheese, sweetmeat, etc.)?	Number	Percent
Approximately 20% over the project period.	1	3.2
Milk products have increased. Average 30% increased	1	3.2
Milk products have increased on average 15% per year during past 5 years.	2	6.5
Meat production increased 20% per year during past 5 years.	2	6.5
Milk and meat production has increased.	7	22.6
Milk production increased by 10-15%	1	3.2
Fodder cultivation increased by 300%	1	3.2
50% increment in livestock production	1	3.2
Milk production has increase by 20-25%	1	3.2
Meat production has increased by 20%	1	3.2
Fodder cultivation increased by 300%	1	3.2
Feed cost reduced by 30%	1	3.2
Rate of pregnancy of animals has increased	1	3.2
Growth rate of animal has also increased	2	6.5
Dairy products manufacturing has increased by 200%	1	3.2
Small entrepreneurs for dairy products have emerged, some of whom are selling their products online	1	3.2
Farmers trained in fodder cultivation increased	1	3.2
Milk production and secondary milk products increased significantly	1	3.2
The expenses have reduced almost 40%.	1	3.2
The income of the people connected with it has increased.	1	3.2
Grass is now cultivated by 70% of the farmers, whereas in the past it was only 20-25%	1	3.2
Dairy products manufacturing has increased by 200%	1	3.2
TOTAL	31	100

Theme Questions and Sub-questions	**Response**	**Percent**
Primary products resulting from increased fodder		
EQ 3a.How successful has this (fodder) Activity been in increasing productivity in terms of milk yield per cow, days to achieve market weight and increase in off take weight for beef cattle?		
3.a.1 How has increased access to fodder affected your farming enterprise profitability?	Number (n=29)	Percent
Farmers are increasing, they are becoming profitable	1	2.1
Profitability has increased due to 50% reduction in production costs	1	2.1
Feed cost has significantly reduced as a result of reduced concentrate feeding	1	2.1
Increasing milk and meat due to more fodder cultivated	2	4.2
Increased number of livestock	6	12.5
Increased milk production	12	25.0
Increased meat production	7	14.6
Milk collection rate has increased by 21.54% in a single year	1	2.1
Fodder production has increased fodder	3	6.3
Increased income of producers	1	2.1
Improved cattle health	1	2.1
Increased number of livestock	3	6.3
Our milk collection rate has increased by 21.54% in a single year	1	2.1
The fodder price is reduced to only Tk. 4 per kg	1	2.1
LPIN successful in developing interest among farmers in rearing crossbred cattle	1	2.1
Overall improved livestock	4	8.3
Both milk supply and profitability increased (both mine and the farmers)	1	2.1
Profitability increased due to higher yield	1	2.1
TOTAL	48	100.0
3.a.2 Is it more profitable to provide fodder to local cattle or to cross-bred cattle?	Number	Percent
Crossbred cattle is more profitable	30	100.0
TOTAL	30	100.0
3.a.3 Please express benefits in terms of increased milk yield/day; improved quality of milk; reduced time for beef cattle to reach maturity; better fertility (calves per year per cow); better tolerance to disease)	Number (n=23)	Percent
Milk production increased	23	38.3
Meat production increased	7	11.7
Income of farmers has increased	5	8.3
15% increased milk production	2	3.3
Milk and milk processing production increased	2	3.3
Cattle reached maturity with less time	2	3.3
Overall 50-60% increase in milk yield	1	1.7
Increased immunity of livestock animals	2	3.3
Calves mature in less time (1.5 years instead of 2 years OR in 12-14 months than 18-20 months previously)	4	6.7
50-60% milk yield	1	1.7
20% increase in milk production	4	6.7
50% increase in milk production	3	5.0
Improved milk quality	4	6.7
TOTAL	60	100.0

Theme Questions and Sub-questions	**Response**	**Percent**
Secondary products resulting from increased fodder		
EQ 3b. How successful has the Activity been in increasing secondary production of value-added meat and dairy products?		
3b.1. What has been the uptake of the (fodder) initiative to increase secondary processing/ production of *meat* products (weight and value increase per year)	Number	Percent
Livestock growth, milk, meat increased	5	33.3
More people involved in livestock industry	3	20.0
Dairy sales and production increased	3	20.0
More people are becoming milk processors	1	6.7
Production and sales of dairy products have increased 4 folds over the last 3 years	1	6.7
The growth rate and off take weight of livestock has increased.	1	6.7
No idea	1	6.7
TOTAL	15	100.0
3b.2. What has been the uptake of the (fodder) initiative to increase secondary processing/ production of *milk* products (weight and value increase per year)	Number	Percent
Milk products have increased	9	56.3
Production and sales of dairy products have increased	1	6.3
ACDI/VOCA provided training on Milk processing.	1	6.3
Overall 50-60% increase in milk yield	1	6.3
There was an initiative to connect local processors with the large retailers	1	6.3
Product variety (different varieties of sweetmeat) has increased	1	6.3
300% increase in productivity over the past 5 years	1	6.3
Prospective processors have developed e.g., Joygun Dairy	1	6.3
TOTAL	16	100.0

Theme Questions and Sub-questions	**Response**	**Percent**
Sustainability of LSP market development business model EQ3.c. What have been the major constraints and opportunities with respect to developing and establishing the LSP business model? Based on the Activity's performance, how sustainable will this model be beyond the life of the Activity?		
3.c.1 Is credit readily available to individual farmers or groups in relation to increasing fodder production and developing the meat and dairy value chains?	Number (n=29)	Percent
Yes/from NGO	5	17.2
Yes, but complex procedure, so farmers get demotivated	16	55.2
Credit is not readily available.	7	24.1
No idea	1	3.4
TOTAL	29	100.0
3.c.2 Is land availability or accessibility for smallholders the apex constraint on increasing fodder acreage?	Number	Percent
Yes	13	59.1
No	9	40.9
3.c.3 Is profitability an issue (high production/transportation costs or ability of buyers to purchase fodder)	Number	Percent
Yes	9	47.4
No	10	52.6
TOTAL	19	100.0
3.c.4 What are the constraints and opportunities for increased production and marketing of processed meat products?	Number	Percent
Constraints		
Farmers lack of consciousness / training / knowledge	2	9.5
Marketing - less opportunity etc.	2	9.5
Communication system	1	4.8
No fodder house / market	2	9.5
Hygiene management	1	4.8
Proper slaughtering process	1	4.8
Land availability for fodder	1	4.8
Lack of skilled labor and manpower	1	4.8
Lack of veterinary and diagnostic services	1	4.8
GOB business relations with LSPs	1	4.8
Brokers in cattle market, farmers do not get proper price due to syndicate	1	4.8
no processing system / freezing facility	1	4.8
high disease cases, FMD in cattle, PPR in goats	1	4.8
high cost of concentrated feed	1	4.8
Lack of veterinary services	1	4.8
Lack of diagnostic services	1	4.8
Animals are not sold on live weight basis	1	4.8
Lack of farmer training	1	4.8
TOTAL	21	100.0
Opportunities		
Farmers are now aware of cattle health	1	5.0
Small and medium entrepreneurship is an opportunity	1	5.0

and also family can rear cattle at their own house (zero-grazing)	1	5.0
train and fund families to rear animals without medicines	1	5.0
Increasing meat and milk market, beef export	10	50.0
Fodder cultivation	1	5.0
Vaccine and veterinary services	1	5.0
Vaccine supply has increased	1	5.0
Year round fodder cultivation is possible	1	5.0
Good demand of beef cattle	1	5.0
trained butchers are in demand	1	5.0
TOTAL	20	100.0
3.c.5 What are the constraints and opportunities for increased production and marketing of processed milk products?	Number	Percent
Constraints		
No chilling point / milk processing center / technology	3	8.8
Lack of grass (fodder)	1	2.9
lack of market access	3	8.8
unstable milk price, inconsistent market	4	11.8
insufficient hibrid cows	2	5.9
Lack of a processing center	3	8.8
high feed cost	1	2.9
high labor cost	1	2.9
livestock disease and treatment center not enough	1	2.9
milk marketing is still difficult	2	5.9
strict Government regulations on food safety	1	2.9
shortage of concentrated feed	1	2.9
land shortage	1	2.9
Price discrimination of milk	1	2.9
absence of packaging facility	1	2.9
Brokers syndicate	1	2.9
Lack of Government intervention to preserve raw milk	1	2.9
Market is not consistent	1	2.9
Un-favorable Government policy such as	1	2.9
Absence of cold chain	1	2.9
Milk price is low	2	5.9
Lack of processing skill	1	2.9
TOTAL	34	100.0
Opportunities		
Farmers get a good amount of hard cash by selling surplus yearlings	1	12.5
Milk production is increasing	2	25
Market for milk is increasing, local, national and internationally	5	62.5
TOTAL	8	100.0
3.c.6 Is the LPIN business model sustainable post-program? If not, why?	Number (n=26)	Percent
Yes	25	83.3
May be	5	16.7
TOTAL	30	100.0

Theme Questions and Sub-questions	Response	Percent
Household consumption of meat EQ 4a. How successful has the Activity been in promoting increased consumption of primary & secondary meat products, and better hygiene		
4.a.1 How has household consumption of processed meat products changed downstream of increased production as a result of LPIN, year on year since 2015 (type and weight increase)?	Number	Percent
Increased approximately to 15%	1	14.3
Milk consumption at household level has increased a lot.	4	57.1
Household consumption of processed milk products has increased approximately 50% since 2015.	1	14.3
100 – 150% increase in consumption since 2015	1	14.3
TOTAL	7	100.0
EQ 4b. Increased consumption of dairy products, and increased sale of surplus milk		
4.b.1 How has household consumption of processed milk products changed downstream of increased production as a result of LPIN, year on year since 2015 (type and weight increase)?	Number (n=7)	Percent
It has increased approximately to 15-20%	5	38.5
Household consumption of processed milk products has increased approximately 50% since 2015.	1	7.7
Milk/milk products consumption at household level has increased a lot.	6	46.2
100 – 150% increase in consumption since 2015	1	7.7
TOTAL	13	100.0
4.b.2 Has any child been identified as undernourished (SAM/MAM cases) over the past three years at the household level?	Number	Percent
Nil	0	
TOTAL	0	0.0
4.b.3 At what level has meat and milk consumption increased at the family level (volume/weight per week)?	Number	Percent
Increased 10-15% over the last 3 years.	1	5.3
About 40% at household level during past five years.	2	10.5
100 – 150% increase	1	5.3
Milk consumption increased significantly	15	78.9
TOTAL	19	100.0
4.b.4 What are the food safety challenges for meat and milk processing at the village level?	Number (n=14)	Percent
No chilling point so that farmers can not preserve milk.	11	78.6
Modern technology – not available at village level	2	14.3
Not aware	1	7.1
TOTAL	14	100.0

Theme Questions and Sub-questions	Response	Percent
Behavior change EQ5.a.How successful has the Activity been in promoting nutrition messaging and generating nutrition awareness among the targeted beneficiaries? What have been the most effective means/approaches by the Activity to drive individual, household, and community consumption of nutritious and safe diets?		
5.a.1 How successful has the Activity been in promoting nutrition messaging and generating nutrition awareness among the targeted beneficiaries?	Number (n=25)	Percent
Very effective and successful	16	64.0
Somewhat effective and successful	7	28.0
50% achievement	2	8.0
TOTAL	25	100.0
5.a.2 What are the key nutritional messages disseminated/promoted by the program to family and community, and how?	Number (n-=20)	Percent
Milk is essential for brain development of human baby as well as essential for all family members.	6	25.0
If cow intake fodder, milk can be produced over the year.	1	4.2
Importance of milk and meat for improved nutrition	15	62.5
Hygiene issues	2	8.3
TOTAL	24	100.0
5.a.3 Provide examples of barrier categories (social norms/gender) that are proving most resistant to change.	Number (n=14)	Percent
Lack of media / broadcasting	1	6.25
Lack of knowledge / awareness or having previous bias	8	50
Lack of education	4	25
Financial problem	2	12.5
None	1	6.25
TOTAL	16	100.0
5.a.4 What have been the most effective SBCC interventions by the Activity to drive individual, household, and community consumption of nutritious and safe diets?	Number (n=14)	Percent
Courtyard meeting / meeting	6	35.3
Training	2	11.8
School program	1	5.9
Reaching out community through religious leaders	2	11.8
Inter personal communication	4	23.5
Nothing significant	2	11.8
TOTAL	17	100.0
5.a.5 What have been the least effective SBCC interventions by the Activity to drive individual, household, and community consumption of nutritious and safe diets?	Number	Percent
Some real life examples were required to make the trainings more effective	1	50.0
No such intervention	1	50.0
TOTAL	2	100.0
5.a.6 What enablers/facilitators/champions have proven themselves valuable during LPIN (Community radio/radio clubs, Mullahs, traditional leaders, sports stars, media personalities, etc.)?	Number (n=7)	Percent
Religious leaders have proved themselves valuable.	4	57.1

The drive of the private sector	1	14.3
TV	1	14.3
LPIN Campaign/program	1	14.3
TOTAL	7	100.0
5.a.7 What are the significant behavioral changes which have occurred at family level over the past three years (e.g., adopting/adapting practices in hygiene and preservation)?	Number	Percent
Attitude and behavior has changed, becoming more positive towards milk intake over the past three years at community level.	1	5.6
Milk consumption has increased and attitude regarding misconceptions has been changed.	14	77.8
Increased meat consumption	1	5.6
Personal hygiene	2	11.1
TOTAL	18	100.0
EQ5.b How effective was the Activity in coordinating, collaborating, and leveraging resources with other donor-funded nutrition activities in implementing behavior change communication on nutrition in order to overcome the barriers to the adoption of nutrition related behaviors?		
5.b.1 What has LPIN done in association with other donors/programs to inquire about barriers at household level to adopting beneficial nutritional BC, and how these barriers may be overcome? (only one response found)	Number	Percent
mPower has worked with the USAID-supported AESA (Agricultural Extension Support Activity)(2012-17), a social enterprise too, part of the FTF initiative, with which mPower was associated. ICT livestock was a small component of it.	1	100.0
TOTAL	1	100.0
5.b.2 What synergy, if any, has there been with other donors in the drive to promote beneficial BC with regard to household nutrition?	Number	Percent
No response available under this question		
TOTAL		

Theme Questions and Sub-questions	Response	Percent
Cross cutting issues (PPP) EQ6 How successful has the Activity been in leveraging private sector investment and developing public-private partnerships (PPPs)? What have been some of the challenges in forming partnerships?		
6.1 What have been the challenges in promoting PPPs under the LPIN program?	Number (n=24)	Percent
Investment is not enough.	2	8.3
Monitoring is challenge	1	4.2
Equal interest need to be ensured	1	4.2
Understanding benefit of PPP	1	4.2
Lack of coordination	1	4.2
Lack understanding	3	12.5
No logistical support in partnership	1	4.2
The training arranged by LPIN was insufficient	1	4.2
No common interest	3	12.5
Policy gap no specific guideline/policy to promote PPP	2	8.3
Return on investment is a question	1	4.2
Donor organizations are more interested in numerical figures.	1	4.2
Lack of proper approach by the private organizations	1	4.2
Establishment of proper connection with government offices (BLRI and DLS) for information	1	4.2
Lack of interest from the Government officials, though occasionally	1	4.2
There was no logistical support in partnership	1	4.2
Partnership is not established significantly	1	4.2
Lack of understanding of win-win situation	1	4.2
TOTAL	24	100.0
6.2 List the successes and failures.	Number (n=16)	Percent
Success		
Our area is now self-sufficient in meat.	1	6.7
The project has giving access to the marketing level of the milk	2	13.3
Created marketing opportunity, need to add buffalo to the program	1	6.7
Support in livestock vaccination (LSP and SALO worked jointly	1	6.7
Many fodder entrepreneurs were developed, 60% of whom are women	1	6.7
28-30 acres of new land were incorporated into fodder cultivation per year	1	6.7
420 fodder entrepreneurs were developed	1	6.7
120 fodder sellers were developed	1	6.7
Linkage between DLS and farmers through LSPs	1	6.7
Training of female AI workers	1	6.7
Death rate of cattle decreased	1	6.7
Number of farmers increased	1	6.7

Number of cattle increased	1	6.7
Production of fodder increased	1	6.7
TOTAL	15	100.0
Failure	Number	Percent
Farmers need more motivation for giving fodder to their cattle	1	16.7
No joint planning with DLS/ULO	1	16.7
Communication gap between Government officers and LPIN officials	1	16.7
There is a lack of logistical support, like milk chilling facility, silage pit, etc.	1	16.7
The program was not inclusive	1	16.7
Did not cover whole community	1	16.7
TOTAL	6	100.0
EQ 6.3 What are the common ingredients of success stories which can be upscale to future PPPs?	Number (n=8)	Percent
42 LSPs in coordination with LPIN	1	11.1
Work at village /root level	1	11.1
Developing entrepreneurs	1	11.1
Bridge gaps between DLS and farmers, build networks	2	22.2
App-based training for LSPs and beneficiaries	1	11.1
Women engagement	1	11.1
Improving farmer skill level	1	11.1
Training	1	11.1
TOTAL	9	100.0
EQ 6.4 Is there a better alternative to PPPs in promoting nutritional interventions?	Number (n=6)	Percent
Skill development	1	100.0
TOTAL	1	100.0
6.5 Private sector investment is better assured when bankable profitable business cases can be made — was this done under LPIN?	Number	Percent
Yes	3	60.0
No idea	2	40.0
TOTAL	5	100.0

Theme Questions and Sub-questions	**Response**	**Percent**
Cross cutting issues (Gender and women's engagement) EQ7.How effective was the Livestock and Nutrition Activity in integrating or incorporating gender in its interventions? How successful has it been in promoting women's leadership in new market opportunities?		
EQ 7.1. How effective are LSPs at providing extension services to women farmers under LPIN?	Number (n=29	Percent
Highly / effectively engaged	29	93.5
Most entrepreneurs (90%) were women	1	3.2
No idea	1	3.2
TOTAL	31	100.0

EQ 7.2. How effective has LPIN been at household and market level in increasing women's role in family agribusiness decision-making?	Number (n=32)	Percent
10% increase in agri-business	1	3.13
40% increase	1	3.13
20% increase	1	3.13
LPIN has increased involvement of women in the area.	2	6.25
Significantly increased	11	34.38
Women's role has increased approximately 40%.	1	3.13
More women are engaged in livestock activities at household level	3	9.38
Women's participation has increased approx. 20%	1	3.13
LPIN has increased engagement of women in livestock activities.	2	6.25
Women's involvement in livestock activities significantly increased.	3	9.38
A number of female LSPs were developed	1	3.13
Women's participation in vaccination and primary health care increased	1	3.13
LPIN activity gives more emphasis on women engagement	1	3.13
LPIN activity engages women; 95% of the stakeholders are women	1	3.13
Some female AI workers were trained	1	3.13
Women play the key role in animal husbandry	1	3.13
TOTAL	32	100.0
EQ 7.3. Was there a shift in household responsibility for livestock and related income generation under LPIN?	Number (n=26)	Percent
Yes	24	92.3
No	2	7.7
TOTAL	26	100.0
EQ 7.4. Are there other impacts that women experienced from having increased income and/or consumption of more nutritious food as a result of adopting knowledge and skills from LPIN?	Number (n=26	Percent
Financial and social status / empowerment	18	45.0
Improved diet / health awareness	5	12.5
Important part of family decision making	6	15.0
Gender based violence decreased	1	2.5
More women entrepreneurs / job opportunities	3	7.5
Better child health / education	5	12.5
Women leadership / networking in business	2	5.0
TOTAL	40	100.0

Theme Questions and Sub-questions	Response	Percent
General Comments		
1.1 When you think about the activities of the LPIN, to what extent did its activities raise awareness about the nutritional requirement for livestock and modern farm practices?	Number	Percent
Significantly increased	16	41.0
Increased	18	46.2
Somewhat increased	4	10.3
Minimum increased	1	2.6
TOTAL	39	100.0
1.2 Can you tell me about your first time engagement with the LPIN Activity?	Number	Percent
Year 2015	4	7.4
Year 2016	4	7.4
Year 2017	4	7.4
Year 2018	6	11.1
Year 2019	18	33.3
Year 2020	18	33.3
TOTAL	54	100.0
1.3 Your role in LPIN	Number	Percent
Trainer	8	14.5
DLS Staff	13	23.6
Marketer and Processor	2	3.6
Credit providers	3	5.5
Software maker and distributor	1	1.8
Religious leader	3	5.5
Private sector	3	5.5
BLRI	1	1.8
Together with ACDI/VOCA	2	3.6
Supplier Dairy product	1	1.8
Milk processor	1	1.8
ULO	3	5.5
DLO	1	1.8
Others	13	23.6
TOTAL	55	100.0
1.4 type of organization / work you do	Number	Percent
Private sector	28	50.9
Government	14	25.5
Others	13	23.6
TOTAL	55	100.0
1.5 Number of trainings you have provided	Number	Percent
1-10 batches	7	16.3
11-20 batches	12	27.9
21-50 batches	24	55.8
51-100 batches	0	0.0
101 and above	0	0.0
TOTAL	43	100.0
1.6 Type of training you provided	Number	Percent

Fodder production	7	15.6
Animal health	11	24.4
Nutrition	5	11.1
Diseases	4	8.9
Feeding	4	8.9
Farming	4	8.9
Silage preparation	1	2.2
Modern dairy management	6	13.3
Vaccination	3	6.7
TOTAL	45	100.0
1.7 Extent you supported capacity building within the program	Number	Percent
Fully	6	
Medium	21	
Great extent	17	
TOTAL	44	
1.8 Your confidence level to continue after program ends	Number	Percent
Fully confident/Extremely confident	39	79.6
Medium	8	16.3
Somewhat	2	4.1
TOTAL	49	100.0

ANNEX 18. FODDER CASE STUDY

This annex summarizes the two key reports among nine submitted by the Borlaug Institute (Appendix 1 below), following several visits its staff made to Activity sites from mid-2015 to mid-2017.

I. Rapid Institutional Needs Assessment of Bangladesh Livestock Research Institute Livestock Forage, Fodder, and Feed Programs, by Dr. Steven Whisenant, October 2015

Context: A Presidential Ordinance established the Bangladesh Livestock Research Institute (BLRI) in 1984. The mandate of BLRI is to identify livestock and poultry production constraints at the national and farm level, solve those problems through multi- and interdisciplinary and interinstitutional research, and develop technologies to help food and nutrition security for the increasing population, poverty alleviation, employment opportunities, income generation, and control of environmental pollution.

The long-term strategic plan for BLRI (Livestock and Poultry Research, Development, and Extension Plan 2021) describes specific research priorities in seven research and development areas:

1. Animal Production Research (contains fodder development program)
2. Goat and Sheep Production Research
3. Animal Health Research
4. Poultry Health Research
5. Socioeconomic Research
6. Farming System Research and Technology Transfer
7. Information Communication Technology

Long-term commitments from GOB, the World Bank, and UNDP/FAO suggest financial support for the basic staffing and operations of BLRI are sustainable. GOB, through MoFL, funds basic BLRI staffing and operations, supplemented by project-related funding from various other international donors. Most of that support seems to focus on specific project-related outcomes rather than long-term capacity building.

The primary goals of the Rapid Institutional Needs Assessment were to identify and prioritize BLRI's most critical gaps in forage and fodder research. The assessment was based on a visit in October 2015 to the BLRI offices in Savar and related field visits. The process involved examining BLRI facilities and meeting administration, scientists, and collaborators to assess the following:

1. Institutional financial sustainability
2. Research management capacity
3. Ability to access and reproduce a variety of fodder and forage species
4. Capabilities in saline-tolerant fodder and forage research
5. Capacity to conduct cost-benefit analyses of different forage/fodder systems
6. Capacity to disseminate research findings

The needs assessment sought to identify critical gaps in performance, examine their causes, and propose strategies for future actions. In the assessment, "needs" were viewed as the gap between current and desired performance. This included identifying or breeding improved forage plants, developing new production and storage strategies, providing large numbers of improved plants to farmers, and training farmers to grow and manage the new forage or fodder systems. Once a need was identified as a priority, possible actions to improve performance were considered. These alternatives for improving performance were compared based on their relative contributions. It was also useful to consider needs of related components of a forage and training delivery system. Providing training and improved forage plants to farmers in the FTF area requires collaboration with other organizations (Division of Livestock Services [DLS], BRAC dairies, etc.).

The current fodder supply situation

Dr. Khan Shahidul Huque, the BLRI Chief Science Officer and Head of the Animal Production Research Division, discussed the challenges and opportunities of both forage quantity and forage quality in Bangladesh. He stated that theoretically Bangladesh produces enough fiber (roughage) to support their livestock herd and increase milk production, but there is excessive wastage. Excess forage production during the wet season (June–October) is wasted rather than consumed. Forage prices are low during that most productive season. There is insufficient forage produced in the dry season (December–March) when prices are high. Low-quality forage is also a substantial problem. Higher-quality grasses are often less productive and highly productive grasses, like Napier, have low feed quality. Leguminous woody species of the genera *Moringa*, *Gliricidia*, or *Sesbania* can be grown and their leaves pelletized or mixed into silage or feed to produce a high-quality feed. Both academic research and farm demonstrations indicate supplements can be profitable as a feed additive. Farmers do not understand this and are unwilling to invest scarce resources until it has been proven to them. BLRI has substantial research and practical experience in formulating productive and economic feeds with available resources.

Forage storage systems are proven to be profitable but are poorly understood by farmers. Less expensive silage systems are beneficial and farmers have often adopted these technologies, at their own expense, following training. India has similar ecosystems and human population density yet produces an excess of fodder for export. It is likely that small-scale technologies (e.g., pelleting or silage systems) developed in India can provide both economic opportunities and livestock feed solutions. There are many possibilities but low-quality grass must be mixed with high-quality herbaceous or woody legumes to provide quality silage feed and storage situations. Small-scale pelleting technologies may also provide new economic opportunities within local communities.

Most of the strategic goals of the BLRI fodder program can contribute to the Activity and USAID agendas in southwest Bangladesh. Recently completed research activities at BLRI (by the forage, socioeconomic farming systems, nutrition, feed, and feeding biotechnology working groups) include topics such as the following:

1. Conservation, multiplication, and development of fodder production systems and preservation technologies for fodder crops
2. Development of community-based fodder production model in haor areas of Bangladesh
3. Development of cost-effective crop residues based on total mixed ration for ruminants
4. Seasonal dynamics of feed resource utilization and management as influenced by different coastal and river basin areas of Bangladesh
5. Development of salt-tolerant fodder species through plant genetic engineering
6. Development of feeding systems and least-cost balanced rations, with locally available feed ingredients for different selected regions
7. Study on availability of different feeds and fodder in selected regions
8. Accelerating technology transfers through farmer training and field demonstrations

Findings and Recommendations: The needs assessment report concludes with specific interventions that support BLRI's capabilities to provide improved forage and production-storage systems to farmers. As there is never enough money to meet all needs, this assessment sought to identify achievable strategies for increasing BLRI capacity. Both short- and long-term capacity-building strategies were addressed even though some were beyond the scope of USAID's L & N Activity, and their resolution will require attention beyond its lifespan. Some of the key findings/recommendations from the Institutional Assessment are given below:

1. **Long-term improvement of BLRI's research capacity requires significant investment** in advanced training and improved laboratory facilities and in outreach capabilities to disseminate findings. Regarding the latter, in separate meetings with Dr. Whisenant, DLS indicated it is the official extension organization and training should be provided through its network. DLS does have a substantial local network, but their local livestock health workers have no financial incentive or skills to provide forage-related training. Thus, this strategy would likely not work for the Activity's forage aspects. The BLRI 10-year strategic plan approved by the Ministry of Fisheries and Livestock (*Livestock and Poultry Research, Development and Extension Plan 2021*) indicates that BLRI also has a formal extension role, but this still has to be developed in practice. BLRI capacity to develop improved forages through breeding is limited by the staff's skill set. Human capacity should be developed through multiple types of training.

2. **Fodder and forage strategies:** Although there are multiple alternative forage strategies, each involves trade-offs such as quantity vs. quality, wet vs. dry season, immediate consumption vs. silage systems, and salinity tolerance vs. avoidance. There will not be an ideal single solution. Creating multiple forage options for specific circumstances and training farmers to select from among those options will be most effective. Increasing livestock production in southwest Bangladesh will require silage storage alternatives in addition to simply producing more forage. Invigorated effort is needed within BLRI to conduct comparative cost-benefit analyses of such forage and fodder systems. Providing quality feed on a year-round basis cannot be accomplished without significant improvements to storage/silage systems.

Potential forage solutions must be developed from among all possible alternatives—whether novel or simply improvements on common forage strategies. Forages that maximize production typically have quality problems. Higher-quality forages are often less productive and require more land resources. Legumes, both herbaceous and woody, can be mixed with lower-quality forages to create high-quality feed for livestock but would have a substantial land requirement.

3. **Napier grass limitations:** Napier is not abundant in southwest Bangladesh, BLRI has identified adapted and more salt-tolerant varieties. The advantage of very high productivity is offset by low quality that requires mixing with supplements or high-quality forage. The land requirement for less productive, high-quality forages may be high. When Napier is a major part of the diet, the livestock can develop serious (even fatal) Ca^{++} deficiencies. This problem is well understood by the rumen nutritionists at BLRI and can be prevented with small amounts of feed additives. This issue is not understood by farmers but could be improved by training farmers.

4. **Shortage of novel planting materials for testing**: An inability to acquire seed, transplants, and fertilizers through government procurement processes seriously limits BLRI's ability to test and develop novel forage solutions. Providing seed or transplants of potentially beneficial forage species will increase BLRI capacity to develop new forage production systems. This is likely to be the only mechanism by which truly novel materials will be assessed for forage value in southwest Bangladesh. This assistance may require only small quantities of seed or transplants for testing. These materials may be provided through direct purchases, arrangements with NGOs, CGIAR centers (such as CIMMYT and World Agroforestry Centre), or even commercial donations.

II. Trip Report to the Livestock and Nutrition Activity site in Khulna Division by Dr. Maad Rawendoozi

Dates: April 17–May 8, 2016
Destinations: BLRI research station in Savar, Khulna, Satkhira, and Jessore Districts
Members: Maad Rawendoozi, Mahbub Alam, and others from BLRI, BRAC, and DLS.

Trip Objectives

1. To visit and assess project forage demonstration plots and forage production farms, and to visit some dairy farms and feed lots
2. To assess plot layout, varieties tested, and accessibility to DLS livestock officers and producers
3. To make recommendations for expanding field trials to district/*upazila* livestock offices and subsequent training for farmers
4. To derive recommendations for extending field trials to farmer-level plots; the use of field trial areas as learning and demonstration areas for producers, DLS livestock officers, and partner research; and expanding BLRI's research efforts to alternative forage crops, especially woody and aquatic forages where appropriate
5. To conduct a workshop on current livestock production challenges in southwest Bangladesh

Key activities undertaken

Conducted field visits to the demonstration plots in the Livestock and Nutrition project area accompanied by ACDI/VOCA, BLRI, BRAC, and DLS representatives; met with farmers and livestock service officers of the districts and subdistricts of Khulna Division; visited some dairy farms, feed lots, milk collection points, and the DLS artificial insemination center in Jessore; conducted a workshop on the challenges facing livestock production in the project area.

Key findings

1. BLRI research plots:

a. Varietal trials on numerous forage crops and fodder production fields were observed during the visit to BLRI.

b. Most species under investigation observed at BLRI belonged to the Gramineae family, such as Napier (*Pennisetum purpureum*), Guinea (*Panicum maximum*), Signal (*Brachiaria decumbens*), German (*Echinocloa crusgali*), and Bermuda grass (*Cynodon dactylon*). Two green fodder trees (*Moringa oleifera*) and lipl-ipil (*Leucaenaleuco cephala*) were observed.

c. No herbaceous legume forage crops were observed.

d. Forage research plots are well managed and meet scientific standards of varietal trials.

2. Livestock and Nutrition Activity area

1. Demonstration plots[47]

During the visit to the program area and meeting with various groups of farmers, officials, and others concerned with livestock production, the following issues were observed:

a. Demonstration plots were not always easily accessable to farmers and many were adversely affected by shading, weeds, or empty spots.

b. Demonstration plots should represent good agronomic practices so farmers can watch and learn. Plant density (row and plant spacing) was not appropriate for specific crops. This weakens growth and uses more transplants than necessary.

[47] It was hot and dry during the visit and difficult to provide irrigation in some plots. Just after the visit, rain fell and the situation of those plots improved.

c. Demonstration plots must not be limited to one or two fodder crops (Napier and German grass). Species such as Bermuda grass (*Cynodon* sp.) and more salt-tolerant alfalfa (*Medicago* sp.) varieties should be obtained and planted.

2. General observations

a. Insufficient land devoted to green fodder crop production. Farmers and community leaders should assist in developing solution alternatives for increasing land devoted to forage.

b. Absence of grazing lands. Farmers and community leaders should assist in developing solution alternatives for increasing land devoted to grazing.

c. Lack of crop diversity. Most lands are devoted for growing rice. Implementing crop rotations can increase forage availability while improving soil quality. Only one farmer was observed growing alfalfa. Adapted alfalfa varieties should be imported, tested by BLRI, and made available to farmers.

d. Limited number of planted species of green fodder crops (mainly Napier and German grass). BLRI should be supported to increase options for forage production and storage. BRAC seed might be encouraged to import additional forage seed species.[48]

e. Lack of knowledge and awareness of livestock nutrition requirements. New programs should be developed to train farmers in the basics of livestock nutrition requirements and how to grow, store, and mix forages to meet those requirements.

f. Salinity management training should be available to farmers and their advisors.

g. Limited extension services and outreach limit the capacity to convey knowledge to farmers. This is largely a problem of institutional relationships and capacity.

h. No fodder preservation practice (silage) was observed. Silage represents a significant opportunity to increase year-round milk production.

i. Lack of improved animal breeds.

j. Low milk price reduces the motivation to improve production.

k. In contrast to all of these observations, not one farmer complained of having a serious problem with regard to fodder or livestock production. It seems they are unaware of the importance of forage nutritional value and consider mere straw enough during the green fodder off-season.

Recommendations for the Activity's management:

1. Improve management of demonstration plots (including full record of planting dates, variety names, etc.) in the Activity target areas to be convincing to farmers, using recommended spacing for the various species (e.g., Napier 3 ft [rows] x 2 ft [within rows]). It is better to have fewer but manage them well and for farmers to be invited to open days and provided with means of transportation to do so. Cutting intervals must be maintained; early or late cutting affect fodder quantity and quality. Cutting height must be according to variety recommendations. BLRI has this expertise and could be more closely involved in

[48] Para grass was also introduced. During the upcoming winter season it was intended that legume fodders would be introduced.

training or in preparing recommendations. Easy-to-understand brochures should be distributed to farmers showing recommended agronomic practices for each fodder crop. These should include illustrated instructions for illiterate farmers.
2. The Activity should incorporate salt-tolerant crops (Bermuda grass, Rhodesgrass [*Chloris* sp.]) and varieties in coordination with BLRI. The Activity was encouraged to train farmers on how to make better use of marginal land and state-owned land (Khasland) (which would need an agreement) for fodder crops.
3. Farmers need encouraging through training on field days to make silage, using BRLI staff and knowledge.

An update on the Activity's involvement with fodder was provided in the KII between the ET and Activity COP Siddiquee on April 7, 2021. One example of GOB capacity building undertaken by the Activity has been the establishment of demonstration plots promoting improved fodder grasses. DLS has taken over the management of these plots now, with ULO and DLO involvement. BLRI, having fodder development and distribution as part of its mandate, is also involved and has provided 2 million cuttings in the FTF ZOI in a year, as well as in the ZOR (except in Barisal). Recently, the Activity has included saline-tolerant varieties of grasses in its demonstrations in polder areas of the Southwest; polders have been created by embankments over recent decades to protect land against flooding of land by the sea. This latter work represents shared actions with IRRI and CIMMYT (and BLRI). IRRI's involvement is under its Sustainable Intensification Innovation Laboratory initiative in Bangladesh of 2020.[49] The Deputy COP of the Activity says that Napier 5 is a fairly saline-tolerant variety of grass, and BLRI is researching this.

Appendix 1.

Bibliography of 9 Reports submitted by the Borlaug Institute to USAID, resulting from its interventions (2015-17)

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2. Borlaug Institute (2016a). Travel assignment SOW-USAID Bangladesh FTF LPIN. Apr 2016. 3 pp.
3. Borlaug Institute (2016b).Trip report to ACDI/VOCA Livestock & nutrition project to project area Khulna Division. April17-May 8, 2016. 8pp.
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5. Borlaug Institute (2016d). USAID's LivestockProduction for Improved Nutrition project. Borlaug Inst for International Agriculture. Sub-implementer quarterly report, Oct 2015-Sept 2016. 3pp.
6. Borlaug Institute (2017a). USAID's LivestockProduction for Improved Nutrition project. Borlaug Inst for International Agriculture. Sub-implementer quarterly report, Jan-Apr 2017, 2pp.
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8. Borlaug Institute (2017b). The Borlaug Institute's Technical Support to the FTF LPIN Project. Technical Summary Report. July 14, 2017. 7pp.
9. Borlaug Institute (2017c).Proposed FTF Bangladesh LPIN follow-up Activity by the Borlaug Institute at Texas A & M University. Submitted by T Davis. October 2017, 2pp.
10. Innovision (2013). Assessment of feed and fodder market for livestock in Bangladesh. Innovision Consulting Private Ltd, Dhaka. CGIAR. 17pp.

[49]https://www.irri.org/news-and-events/news/innovation-key-sustainable-intensification-polder-agriculture-coastal

ANNEX 19: CASE STUDY: MPOWER'S SHUDOKKHO LIVESTOCK APP

1. Context

According to the DLS portal website,[50] in 2019–2020 there were some 24.4 million cattle in Bangladesh. This represents one to two per household in backyard farming, cattle being regarded almost as members of the family. Because of this scattered distribution across the country, it is impossible for DLS to reach out to all farmers with livestock-related services.[51][52]A cadre of LSPs constitutes a means whereby this shortfall in public service provision can be addressed, though only partially so because LSPs are still relatively few.

Stakeholder mapping of smallholder livestock production shows the main players to be the smallholders, veterinarians, LSPs, pharma companies, and retailers. Characterization of the smallholder farmer community indicates that the majority of poor rural households raise ruminant livestock, with low productivity and ignorance of best management practices. The women in the household tend to the livestock. Owing to the shortage of GOB and private practicing veterinarians[53] and distance from the ULO's office, these women raisers of ruminants rely heavily on LSPs to resolve their livestock health issues. Pharma companies market not to the farmers but to the LSPs. These companies say it is LSPs who write 95 percent of the prescriptions for veterinary drugs.[54] A large retailer is usually affiliated with multiple LSPs, and often the LSP serves as micro-level retailer of both drug and feed products. Pharma companies typically sell to LSPs on credit.

The aforesaid LSPs are clearly the prime movers in servicing the country's smallholder ruminants. They are individual members of the small and medium enterprise (SME) private sector, tending to emerge from each local community based on their interest and trustworthiness within that community. They are distinguished from the majority of the community by being literate, with a secondary school education and up to three months of veterinary training. Pharma companies compete to keep them happy with training, free samples, and ready supplies of merchandise. Most of them have connections with one or more veterinarians from whom they can secure advice by phone on matters beyond their limited capacity to resolve.

2. ICT apps as a tool

Under LPIN, the modality its LSPs use to support both their client livestock farmers and DLS involves an information and communication technology (ICT) solution mediated by a group called mPower. This entity is a Bangladesh-based social enterprise that specializes in technology-based development solutions applied

[50] Accessed April 20, 2021.

[51] Rahman, M.H. and Rana, S. 2013. Farmer's constraints in receiving animal health services in rural areas of Bangladesh. Bangladesh Journal of Veterinary and Animal Sciences, 2: 20-26 (https://www.researchgate.net/publication/333199253_Farmer's_constraints_in_receiving_animal_health_services_in_rural_areas_of_Bangladesh)

[52]Roess, Amira A (2013). Animal Husbandry Practices in Rural Bangladesh: Potential Risk Factors for Antimicrobial Drug Resistance and Emerging Diseases. Am. J. Trop. Med Hyg 89(5), 965-970. November 6, 2013. (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3820344/)

[53]who tend to focus on poultry, as this is raised commercially and offers opportunities for private veterinarians to make a more profitable livelihood

[54]Pers. com. From mPower's Mushafiqur Rahman, and not only drugs of a veterinary nature but for human medical needs too

to a broad range of fields.[55][56] mPower is dedicated to information technology solutions and strategies that have maximum impact on people's lives.

ICT's effectiveness in improving agricultural extension services and incomes has been demonstrated globally in many contexts. For example, an SMS program for sugar cane farmers in Kenya increased yields by 11.5 percent,[57] and a mobile phone agricultural consulting service (*Avaaj Otalo*) in Gujarat, India, resulted in a yield increase of 28 percent for cumin farmers and 8.6 percent for cotton farmers.[58]

Since 2010, mPower has been supporting the country's farmers in improving their management practices through mobile phone-based information services. Its Agricultural Knowledge Bank (AKB) work was initially a knowledge hub related to crops, comprising an agriculturalist sitting in a call center receiving queries and supplying answers. As part of its mobile agriculture program (Agro360), mPower sends text and voice messages with crop management and weather-related recommendations to farmers. The messages are customized by farmers' crop choices and sowing dates. The topics addressed include advice on pre-sowing, sowing, fertilizer use, weeding, pest and disease management, irrigation practices, harvesting, and post-harvest management.

Under an additional initiative, the Pilot Program for Climate Resilience (PPCR) funded by Climate Investment Funds, mPower worked with smallholder farmers on selected vegetables and rice. This project aimed to increase farmers' revenues by adoptinng sustainable climate-smart agribusiness technologies and practices and to demonstrate business models for technologies, products, and services that would make farmers more resilient to climate change. Under this project, mPower developed a service entitled SHUFOLA that was rolled out to almost 65,000 farmers targeting six crops across four districts and nine *upazilas* in southern Bangladesh. One hundred forty-three lead farmers were deployed in the field to register and train smallholder farmers. mPower is now scaling up this service and reaching out to GOB and NGOs that have a significant farmer base for adopting SHUFOLA for their farmers.

3. The mPower SHUDOKKHO livestock app

In early 2018, LPIN and mPower signed an MOU though mPower had been in discussion with USAID before that. The group had earlier worked with USAID and been awarded grants. The USAID-supported project Agricultural Extension Support Activity (AESA) was another social enterprise with which mPower was associated. ICT livestock constituted a small component of AESA during which mPower's Farmer Query and AKB applications were developed.

The L & N Activity invited mPower to use its experience in Bangladesh to adapt its agriculture and crop- and climate-based apps to create a program specifically for livestock. The intent was that this platform would inform, support, and empower LSPs so that they could better assist livestock farmers. The result

[55]mPower is a social enterprise founded by graduate students of Harvard University and MIT in 2008. With the aim of enhancing the paradigm of social good with the power of great design, information, and technology, it began its journey in Egypt. Soon it spread to other countries in Africa before its center of gravity shifted to Bangladesh in 2010.

[56] On March 25, the LPIN evaluation team leader conducted a remote Key Informant Interview (KII) with Shah Mohammad Mushfiqur Rahman, Director of e-Agriculture at mPower. This Case Study is largely based on this KII, augmented by a remote KII with the L & N Activity's managers on April 7th, and information gleaned from other remote KIIs which the team leader conducted, and KIIs/FGDs/Surveys/direct observations in the field by the national consultants whilst conducting this FPE

[57]Casaburi, L. et al, (2019). Harnessing ICT to increase agricultural production: evidence from Kenya.2nd draft Sept 23, 2019. 25pp. Poverty Action (https://www.poverty-action.org/sites/default/files/publications/Harnessing-ICT-to-Increase-Agric-Production_Cassaburi-et-al._Sept2019.pdf).

[58]Cole, S.A and Fernando, A.N (2016).Mobile'izing agricultural advice: technology adoption, diffusion and sustainability. Harvard Business School, working paper 13-047.57 pp. (https://www.hbs.edu/ris/Publication20Files/13-047_155cb6a2-afb5-4744-a62d-929b01fc9e7c.pdf).

was the software dubbed SHUDOKKHO (meaning "highly skilled" in Bangla) to improve service efficiency and delivery of livestock and nutrition services (see Section 5 below for the SHUDOKKHO app content). The relevance of mPower's collaboration and grant agreement with the Activity relates to the latter's Results Framework Intermediate Result (IR) 1 (increased livestock productivity) through sub-IR 1.2 (improved livestock practices and technologies). Geographic coverage is eight districts and the whole FTF area. mPower has given initial and on-the-job training to the Activity's LSPs, both female and male, showing them how to use the app. This training has taken time as LSPs do not have much post-school education; before their association with the Activity, their skill set was derived mainly from learning by doing.

The view of SHUDOKKHO by the Activity's (ACDI/VOCA) management team

In a remote KII conducted with the Activity COP and his team by the FPE team on April 7, Mr Siddiquee explained that rollout of SHUDOKKHO has sought to ensure that its modules work as a means of sharing information with and educating LSPs to promote better management of farmers' financials and show transparency to farmers. Bangladesh's experience has been that ICT applications do not work well with farmers as they are too complex for an illiterate peasantry. So the SHUDOKKHO app was developed as a learning platform for veterinary drugs and emergencies, not for farmers directly (with whom mPower and SHUDOKKHO do not directly interact) but for the better-educated LSPs.

Thus, this app does not have a fodder modality, only veterinary and AI. To address the fodder component of livestock services, fodder-related messages are provided under separate cover by the Activity team to LSPs, such as "It is now fodder production season, so look out for information and planting material." A total of 1,100 LSPs under the Activity have received the SHUDUKKHO software on their smartphones and are currently using it. SHUDOKKHO focuses on veterinary information and training for LSPs geared toward solutions. The app, together with networking, ensures that LSPs link with veterinarians. Mr. Abdus Salaam (Livestock team lead with the Activity) confirmed that the Activity connects LSPs with clinics and other livestock institutions. He opines that during the two years he has worked with the Activity, LSPs have increased in confidence—they are very busy as farmers create high demand for their services.

When asked about the monitoring mechanism for the rational use of drugs, COP Siddiquee said that in the training given by DLS and the private sector, the Activity ensures that LSPs know what constitutes "malpractice." The SHUDOKKHO app's "prescription" module enables LSPs to know which medicines first require them to consult the ULO or a veterinarian before administering—for antibiotics this is a must. Farmers also need to be made aware of LSP services (type, prices, and benefits). Before an LSP gives treatment to a farmer's animal, she/he must send a note to the app on the diagnosis and what she/he intends to do. Transparency is created in this way for both public and private sectors. Before they joined the Activity, LSPs considered that local DLS offices did not recognize their work as having value. The program has ensured that the DLS office now supports LSPs, and the latter have noticed a change in DLS's attitude toward them. Regular communication between LSPs and ULOs has optimized the relationship, with LSPs providing ULOs/DLS with feedback from the farms. Pharma and other input supply companies also act as information sources for the LSPs, as well as acting as a source of income for them.

4. The needs of both LSPs and pharma companies to ensure effective service delivery

Presented below is a chart of five key challenges faced by an LSP/para-vet and means of addressing them.

	Challenges	What LSPs need to resolve them
1	With an average of 500 clients, an LSP's client relationship is mostly reactive in nature	A tool that would serve as an assistant, with access to a centralized knowledge and skill base, to help address farmers' challenges both reactively and proactively
2	LSPs often forget schedules of client visits and follow-ups	Auto-scheduler and reminder system
3	LSPs are prone to providing services and goods on credit without any record and sometimes forget to recover monies owed to them	Credit management system
4	LSPs tend not to track their costs and income and thus have no records as to the profitability of their professional work	User-friendly benefit-cost tools to keep track of their costs, debts, and income
5	LSPs often forget the names of the various medicines for specific conditions, doses, side effects, etc.	A tool that would remind them of such

The following chart presents pharma companies' challenges and needs:

	Challenges	What Pharma companies need to resolve them
1	For field data, Pharma companies do not have many data points, medical representatives being the major data providers	Better visibility and analytical capability of field conditions on things like disease trends, medicine usage, LSP activity etc
2	Due to lack of reliable data , their supply chain cannot perform efficiently	Better way of devising a competitive landscape to facilitate informed business planning
3	Their promotional activity towards LSPs is based on perception rather than being driven by data; for example, volume of prescription sales generated by an LSP and specific brands prescribed by an LSP	Targeting LSPs based on their activity level
4	Making promotions to LSPs is both resource-intensive and time consuming	Faster way of communicating with LSPs on specific messages

5. Features included on the app to address the concerned parties' needs

News on livestock: Every day there is fresh news published on the app whereby LSPs can learn the latest development in the industry. They can also explore the news published earlier.

Record keeping: LSPs can keep records of interactions with farmers and of phone inquiries.

Client visit schedule: All new visit records are arranged here as part of a client-centered complete visit schedule, with farmer information and scheduled time. An automatic alert is generated 30 minutes ahead of each visit.

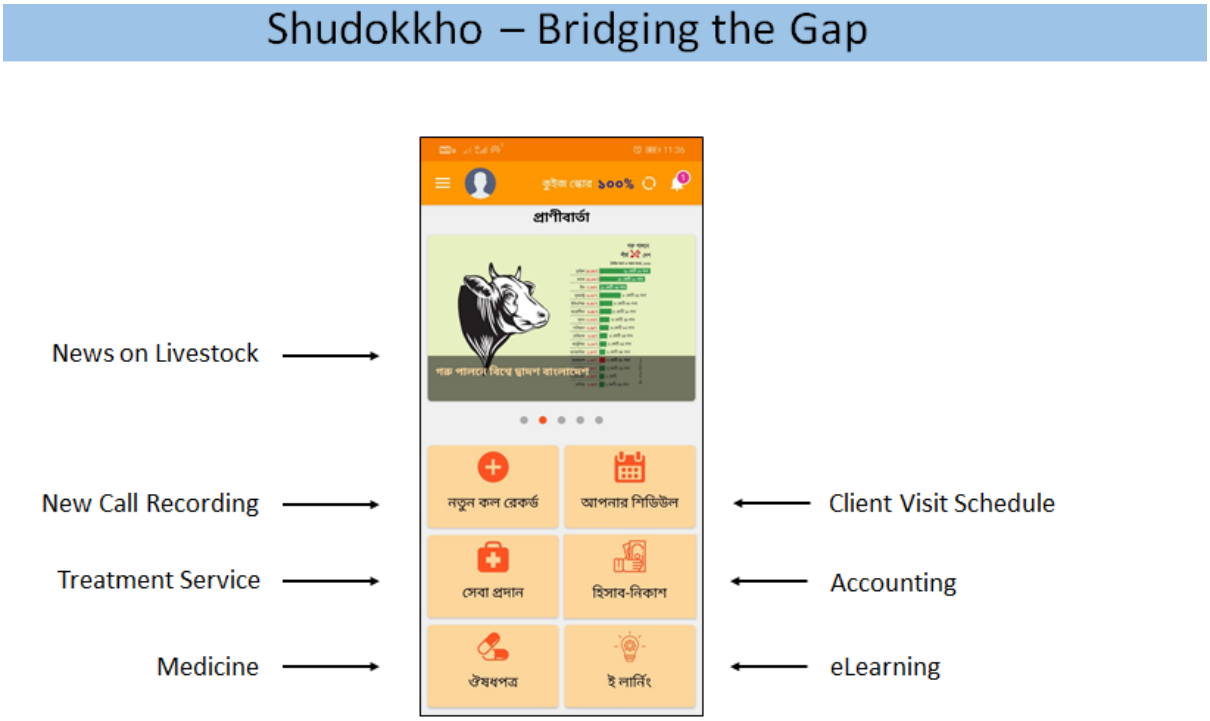
Treatment service: At the center of the system is the treatment service, using which an LSP can find the appropriate medicine with the standard dose prescribed by the app automatically; follow-up visits can also be scheduled.

Medicine: Under this functionality, an LSP can identify any medicine available in the market and learn from the associated veterinary information. Medicines can be searched for by disease type, medicine type, generic name, and company name.

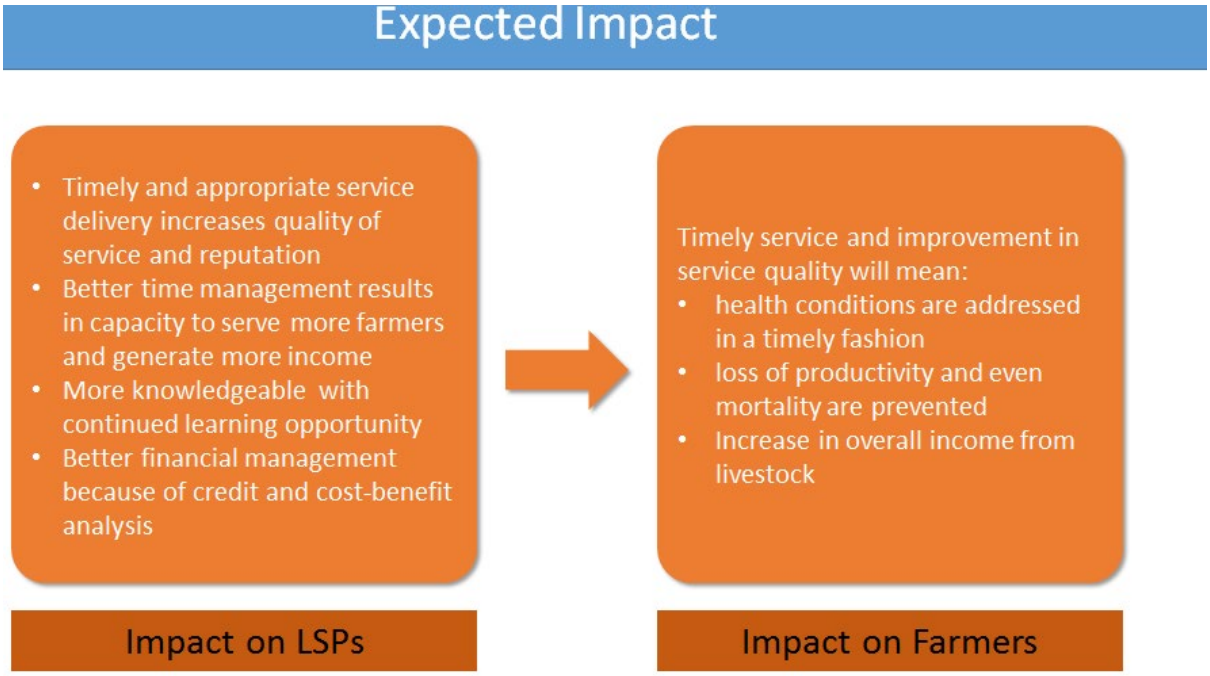
Accounting: The LSP can record service fees with credit information. This income will then be shown in a dashboard of 7-day and 30-day periods. An LSP can also look at the credit history from a list and place direct calls to the farmer.

eLearning: All the knowledge an LSP needs to have is placed in this feature in bitesize modules. An LSP can track her/his progress by course unit and get certified for successfully answering quizzes following completion of the courses.

SHUDOKKHO thereby offers a solution to bridging the gaps identified in (4) above. It provides a menu-driven assembly of press-button call-downs, as pictured below.



The impact of using the app for both LSPs and farmers is represented below:

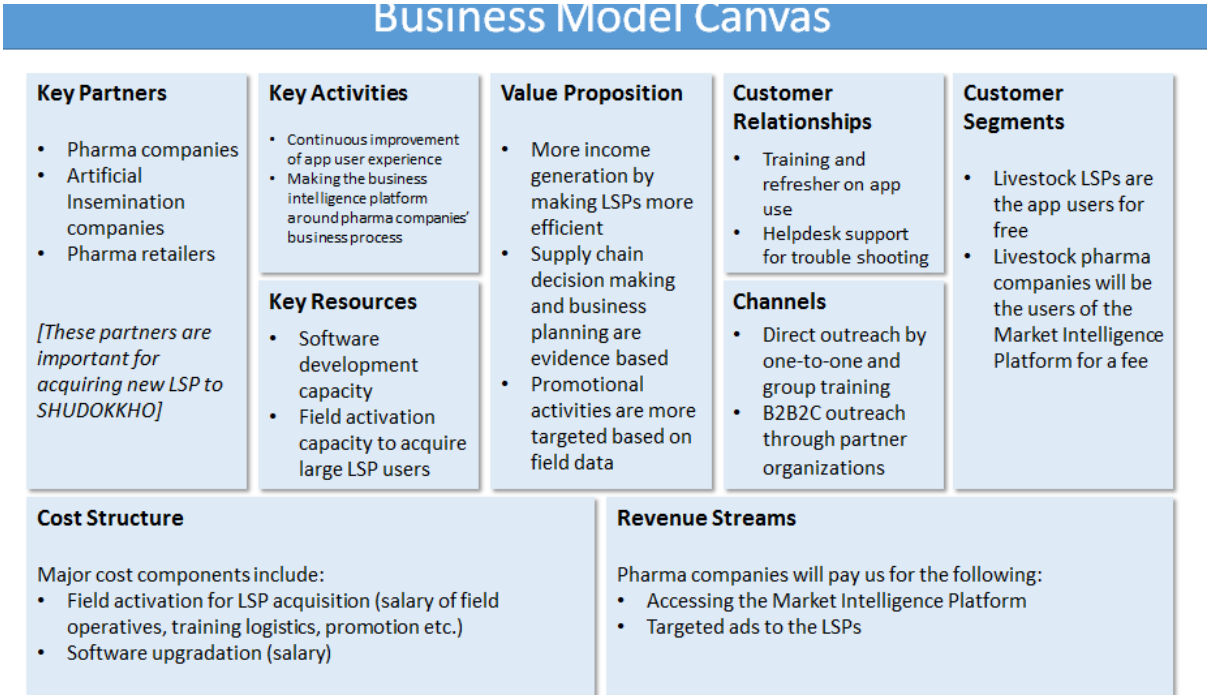


6. SHUDOKKHO app sustainability

Affordability had become an issue for rolling out SHUFOLA, explained Mushfiqur Rahman during the March 25 interview. As long as the information was provided free, there was great interest across the farming community. However, such a freebie model outside the public sector is neither commercially viable nor sustainable. When mPower started charging for the service, even at just 25 cents per item of information, LSP interest waned drastically. mPower therefore needed to conceive a categorization of users that identified revenue sources that would help it carry forward the service beyond its initial development phase, which used funding from the International Financing Corporation. In this way, farmers and LSPs would continue to receive the service free of charge, whereas those who used it and had greater financial resources were called upon to pay a subscription fee—input companies, INGOs/ NGOs, GOB organizations, and micro-finance institutions.[59]

[59] Another aspect of mPower's sustainability strategy was to associate its AKB with other services.

The commercial sustainability of the app's presence in the livestock sector may be represented as follows:



The revenue streams from the pharma companies will enable mPower to keep providing the service and continually upgrade it based on feedback. As more and more LSPs are trained, come to know of, and benefit from using the app and more farmers are pleased with the service provided (as indicated by improved productivity and profitability), more sales will be generated and the subscription service will be increasingly consolidated. The private sector involvement (pharma companies, farmers, private sector veterinarians and laboratory services, and LSPs) will have been corporately responsible for the sustained success. Additional beneficiaries will of course also include the consumers of the incremental primary and secondary products generated from the improved productivity, the many incremental jobs that will be created along the value chain, and the import substitution benefits to the national balance of payments.

mPower has concluded that although a variety of mobile-phone-based techniques have proven effective in informing farmers on best practices, effectiveness (and hence sustainability) depends heavily on local factors. Research has shown a large variation across various settings in the effectiveness of various ICT solutions (including SMS, IVR,[60] and other communication strategies).

mPower and Precision Agriculture for Development are partnering to rigorously evaluate mPower's Agro360 program in Bangladesh and improve its impact and are currently investigating whether an additional voice-based component to its SMS services could improve impact. Though SMS content might be particularly useful for later reference (e.g., for farmers to share with agro-dealers when purchasing inputs), voice messages on recommendations might be easier for many farmers to understand, bearing in mind the low literacy rate in rural areas (approx. 65 percent in 2017 according to the Bangladesh Bureau of Statistics). Such advanced features will be transferable to the SHUDOKKHO app.

DLS and BLRI are both indirectly involved with rolling out SHUDOKKHO. To foster sustainability, however, mPower does not foresee the rollout being taken on as a government service. Rather, it needs

[60] Interactive voice response is a technology that allows humans to interact with a computer-operated phone system through the use of voice and Dual-Tone Multi-Frequency tone input via a keypad.

to embed itself in the LSP cadre and be an integral part of the Livestock and Nutrition Activity business model.

7. Measure of success as a guide to future rollout of the SHUDOKKHO app in any continuation of USAID's Livestock and Nutrition Activity in Bangladesh. The three-year overarching MOU with the Activity came to an end on March 31, 2021. In USAID's original Activity Project Description, the target number of LSPs to be equipped with the SHUDOKKHO app was just 82, but 120 were distributed in just the first six months. Up until March 25, 2021, 1,100 had been deployed using LPIN money, with a further 2,291 distributed to LSPs beyond the Activity using mPower's own finances. In terms of uptake, the mPower component of the Activity has therefore far exceeded expectation.

The app's promise and usefulness have been recorded in the Activity's Annual Progress Reports for 2018–2019 and 2019–2020 (see Appendix 1 below). Furthermore, in addition to the beneficiaries cited in Section 6 above, mPower's field investigations indicate that there are high numbers of unintended beneficiaries, as 65 percent of farmers targeted by the SHUDOKKHO app indicated that they shared the information they received with others, primarily from the same village.[61] These precedents are surely a good indicator of need and utility though there has yet to be an independent evaluation of this, to which mPower's Mushfiqur Rahman himself drew attention during the KII with the FPE team leader on March 25.

An extension of the general Activity-mPower MOU in a post-Activity phase would enable fine-tuning of the app to make it even easier for the LSPs to navigate and thereby make it more sustainable. For the Activity, the app was formulated to combine multiple features into one solution for farmers. The model is still evolving to a post-Activity phase, with mPower wishing that livestock nutrition be integrated into it and for human nutrition to be addressed through improved livestock productivity. In addition to extending its scope in this way, there is need to make it simpler for LSPs to use; many app users shy away from uploading data, despite not having to do so directly but choosing from a drop-down list (multiple choice). This operational constraint may best be resolved through more on-the-job mentoring for LSPs.

Feedback from LSPs and government livestock officers in the field has provided mixed messages. On the one hand, two livestock officers in Satkhira District said in their KIIs that they had trained LSPs in SHUDOKKHO. In addition, on April 15, as revealed to Dr. Raihan, SHUDOKKHO training for LSPs in Khulna Dumuria was set up by ULO Dr. Sultana and by ULO Dr. Halder in Batighata, Kulna. Moreover, Dr. Raihan has conducted a KII with Salim Mahmud of mPower. In 2019 Salim started training LSPs in the field on SHUDOKKHO and has now completed 82 one-day training sessions, with 1,012 LSPs having been trained (902 male and 110 female). The app has 11 e-learning courses with contents designed by veterinarians. The Activity helped organize these trainings and covered the cost. Salim says that LSPs are highly satisfied with the app.

However, there are indications that all may not be well with the app at field level. For a start, a smartphone (with an internet connection) is necessary and not all LSPs have these. Even when they have, many tend to use the app as a training aid, a book for learning new information. For instance, in an FGD on April 18 with Dr. Raihan, LSPs in Batiaghata, Khuln, expressed appreciation for SHUDOKKHO as an informative learning instrument (rather than a management tool). The database aspect is not clear to all LSPs as it needs to be more user friendly. LSPs need more hands-on training and on-the-job mentoring because hardware and software skills cannot be honed virtually (under COVID-19-related restrictions). LSPs are not well educated, many not having an HSC or advanced familiarity with internet usage. They can use Facebook but not engage with the app as a tool, which involves uploading their practice data. The app's

[61] Pers. comm. Mushfiqur Rahman, March 25, 2021.

workability needs to be monitored. DLO Faridpur says he has had the app training but there was no follow-up after training. He is upset that the app software is not linked with the DLS database, saying his district will benefit only if his staff can use the app in the DLS system.

Another complication is that the Activity has set up a "competing" facility in its one-stop shop in each *upazila*, at which farmers can register their data. It seems to be easier for LSPs to upload data at this shop than on the SHUDOKKHO app. Indeed, so popular are these shops that there are calls for more than one such shop per *upazila*.

Appendix 1. Some excerpts relating to mPower from Activity Annual Progress Reports, FYs 2018–2019 and 2019–2020

The 2018–2019 Annual Progress Report (APR)[62] mentions that the Activity will support mPower to develop the SHUDOKKHO app for LSPs. To promote the Activity's Access to Information component, mPower initially provided training and launched field testing with 14 LSPs, making user-friendly adaptations to the app based on feedback from the field. It then selected, oriented, and created profiles for 89 LSPs, including 16 women, who would use the application. In addition, mPower completed the design of an associated tele-veterinary service business intelligence dashboard for private agrovet companies (SHUROKKHA), which can also be accessed during Activity implementation.

In the 2019–2020 APR, there was mention of the Activity working with mPower to develop a sustainable, commercial business model to scale up and improve the blended learning skills development program for 1,000 men and women LSPs. During the period covered by this APR, 522 LSPs (388 from the ZOI) were registered on the SHUDOKKHO app, with 485 actively using one or more modules of the app. During FY 2020, 143 LSPs recorded on the app 5,937 service deliveries to 3,804 farmers, while 108 LSPs recorded 3,288 schedules to visit 2,397 farmers. During the grant period up until the end of the FY 2019–2020 reporting period, 135 LSPs (including 14 females) were trained by mPower and improved their service quality by using the app. As a result, their gross income rose on average by 16.8 percent, from $245 to $285 (BDT 20,216–23,607), and the average number of client farmers per LSP rose by 20.6 percent, from 115 to 139.

During the COVID-19 pandemic, the SHUDOKKHO app has gained popularity with LSPs, owing to their enforced reduced mobility. During FY 2019–2020, in a further example of cooperation with the Activity, mPower also developed a digital cattle platform to ensure cattle traders had alternative access to cattle markets during the pandemic and briefed 25 Activity-trained LSPs on its use and the process of registering cattle for sale.

As an example of how SHUDOKKHO was used to disseminate nutrition-related messages, during National Nutrition Week April 23–29, 2020, the Activity shared messages with LSPs (and hence farmers) on the nutritional benefits of milk, other dairy products, and meat, as well as the importance of handwashing. The Activity also passed the same messages to dairy processors and milk collectors through other ICT platforms.

The Activity signed another grant agreement with mPower in July 2020 to develop a remote mobile application for capacity building and offer support services to 1,000 LSPs in the FTF region. In collaboration with a for-profit livestock training institute, mPower committed to launch a blended-learning skills development that combines classroom training with ongoing app-based training modules, the latter being accessed through the SHUDOKKHO app.

[62] This is the first time that mPower has been mentioned in the six 2015 to 2019–2020 series of Activity Annual Progress Reports.

ANNEX 20: SUMMARIES OF NINE KEY ACTIVITY PARTNER CONTRIBUTIONS TO THE IMPLEMENTATION

These summaries, based on KIIs conducted between March and April 2021 by the FPE team leader John Ashley, are tied to the EQs.

CO-IMPLEMENTER
1. Borlaug Institute for Agricultural Research, Texas A & M University, USA (Dr. Steve Whisenant and Dr. Maad Rawendoozi)

LSP TRAINING INSTITUTIONS
1. Faculty of Animal Science and Veterinary Medicine, Patuakhali S & T University, Barisal (Professor Md. Fakruzzaman)
2. Department of Veterinary and Animal Sciences, University of Rajshahi (Professor Md. Jalal Uddin Sarder)
3. Chattagram Veterinary and Animal Sciences University (CVASU), Chittagong (Dr. Md. Inkeyas Uddin, Senior Scientific Officer, Poultry Research and Training Center – PRTC)

PRIVATE SECTOR
1. SME Corporation (Mr. Hridoy Islam, Project-in-Charge)
2. BRAC Dairy and Food Project (Dr. Md Harun-Or-Rashid, Deputy General Manager, Milk Collection and Production Services)
3. BRAC AI Enterprise (Dr. Md. Matiur Rahman, Manager, Livestock Services and Training, BRAC Artificial Insemination Enterprise)
4. ACI-Godrej (Dr. Debashis Paul, Head of Sales and Marketing) Social Enterprise
9. mPower (Shah Md. Mushfiqur Rahman, Director of eAgriculture)

CO-IMPLEMENTER OF THE ACTIVITY

Borlaug Institute for Agricultural Research (Dr Steve Whisenant and Dr Maad Rawendoozi)

Livestock productivity. EQ1b: What has been the Activity's success in building the capacity of the DLS and BLRI in the areas of research, production, and distribution of improved fodder materials?

Drs. Whisenant and Rawendozi came to Bangladesh on several occasions between June 2015 and mid-2017 for a BLRI institutional needs assessment and GoB fodder production training.

The Borlaug Institute's international training unit "designs and implements science-based agricultural development and training programs that guide the phases of agricultural industry from production to consumption in order to fight hunger and poverty among small-holder agricultural communities of the developing world." (https://borlaug.tamu.edu/international-training-2/)

Dr. Steve Whisenant (Regional Director for Asia) conducted a rapid institutional needs assessment of BLRI forage, fodder, and feed programs in October 2015 to assess institutional financial sustainability, research management capacity, ability to access and reproduce a variety of fodder and forage species, capabilities in managing saline-tolerant and aquatic fodder and forage research, capacity to conduct cost-benefit analyses of alternative forage and fodder production and supply systems, and institutional capacity to disseminate research findings. The institute will also strengthen BRLI's capacity to select suitable varieties and scale up production and distribution of high-quality available fodder/forage materials. The work will aim to improve the whole FTF zone's fodder and forage production. The institute worked with

BLRI to develop a ToT program on feed production and management to increase demand for and technical knowledge to cultivate fodder/forage crops.

Dr. Maad Rawendoozi conducted a three-week trip to assess project-led fodder demonstration plots and fodder production farms to provide recommendations to improve production systems, visit dairy farms and feedlots to better understand the dairy value chain, and, in conjunction with key stakeholders (including BLRI, BRAC, and DLS) prioritize and map the current challenges to livestock production in the southwestern region of Bangladesh.

Major observations:[63]
1. Farmers do not understand cattle's nutritional needs, only their hunger.
2. Farmers are not prioritizing storage of fodder and making silage for the lean season.
3. Fodder production networks of farmers/entrepreneurs had developed from Activity ULO demonstrations and distribution of planting material.
4. Some fodder demonstrations upcountry were poorly managed, with no facilitation for farmers to visit on open days; there is need to include saline-tolerant species/varieties for testing.
5. DLS and BRLI would not attend the same workshop together, revealing an institutional impasse that curtails synergy and effective GoB livestock service delivery.
6. BLRI greatly needs generic capacity building (staff training, facilities, lab equipment, logistic support etc.), though much of this is beyond the Activity's mandate.
7. Women livestock farmers may wish to expand their areas of fodder, but time to do so is constrained by their household obligations.

Recommendations:
1. Emphasize planting material distribution and training (including saline-tolerant types for flood-prone saline areas), rather than fine-tuning variety recommendations.
2. Address storage and silage for lean season feeding.
3. Cost-benefit analyses need to accompany all fodder solutions (growing fodder to feed or sell can be more profitable than growing rice).
4. Overreliance on Napier can lead to ruminant metabolic deficiency disorders and death, so farmers must also provide a mineral-rich nutritional supplement.

LSP TRAINING INSTITUTIONS

Professor Md. Fakruzzaman, Faculty of Animal Science and Veterinary Medicine, Patuakhali S & T University, Barishal

Livestock productivity. EQ2a. How successful has the Activity been in building the capacity of LSPs to act as trainers for livestock farmers and other livestock value chain actors?

Student AI technicians undergoing training at the Department of Genetics and Animal Breeding, Faculty of Animal Science and Veterinary Medicine, Pathuakhali Science and Technology University, Barisal. October 28, 2020 (under USAID's Livestock and Nutrition Program).

An MoU with LPIN was signed in July 2020. One training, starting October 28, 2020, and lasting 50 days, was given to 19 women AI trainees, with emphasis on cattle and goats. Theory classes were interspersed with practical sessions. AI was defined and its advantages and limitations explained. The students were taught about semen, refrigeration, liquid N at -196°C, and proper recording of data. They were shown the anatomy of the animal's reproductive organs and taught oestrus/heat symptoms. The tuition also

[63]These major observations and recommendations by the visiting Borlaug team have been incorporated into the main text of the report.

covered general livestock management: feeding for proper nutrition, dependent on whether the animal is a young calf, an older calf, or a pregnant/pre- or post-parturition cow. Also fodder issues and need for silage and hay for the lean season were discussed; in the monsoon season, the land in Barishal is flooded, so saline-tolerant fodder species are required.

Following training, back in their own home areas, each AI technician started work as an LSP, charging $4–5 per insemination, having bought the semen straw from BRAC AI for $2.50. The technicians also sell veterinary drugs so that they can sustain a comfortable livelihood. AI technicians call Prof. Fakruzzaman to discuss and solve problems they may have in the field. They do well but can make silly mistakes, the professor says. After six months, they need 10-day refresher training, which is due now.

Professor Md. Jalal Uddin Sarder, University of Rajshahi, Professor of Veterinary and Animal Science and President of the Bangladesh Livestock Society

Livestock productivity. EQ2a. How successful has the Activity been in building the capacity of LSPs to act as trainers for livestock farmers and other livestock value chain actors?

Cooperation with the Activity started in April 2018. Professor Sarder's contribution was as a Trainer of Women Technicians/LSPs in livestock management, health, and breeding. He ran two training programs: April 15–29, 2018 (15 days for 23 women LSPs), and Feb. 17–March 2, 2020 (15 days for 25 women LSPs).

The syllabus included livestock management (feed and fodder), how to manage livestock health/vaccines, AI, monitoring and follow-up, women's empowerment, and communication. The training was conducted through demonstrations, lectures, field visits, and case studies. Teaching and accommodation were at the university. All 27 teachers in Prof. Sarder's Dept were involved. The women much enjoyed the sessions and cried when it was time to go. The trainee catchment area was Jashore and Satkhira Districts.

Training of the LSP cadre augments the limited GOB services. Seventy-six percent of households rear livestock, but there is only one veterinary assistant (maximum) per *upazila*, with each *upazila* on average having 1 million cattle and 1 million goats, together with buffalo and chickens. Many *upazilas* have no GOB vet assistant. LPIN is addressing this capacity gap (together with BRAC AI and CARE Bangladesh etc.).[64] Prof. Sarder used to be a veterinary doctor with GOB and still has close links with DLS and BLRI. There is an urgent need to train more LSPs/vet assistants to address this low level of service to livestock farmers.

He was impressed by the women trainees' caliber; they will readily find self-employment as LSPs, having easy access to farmers (as most livestock are reared by women). LSPs can go door to door in the south of the country. Women do not need their husband's permission to do this now. This training results in women gaining confidence, with improved income, empowerment, and decision making.

Prof. Sarder was of the view that the whole farming system needs to be addressed—livestock, crops, and forests. There are also no dedicated slaughterhouses; animals are killed everywhere. This needs to change. In his view, Prime Minister Hassina has a personal interest in promoting the livestock sector. Now there are 13 agricultural universities and 13 veterinary universities and many dairies and sheep and poultry farms. Livestock numbers in Bangladesh are the 11th highest in world rankings though productivity is low. The sector is overdue for further attention. For this reason, there is need to expand the Activity.

[64]The big player in this technical field is the World Bank's Livestock and Dairy Development Project, with a $500 million loan (infrastructure, consumer awareness, and nutrition).

Through the training given under the Activity, 48 female LSPs have been launched into the livestock service sector to improve productivity. A milk yield per cow of 1 liter/day was the average a decade ago, but this has now risen to 6 liters/day through better fodder and disease control and cows' higher genetic potential.

In answer to the question of multinutrient block supplementary feed, Prof. Sarder said that although fodder and vaccinations are important to reduce mortality, multinutrient blocks are very important to reduce metabolic diseases, and training in these is needed to create awareness in both the blocks and fodder production. With such a high population density (1,000 people per sq km) and insufficient grazing, trace elements are not readily available for the livestock. Costly improved breeds can die because of trace element deficiency, so multinutrient blocks are important as a tool in livestock management. Dr. M. Saadullah was the first to conduct research on these blocks in Bangladesh at the Agricultural University, Mymensingh, in 1985. Both he and Prof. Sarder are keen that the blocks be popularized.

Dr. Md. Inkeyas Uddin, Senior Scientific Officer, Poultry Research and Training Center (PRTC), Chattagram Veterinary and Animal Sciences University (CVASU), Chittagong

Livestock Productivity. EQ2a. How successful has the Activity been in building the capacity of LSPs to act as trainers for livestock farmers and other livestock value chain actors?

Dr. Inkeyas Uddin started his cooperation with the Activity in March 2020 as coordinator of training programs and monitoring follow-up at the university and focus person for the Activity. There are three functions of his veterinary center: (1) tailor-made training, (2) research (the university's master's and Ph.D. students), and (3) public access laboratories—dairy and fish farmers bring samples to him for analysis. Though Dr. Uddin is with the Poultry Research and Training Center, this does not mean he deals only with poultry. He teaches across many livestock and fisheries disciplines and food safety.

He has conducted one training as part of the Activity (March 1–8, 2020) for 17 women LSPs in animal health and production and farm management. The students were mainly from Cox's Bazar. More LSPs would have been trained, but collaboration with the Activity was curtailed by COVID-19-related restrictions. The subjects were nutrition/feed and fodder, AI, livestock health, women's empowerment, business development, communication, and so forth through discussions, lectures, practicals, farm visits, and question-and-answer sessions. Training was done at the veterinary clinics at Dr. Uddin's University. The schedule was as follows:

Day 1: LSP limitations, livestock breeds, housing, and fodder cultivation and storage
Day 2: Formulation of balanced rations for cow and calf; low-cost feed formulation using local resources to reduce outlay; milking procedures, milk storage, how to prepare *dahi,* etc. (farmers need to process milk into secondary products as they cannot always sell the milk)
Day 3: Vaccination—how to maintain quality of vaccines in transit and storage and practical sessions on vaccination at the university veterinary clinic (mainly with cattle but some training on goat and buffalo as well); how pregnancy can be detected in the cow; examination of clinically sick animals; collection of samples—many livestock patients are in the university clinics, so this was good experience for the Activity LSP students

Day 4: Biosecurity; AI versus natural insemination; how to inseminate and the proper time to do it; recognizing symptoms of oestrus so can LSPs can detect when the cow is in heat; basic information on bacterial and viral diseases of livestock; how to treat and prevent diseases.
Day 5: Reproductive health management, goat farming, beef fattening, poultry, balanced rations; students were taken to a poultry farm 50km away for practicals and lectures

Day 6: Field visit to a GOB dairy farm 30km away from Chittagong and a goat farm; hands-on training

Day 7: Preparation of livestock housing and hygiene matters; disease diagnosis and prevention; animal welfare and disposal after death; primary treatment; restraining animals during vaccination or clinical examination

He linked the LSP students to DLS as they will in the field collect vaccines and semen straws from DLS. Once deployed, the LSPs can call Dr. Uddin or his staff for advice as necessary. To each student he issued a training certificate, a kit for treatment and sample collection, and an apron for use in the field. Students were issued a manual before training, which they took away with them, and a notebook. He is satisfied with their performance in the field. Women get support from their families to empower them–one LSP can help 150 farmers. In this way, they help GOB deliver services as DLS staff cannot reach all farmers. LSPs earn money in the process. He has had no link with the mPower app SHUDOKKHO.

The LSP training he has given supports GOB, the LSPs augmenting DLS's limited outreach. His women LSP graduates have shown themselves to be very successful at serving women livestock farmers. Dr. Uddin is happy to provide more training in future—there would have been more training over the last year but for COVID-19 (Dr. Uddin has had three of his staff come down with COVID-19 recently). Only health clinics are ongoing at his university now because of the lockdown. Training to his own university students was given online over the last year. He plans to continue with ACDI/VOCA. Dr. Uddin has given training to that NGO outside of the Activity to women in Chokoria.

Any Activity extension must include poultry in his view—these are very popular and low in cost. Women can rear poultry, and poultry have no vaccination needs to be scheduled at present—not because it is not needed but because villagers believe that if a bird is vaccinated it will die. Also, vaccines are not available. One hundred fifty families together are needed for a vaccination program—the caseload that an LSP can handle. Cattle and poultry are the main livestock in Bangladesh, with goat and buffalo of lower importance.

PRIVATE SECTOR

SME Corporation. Mr. Hridoy Islam, Project-in-Charge

Livestock Productivity. EQ3c. What have been the major constraints and opportunities with respect to developing and establishing the LSP business model? EQ3c1. Is credit readily available to individual farmers or groups?

An MOU between the Activity and SMEC was signed in May 2019, and collaboration concluded in February 2020. SMEC's role was to provide access to a finance partner for family dairy/livestock farming smallholders targeted by the Activity so that they can generate an income from their enterprise. SMEC has good access to a range of financing partners and can help farmers choose financial products adapted to their needs.

SMEC has facilitated loans for them through its partners (such as Society Development Committee and Bank Asia). Although loans were arranged for several fodder production enterprises and beef fattening, the primary focus was dairy. Most funds were used to purchase cows and the associated physical infrastructure (sheds, flooring, and drainage). The average loan was 30,000Tk, which buys a small cow. For larger loans, farmers were referred to banks.

SMEC tried to get farmers to formalize their businesses to move out of subsistence mode. There is need for a business owner to obtain a loan; the next necessity is a trade license, so farmers then qualify for a larger loan. SMEC helped facilitate this transition. SMEC sought to understand how beneficiaries were using the funds to help them use the loan wisely and grow sustainably. Beneficiaries were encouraged to

graduate from microloans to larger financing through banks. In this way farmers can expand their businesses.

Ninety-five percent of those receiving loans through SMEC were women-owned and -led businesses. SMEC endeavored to get banks to target women also, with positive results. As a result of negotiation, SMEC removed the need by its partner (Bank Asia) for surrender of a title deed, the requirement for which was excluding many women entrepreneurs. Instead, it was sufficient for women to demonstrate an ancestry link with the area (e.g., photocopy of title deed from the farmer) or an electricity bill. Local demand for milk was an important criterion for farmers to be given a loan, so there was no need for SMEC or the Activity to look for markets beyond.

The 2020 Activity Annual Progress Report states, "B SME Corp facilitated 302 dairy enterprises to avail financing of approximately $US130, 560 (BDT 10,836,500) with an interest rate of 9 percent through banks and 23-24 percent through MFIs" (p. 21). Hridoy Islam generally agrees with the quote but says the high interest rates quoted for MFIs @ 23–24 percent are too high as the loan is short term, it having more like a 14 percent effective interest rate. That more milk and meat are being consumed at household level and also being sold with a higher profit margin is evidence of SMEC/Activity impact.

As part of the Activity-SMEC cooperation, 1,800 farmers have been trained: (1) Financial Literacy for Farmers—900 farmers were taught the benefits of using a bank account and to record transactions, separating the business account from the personal account, importance of servicing debts and how they can save to do this, and reinvesting in the farm. Training was given over three months in Dhaka; (2) Dairy Farm Management training over three months, using a module designed for LSPs, who then on-trained 900 farmers. This training was conducted in multiple locations.

SMEC thereby built capacity of LSPs and farmers over the period of the Activity. SMEC/the Activity worked with farmers to digitize their operations and help them manage their finances, using LSPs to facilitate. Activity/SMEC cooperation exceeded the targets set in project documentation and helped digitize the Activity's own operations also. Even beyond the 22-month length of official cooperation, Activity staff and SMEC have continued working together informally.

Hridoy opines that the Activity/SMEC success is a result of ACDI/VOCA staff's active engagement with SMEC staff in the field and with farmers. He noted that even on weekends ACDI/VOCA staff are there, even as observers.

BRAC Dairy and Food Project. Dr. Md. Harun-Or-Rashid, Deputy General Manager, Milk Collection and Production Services

Livestock Productivity. EQ3c. What have been the major constraints and opportunities with respect to developing and establishing the LSP business model?

Cooperation started in October 2020 following the signing of an MOU in August 2020. BRAC D & F collaborated with the Activity in its actions in Kulna and Jessore, where BRAC D & F is based. Cattle are managed largely by women, who make a huge contribution to dairy farming, whereas men are involved mainly in cash cropping. BRAC D & F and the L & N Activity together fully understand that upgrading livestock farming improves women's conditions. Several important interventions have been made.

The Activity's farmers have been linked with D&F's milk marketers, before which farmers could not sell much of their milk. Support is given to collect milk at competitive prices and onward selling of milk, enabling a profit along the value chain. Increased profitability is a concept well understood by farmers.

Once household needs are fulfilled, they sell milk and surplus fodder they may have on the market. BRAC has a marketing unit, but messaging targets urban areas, not rural.

Milk processors have been trained, with hands-on experience provided in collection of milk, improving productivity, veterinary treatment such as deworming, and encouraging marginal farmers to move on from subsistence livestock production. Other basic livestock management training is given, not just on fodder growing. Thus, providing water ad lib rather than just two or three times a day results in greater milk productivity; also untying the cow so it can roam and feed and promotion of feeding green grass rather than straw increase milk productivity by 20 percent. The result is better household nutrition, happiness, and economic stability.

Milk consumption has increased over recent years, this last year being an exception because of COVID-19. From 2015 to 2019, there had been a 10–20 percent increase every year. There is a plan under BRAC to prioritize secondary processing of milk. Currently there is growth in both cottage (Dhaka) cheese manufacture and market demand. Production of AARONG cheese is in central processing plants, though not at household level, through PRAN and MILK VITA (only in the north of the country is cheese made at household level). Nationally, there is growth in both cottage (Dhaka) cheese manufacture and market demand. Normally, homestead cheese manufacture is restricted to the north of the country. There is less processing of meat than milk—there are no local meat processors, only milk processors. Bengal meat is the exception, but that targets profitable urban markets.

Fifty-six farmers have been trained as grass-growing entrepreneurs, production area for whom covers 27ha. Three thousand farmers were targeted in the collaborative effort, 1,000 of whom have been provided with grass seed (3mt in total). Demand for fodder outstrips supply. The collaborative training effort also involved both DLS and BRLI, their own staff having received training. Dr. Harun-Or-Rashid has also introduced multinutrient blocks under the BRAC/L & N Activity collaboration. These blocks are an essential component of livestock nutrition addressing micronutrient deficiencies, which fodder alone will not satisfy. Napier is a good perennial that will last four years. However, this is being replaced increasingly by Jumbo Gold grass and maize, which produce greater biomass and can be used to make silage for feeding in the lean season, when otherwise milk production decreases significantly.

The silage-making experience of BRAC D&F has been availed by training the Activity's farmers in silage production using Jumbo Gold, *Zea mays* (corn), and Napier, aimed at the July to October lean season, when fresh fodder is in short supply.

BRAC D & F is providing credit through BRAC Bank Ltd. at a 4 percent interest rate, lower than other local micro-finance institution rates, a COVID-19-related stimulus package. The credit was used for leasing land to grow fodder, for silage making, and for 1,000 farmers to buy an improved breed animal. There is huge demand for credit from L & N Activity farmers and other farmers. The increased profitability from leasing land to grow fodder allows for reinvestment in the livestock, enabling another animal to be bought (1,000 farmers have already bought an improved breed), and silage making. There was a government scheme that finished on March 31, 2021, whereby if a bank account is opened in a woman's name, interest on loans is 7 percent, not the 9 percent charged to men.
For AI, provided once a year to a farmer, one straw costs 300Tk, half of which is contributed by the farmer, with BRAC providing the other half. Money that BRAC makes through this is used to help fund this and other projects it runs. The BRAC project also runs six vaccination health camps that the Activity's farmers can attend.

In terms of livestock and nutrition messaging, Dr. Or-Rashid laments that using the agency of drama is not possible now because of COVID-19-related restrictions. Nevertheless, the medium of TV is good as people watch this in rural areas. Community radio has great potential that has not been realized.

BRAC AI Enterprise. Dr. Md. Matiur Rahman, Manager, Livestock Services and Training, BRAC Artificial Insemination Enterprise

Livestock Productivity. EQ3c. What have been the major constraints and opportunities with respect to developing and establishing the LSP business model? EQ3c1. Is credit readily available to individual farmers or groups?

March 2020 was the date of the official MOU between BRAC AI and the Activity though both parties have been working together since 2015. Dr. Matiur, with ACDI/VOCA, manages the AI component of the Activity. BRAC is an NGO (Social Enterprise) and trainer, independent of GOB. BRAC AI, and the L & N Activity work well together owing to an alignment of objectives, both providing a resource for the people.

The number of AI technicians trained in 2020 was 19, and in 2021 thus far 3, but only 2 of those were accepted based on on-the-job field assessment after graduation. Since the MOU was signed, training in AI techniques has been given to women; before, such training was given only to men, in the Activity and elsewhere.

The AI training module for field technicians (LSPs) was developed with GOB. It comprises two months initially at a training institution, followed by a one-month apprenticeship in the field. The Activity and BRAC AI work with the Faculty of Animal Science and Veterinary Medicine, Patuakhali, Barisal. The curriculum is 60 percent practical. The criteria of selection of trainees include the need for a secondary school certificate, an age of 20–35, and having social acceptability/credibility in her home area, with no criminal conviction. The training is given at a university institution when possible. However, when COVID-19 came in a year ago, university institutions closed, so training was given at a site close to the university. On "graduation," on-the-job field monitoring is undertaken with a veterinary surgeon, who assesses whether the graduate can do the job in a field situation.

BRAC AI provides liquid nitrogen and straws to the trained women technicians at a charge of $2 per insemination, and the technicians add a markup to perform the service so that they make a profit. The model is sustainable as it is not subsidized by GOB. The AI technician earns directly from the farmer and can earn 15,000–18,000/month (approx. $200/month). There is a follow-up visit 21 days after each insemination by the BRAC AI veterinary monitoring team to see whether the cow comes on heat again, thereby knowing whether the cow has conceived. Semen used is from improved breeds, following DLS breeding policy. BRAC has imported breeding bulls, Friesians from Austria, and other breeds (including Sahiwal) from India. Crossbred bulls from these lineages are also used.

Sustainability of the LSP women AI technicians is more likely than it would have been with more dependence on GOB. BRAC brings its good track record and credibility to the initiative. It also provides vaccines, deworming tablets, and BRAC-formulated mineral-lick blocks for the technicians to distribute at a modest profit for the technicians, who thereby bring a range of services, not just AI.

Follow-up on the AI program is a challenge. The farmers are largely illiterate and cannot keep a register of their animals or records of servicing them. BRAC AI is working with mPower's app SHUDOKKHO for LSPs/technicians. BRAC AI has an MOU with mPower, the app having been adapted to BRAC's needs.

The BRAC AI/Activity collaboration has provided services that GOB cannot provide as extensively as it wishes, owing to numerous constraints. Generally, time is needed for farmers to adapt to new technologies brought to them, but AI has a ready acceptance now, especially when twinned with improved fodder supply and other services. Messaging is conducted in a very practical way on demonstrated higher livestock growth rates and milk yields. To achieve the latter, in southern Bangladesh where flooding

occurs, such as in Barisal, the fodder varieties needed are different from those that do well in other parts of country as they must be saline-tolerant.

There can be a resistance to women operating as AI technicians as men believe women cannot easily move about in rural areas. However, Dr. Matiur arranged for the successful women AI technicians to encourage and convince the new ones of the value of their work and the related high earning potential. The community is approached in this discussion, so that it supports women AI technicians to do their work for the good of all. It is vital that the family of the woman technician also supports her. Support is also indirectly forthcoming from Sir Fazel Hasan Abed's Grameen Bank, which has raised the profile of what women can do in Bangladesh.

Dr. Debashis Paul, Head of Sales and Marketing, ACI-Godrej (supplier of balanced ration cattle feed)

Livestock Productivity. EQ3c. What have been the major constraints and opportunities with respect to developing and establishing the LSP business model? EQ3c1. Is credit readily available to individual farmers or groups?

In June 2019 an MOU was signed between ACI-Godrej and the Activity, valid until Feb.–March 2021. ACI is a private sector supplier of agricultural supplies (including balanced cattle feed) to livestock farmers, twinned with the research capacity of its business partner Godrej Research and Development.

Over the 21-month cooperation period, Dr. Debashis worked with 2,000 farmers, training being given through 43 fairs and through multimedia presentations in Bangla to those farmers, LSPs, and dealers. Balanced ration cattle feed was a new concept for farmers and LSPs in June 2019. Working with the Activity in two districts (Jessore and Cox's Bazar), Dr. Paul's goal was to develop his business, educate farmers and their suppliers, and reduce poverty. He encouraged farmers and dealers by providing "solutions for farmers," "starting and finishing" with farmers, selling feed in the process, and making a profit for farmers. There was little business to start with, but it soon improved, totaling 300mt to date. Farmers saw their profit grow while production costs rose only a little, so every farmer he worked with was pleased. The package size for commercial farmers is normally 25kg, but he made them in 10kg packs for smallholders to render them more affordable.

An aspect of capacity building of the farming community was training on what constituted a balanced diet (for livestock and, by inference, for humans), by Godrej Research and Development. Most livestock in Jessore and Cox's Bazar are local breed, with only 25 percent exotic. The constituents used in the ACI mix are only plant based, such as corn, soya, and various other legumes, rice bran, and molasses, together with calcium. More molasses can be added to render the feed more palatable. These ingredients were both locally sourced and from imports (e.g., soya from the United States, corn from Brazil and India). A balanced feed resulted (unlike multinutrient blocks for licking, which he views only for emergency use and does not deal with). He used his company's digital platform for monitoring sales and outcomes rather than the app developed by mPower.

The beef-fattening component of his work was as useful as the dairy aspect. Within three months, the substantial weight gain can result in doubling the sale price of marketed cattle from 5,000 to 10,000Tk. Since India banned cattle exports, the need for locally sourced beef has grown enormously. Shortage of fodder and land on which to grow it is a major constraint for livestock productivity, cattle feed helping to offset this.

Dr. Paul wishes to continue the association with the Activity if the L & N Activity is extended. He views the cooperation as a win-win situation for farmers, LSPs, his company, and the donor. He believes that the drive of the private sector is what has powered this collaborative initiative.

SOCIAL ENTERPRISE

mPower. Shah Md. Mushfiqur Rahman, Director of eAgriculture (a longer version of this account is provided as Annex 18)

Livestock productivity. EQ 2a. How successful has the Activity been in building the capacity of LSPs to act as trainers for livestock farmers and other livestock value chain actors?

GOB's DLS cannot service many of the resource-poor farmers (mainly women) who rear most of the 24.4 million-strong national cattle herd. Other ways must be found—for example, using a mobile app as an information and training platform geared to bring solutions to farmers, pharma companies, and LSPs/para-vets.

In early 2018, the Activity signed a grant-based MOU with a group called mPower to develop an app specifically for livestock. mPower is a social enterprise, based in Bangladesh since 2010, having a track record of developing and deploying mobile apps targeting crop farmers, including in the USAID-supported agricultural extension AESA project. The Activity asked mPower to adapt these crop apps specifically for livestock smallholders, the result being SHUDOKKHO (meaning "highly skilled" in Bangla), which specializes in veterinary care, AI services, and emergencies.

This app targets the better-educated LSP cadre, which pharma companies also target—LSPs write 95 percent of prescriptions in the country. mPower provides this service to LSPs free of charge. To make SHUDOKKHO commercially viable, mPower charges a subscription fee to other beneficiary users, such as pharma companies, micro-finance institutions, GOB agencies, and international NGOs. BRAC AI is an example of an Activity partner working with mPower's SHUDOKKHO app for its LSP technicians. BRAC AI has an MOU with mPower, the app having been adapted to BRAC AI's needs.

The app addresses the Activity's Results Framework Intermediate Result (IR) 1 (increased livestock productivity) through sub-IR 1.2 (improved livestock practices and technologies). The way SHUDOKKHO is rolled out is compatible with the Activity business model, which puts the commercial private sector at the center of sustainable service provision and development in the livestock sector. Beneficiaries include farmers and their families (many unintended, owing to sharing of information by an LSP's client farmers more widely within a farming community), consumers of primary and secondary products, those who acquire employment along the value chain, private sector vets, and laboratory services and GOB agencies.

Under the Activity, 1,100 apps have been distributed to LSPs who have been trained to use the app. The Activity 2019–2020 APR states that the gross income of LSPs trained on the app rose on average by 16.8 percent, from $245 to $285 (BDT 20,216–23,607), and the average number of client farmers per LSP rose by 20.6 percent, from 115 to 139. During the COVID-19 pandemic, the SHUDOKKHO app has gained popularity with LSPs, owing to their enforced reduced mobility.

As an example of how SHUDOKKHO was used to disseminate nutrition-related messages, during National Nutrition Week, April 23–29, 2020, the Activity shared messages with LSPs (and hence farmers) on the nutritional benefits of milk, other dairy products, and meat, as well as the importance of

handwashing.[65]

Feedback from LSPs and government livestock officers in the field has provided mixed messages. On the one hand, two livestock officers in Satkhira District—DLO Dr. Ahsan and ULO Dr. Singh—said in their KIIs that they had trained LSPs in SHUDOKKHO. In addition, on April 15, as revealed to Dr. Raihan, SHUDOKKHO training for LSPs in Khulna Dumuria was set up by ULO Dr. Sultana and by ULO Dr. Halder in Batighata, Kulna. Moreover, Dr. Raihan has conducted a KII with Salim Mahmud of mPower. In 2019 Salim started training LSPs in the field on SHUDOKKHO and has now completed 82 one-day training sessions, with 1,012 LSPs having been trained (902 male and 110 female). The app has 11 e-learning courses with contents designed by veterinarians. The Activity helped organize these trainings and covered the cost. Salim says that LSPs are highly satisfied with the app.

However, there are indications that all may not be well with the app at field level. For a start, a smartphone (with an internet connection) is necessary and not all LSPs have these. Even when they have, many tend to use the app as a training aid, a book for learning new information. For instance, in an FGD on April 18 with Dr. Raihan, LSPs in Batiaghata, Khuln, expressed appreciation for SHUDOKKHO as an informative learning instrument (rather than a management tool). The database aspect is not clear to all LSPs as it needs to be more user friendly. LSPs need more hands-on training and on-the-job mentoring because hardware and software skills cannot be honed virtually (under COVID-19-related restrictions). LSPs are not well educated, many not having an HSC or advanced familiarity with internet usage. They can use Facebook but not engage with the app as a tool, which involves uploading their practice data. The app's workability needs to be monitored. DLO Faridpur says he has had the app training but there was no follow-up after training. He is upset that the app software is not linked with the DLS database, saying his district will benefit only if his staff can use the app in the DLS system.

Another complication is that the Activity has set up a "competing" facility in its one-stop shop in each *upazila*, at which farmers can register their data. It seems to be easier for LSPs to upload data at this shop than on the SHUDOKKHO app. Indeed, so popular are these shops that there are calls for more than one such shop per *upazila*.

[65] The Activity signed another grant agreement with mPower in July 2020 to develop a remote mobile application for capacity building and offer support services to 1,000 LSPs in the FTF region.

Shudokkho – Bridging the Gap

News on Livestock →

New Call Recording →

Treatment Service →

Medicine →

← Client Visit Schedule

← Accounting

← eLearning

ANNEX 21: SUCCESS STORIES

1. Riaz Uddin's Dream Becomes Reality

Mohammad Riaz Uddin never thought he would be able to start his own business as he had no education or capital. The third child of five, Riaz Uddin lived in Cox's Bazar District. He went to school but stopped in Class V as his parents could not keep him there owing to their extreme poverty. To help his father, the 14-year-old Riaz Uddin worked in a restaurant in Cox's Bazar town, earning a 1,200Tk monthly salary, insufficient to significantly help his family. So he went to Chattogram town in the hope of earning more and managed to secure a job at the Shwad bakery, with a monthly salary of 5,000Tk. He worked there for two years, learning how to prepare various kinds of sweetmeats. With his increasing knowledge base, he got the chance to join another renowned bakery chain shop, Fulkoli in Chattogram, where he worked for three years, learning more about how to prepare sweetmeats and yoghurt. During this struggle to improve himself, he did not visit his parents or siblings to save on transportation costs while he struggled to support his family.

As he became more confident, he started to dream of doing something on his own. After five years of working in Chattogram, Riaz Uddin came home with some savings and shared with his parents his dream of having his own business. With his parents' blessings and his own confidence, Riaz Uddin started his milk processing venture on February 1, 2018, with only a 5,000Tk investment. He bought 20 liters of milk from a cattle farm at Jumchari and prepared 150 cups of yoghurt for sale to nearby market tea stalls and restaurants.

In March 2019, ACDI/VOCA started working in Cox's Bazar District, where the Livestock and Nutrition Activity was providing support to farmers and small entrepreneurs despite the outbreak of the COVID-19 epidemic. Through the Activity, Riaz Uddin came to know about the nutritional value of milk and meat from an Imam during Friday prayers at the nearby mosque, and Riaz Uddin himself started disseminating this information to his customers to promote his milk product sales.

In March 2020, ACDI/VOCA field staff identified Riaz Uddin as a high flier when he was delivering yoghurt to restaurants in the local market. They observed his business's potential and his confidence level. They advised Riaz Uddin to increase his products' quality by applying modern techniques, which could boost his sales and expand his customer base. Riaz Uddin received training through the Activity on milk and milk products, and he applied this knowledge to improve the quality of his business. He accomplished this despite the business setbacks resulting from the COVID-19-related lockdown. His devotion, hard work, and willpower propelled him to be a hero who fought for his dream of a better life.

Riaz Uddin has now established a small yoghurt-producing plant, buying 70–80 liters of milk daily and producing more than 600 cups of yoghurt that he sells to 50 shops and restaurants. His yoghurt is very popular because of its color and taste, thanks to the training he received from the Activity. He keeps his product's price lower than those of his competitors on the market so that lower-income people can afford it. He also added some milk-based products to his curd, such as rice pudding and sweetmeats. He has branded his yoghurt as "Riaz Uddin Yoghurt."

He has started his own cattle farm to produce milk for his business. His monthly income has risen to more than 35,000Tk and his profits have enabled him to arrange the marriage of his elder brother and sisters and to support his younger brother in higher education. Riaz Uddin said, "I want my brother to study at university, whereas I did not get that chance. I will support him."

Riz Uddin is now 21 years old, still having the dream of furthering his business. In 2020, he bought a three wheeler Auto-Rickshaw from his own income and uses it as his delivery van. He is trying to obtain registration for his products from the Bangladesh Standards and Testing Institute. He dreams about having his own factory employing hundreds of people, opening showrooms in the heart of the city, and increasing his flow of quality products that will contribute to human nutrition. Riaz Uddin said, "I want to produce quality products for the people at a low price. Training and guidance from ACDI/VOCA opened my eyes and enabled me to fulfil my dream of being an entrepreneur." He hopes that his sincerity and hard work to establish himself as a successful entrepreneur will inspire the young generation to follow him in becoming independent through SME development.

2. Shirin Akhter Shilpy: a Patuakhali University LSP graduate

Shirin has struggled since adolescence. She got married when she was in class VIII. Her family was conservative and strict in religious values and customs. She lived in a village in Barishal district. After marriage, with the help of her husband, she continued her study in an unfavorable environment and passed her HSC in science. But she didn't stop there, as she had a dream to serve the community and do something for her family—she has one daughter studying for her HSC and one son in class IX.

Her husband practices in their locality as an animal husbandry technician. Inspired by her husband, she started to help him in his work, and she learned about cattle treatment, deworming, and vaccination. They have a shop in the local market and sell cattle food and medicines. For the past seven years, Shirin has worked as an animal husbandry technician—something exceptional for a female in the conservative parts of Bangladesh.

After ACDI/VOCA started to run the Activity, it sought to recruit LSPs and "discovered" a female candidate in Agoijhara and signed her up. This candidate received LSP training from ACDI/VOCA. Then, in February 2020, she received 15 days of LMS training from Rajshahi Medical College. She has also received 45 days of training on AI from Patuakhali Science and Technology University. She is the only female AI provider in Barishal district, where she also provides treatment for cattle, deworming, and vaccination. Her husband has provided moral support to her throughout her career.

The rural community in which she lives and works is very conservative, and it is taboo to talk about sex and reproductive health issues openly, even if it is about animals. Becoming an AI provider in rural areas is not at all easy for a woman. Initially, it was not acceptable to the community. Resistance came from her own family: one of her brothers, who is a religious person (Hafez), was the first to protest. Nor did her parents accept her chosen vocation initially. Yet she chose to ignore what people were saying about her. Through her dedication and sincerity, she has overcome all obstacles and established herself as a successful woman in her locality, with dignity and rights. Now, she is hugely popular in her area, and her income has grown a lot. She can provide school fees for her daughter and son and contributes to her family's other expenses. She encourages every woman to escape from the taboo as she has done. "If you make a continuous effort to make your dream a reality, you too can win," she says.

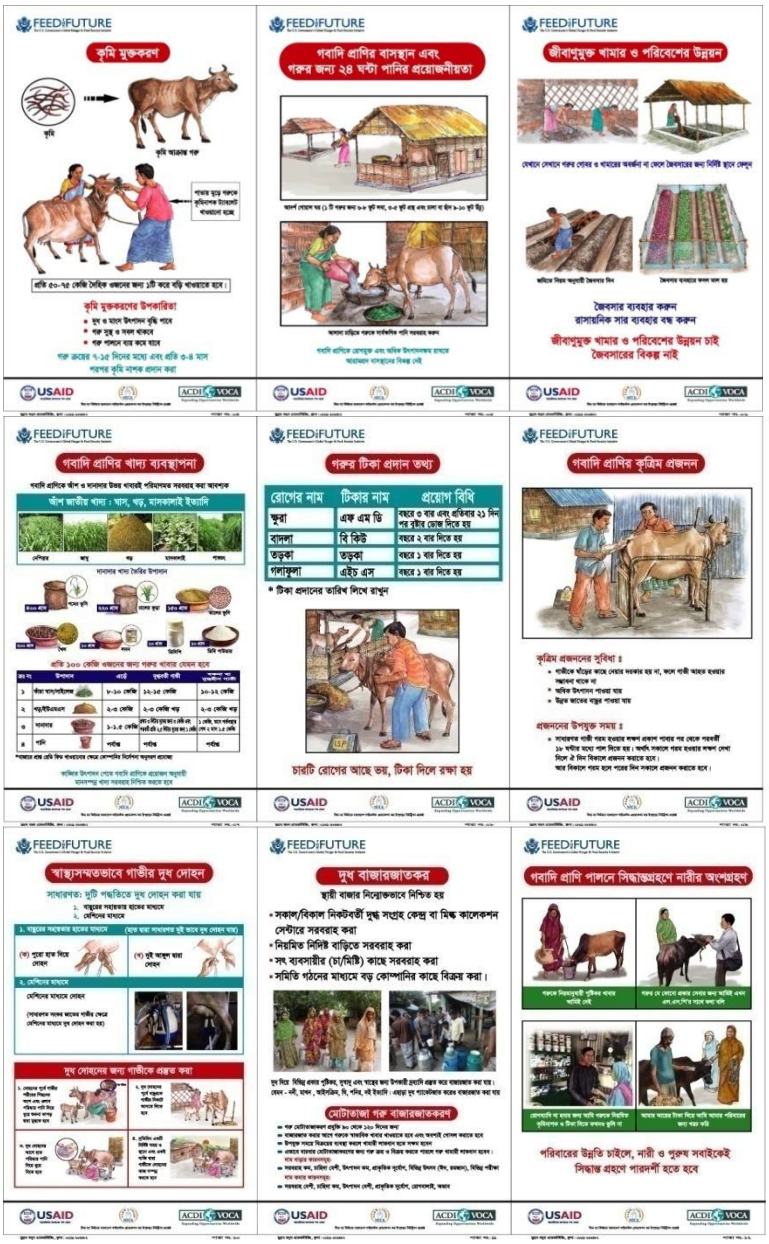
3. Hasina Begum: fodder entrepreneur

Another good example of women entrepreneurship is Hasina Begum, a 35-year-old woman who was involved in the Activity as a fodder cultivator at Amrita Bazar, Magura Union, Jhikargacha Upazila in Jashore District. With a Grade 8 education and one son, she was passionate about promoting and cultivating fodder on her own land. Eventually she was so successful that at least 50 women in the community followed her example and became entrepreneurs themselves. This entrepreneur has been gradually expanding her fodder business by leasing/purchasing new land each year since 2017. She started with 1.5 decimals of fodder land in 2017 and expanded it to 34 decimals by 2021. She now dreams of expanding the plot to 150 decimals. She is earning more than her husband, who worked as a laborer in Malaysia. When the COVID-19 pandemic struck, her husband lost his job and she financed his return trip from the profit she had made from fodder sales. Now she is the sole breadwinner of her family. In 2017 she earned 300Tk per day from fodder sales, which rose to 800–1,000Tk per day in 2021. She is grateful to the Livestock and Nutrition Activity for the training she received on fodder cultivation in March 2018: "I then became aware about the prospect of fodder production and business," she said. She was also provided with 500 Pakchung Napier cuttings. She now sells fodder cuttings @ Tk. 2.00/cutting and fodder @ Tk. 2.50/kg. Her fodder plots are used for demonstration purposes, and all her fodder and cuttings are sold from the field near her house. She also owns a small dairy farm of four crossbred cattle. She is more than happy with the Activity, as are many women in her community.

4. Reaz Mehmud Khan (Pavel): milk processor

Jessore Dairy, a private milk processing company situated in Jashore District, is a good example of engagement of women in milk processing. Traditionally, all dairy processing factories in the country are run by men. However, all four workers in the Jessore Dairy factory are female, as witnessed by the ET. The owner said, "Women workers are more active, reliable, and clean by nature. I have one woman as master yogurt maker. I involve men only in marketing and distribution of my products."

5. Flip charts and posters used during Activity nutrition campaigns and training: Posters and flipcharts in courtyard meetings such as those in the images below were well regarded and constituted part of training sessions/nutrition campaigns conducted on the Activity's behalf by one of its private sector partners, Akiz Food and Beverages.



(courtesy of Akiz Food and Beverage Ltd.)

6. Liberia Case Study

One of the authors of this report, who worked in Liberia in 2011 as COP of a USAID-funded activity,[66] found there to be a huge appetite within the diaspora business community in the United States to invest in its country of origin. Inquiries revealed a web-based forum in which diaspora investors were pleading for opportunities to be brought to them. The lawyer of the government ruling party in Monrovia also had a long list of potential investors from the diaspora. The Government itself made the first move in response to the 14 developed business cases arising from the activity, even before private sector investors had pursued their due diligence checks. As soon as the list was submitted to the Government by USAID, the Ministry of Economic Affairs invested public funds in developing the physical infrastructure of the important market at Ganta on the border with landlocked Guinea. Ganta, the commercial capital of Nimba

[66] Economic Growth Corridor Study, Phase 2.

County, constitutes the northern hub of a natural growth corridor to Monrovia, Liberia's capital on the Atlantic coast. The upgraded market attracted even more hinterland traders, as a result of which the economy of Nimba County prospered, incremental income accruing to the region's people and enabling an improved standard of living, including a nutritional status upgrade. Livestock numbers were bolstered by this increased market activity, their baseline being at an historical low in 2011, following 14 years of civil war in which livestock were eaten, sold, or stolen by the various militias.
(The Liberia case study is included in this report owing to its relevance to Recommendations EQ6.2 & 6.3)

ANNEX 22: GENERAL CONCLUSIONS AND LESSONS LEARNED

GENERAL CONCLUSIONS

1. Pause and reflect on 2015–2021 Activity inputs, outputs, and outcomes before designing the follow-up.

Geographic focus of fodder/livestock productivity: Strengthen/expand into less well-endowed districts and *upazilas* to mitigate the potential of internal migration/climate refugees. Satkhira and Jessore are elite districts whose residents are full of ideas for self-improvement. This proactive attitude has historical roots. For instance, fodder growing has been traditional in Satkhira but not in Khulna (before the Activity). Champions/cheerleaders may need to be mobilized for other districts so that they too benefit from livestock and nutrition interventions.

Consider equity (cited also in Conclusion EQ3a). Some deserving *upazilas* were omitted in the Activity's "first round" and not all unions of a targeted *upazila* were included in Activity actions. Reflect on the reasons for omitting some deserving administrative units that have dreadful human nutrition indicators so that they may be included in the "second round." Also emphasize districts that were targeted late in the Activity's life, such as Cox's Bazar and Barisal.

Strategic direction: Independent assessments of implementation, especially an independent midterm review of future interventions, are needed. Independent assessment of training subjects, methods, and materials would also provide quality control. Such independent studies may help illuminate strategic directions.[67] For example, what would be the best entry points to roll out secondary meat products into the rural market? And is there a case for harnessing biogas from livestock manure in the environmental interest of reducing tree cutting for fuel, which leads to soil erosion? A third example would be to identify the weakest links along the dairy value chain, analyzing the latest data from the National Dairy Development Forum, established in 2018[68] and targeting those weak links.

Ensure more follow-up and monitoring of interventions in future: This should apply to nutritional social and behavioral change, for example.

2. COVID-19-related challenges to the Activity's outputs and impact: COVID-19-related restrictions on movement hampered livestock and milk sales, fodder production, and movement of farmers and LSPs. Issuance of SMEC loans was restricted as a result. Indeed, most financial institutions stopped providing loans at all during the pandemic though they have continued at a lower level over the last six months. Training of GOB staff was reduced, as well as LSP training at universities and on the SHUDOKKHO App at DLS offices. The Activity's achievement of significant outcomes despite the pandemic speaks well of program design and implementation, as well as performance of the implementers led by ACDI/VOCA.

LESSONS LEARNED

1. GOB prioritization of livestock: In its allocation of public sector expenditure, GOB has not prioritized livestock as much as it has crops. The Activity has helped correct this imbalance.

2. Livestock sector upgrade: The livestock sector needs to be upgraded; the Activity has made a

[67] Ashley, J. M., "Lateral Thinking," in *Human Resilience against Food Insecurity*, pp. 147–165 (Elsevier Academic Press, 2018).

[68] https://www.dhakatribune.com/bangladesh/development/2018/01/03/national-dairy-development-forum-established

serious contribution toward this. The Activity's entire rationale and objectives are enshrined in DLS development policy.

3. Variable livestock sector development potential: Fodder growing, together with dairy and beef-fattening enterprises, has high potential for livelihood development and improvement in the ZOI and ZOR though progress in the latter zone will always be constrained by soil salinity and proneness to flooding. Moreover, there can be large cultural differences from one area to another (e.g., between Jessore and Barisal). Cox's Bazar is another case in point, having a conservative culture that is not comfortable with the advent of female LSPs. "One size fits all" recommendations will not work.

4. Activity management and coordination: Though the Activity's first phase was for five years (2015–2020), plus a one-year extension, the program was really in operation for only three years. The first two years were somewhat inefficient because of problems with staff changes and recruitment, lack of interest among some government officials, and breakdown of the partnership with co-implementer BRAC. ACDI/VOCA initially intended to leverage BRAC's extensive network of AI technicians and VHWs, the initial recipients of direct Activity technical assistance, who would serve as the main channels for disseminating livestock-and nutrition-related messages. ACDI/VOCA eventually recovered from all these setbacks, a new COP was appointed in mid-2017, and the Activity started to work well and coherently. The Activity seemed unable to exploit all the advances by another program with which it overlapped for two years and that finished in mid-2017 (the Bangladesh Dairy Enhancement Project, funded by USDA and led by Land O'Lakes). The latter program had a research and agro-industry training approach to dairy development that did not well match the extension and social change focus of the Activity's design.

Furthermore, two LSP models were tested during the initial two years: (1) AI workers from BRAC were trained as LSPs and (2) local animal health workers were trained as LSPs. The first model was later rejected because the AI workers were too busy providing AI services. The second model was finally adopted, with an expansion of the LSP category through including other service providers who interact with farmers regularly, such as fodder entrepreneurs, feed sellers, and milk collectors. The resolution of these options required time and effort.

Working with BRAC as co-implementer in the first year revealed that the Activity depended too much on it. BRAC itself has an enormous agenda—agriculture, health, livelihoods, and its own enterprises—that diluted its prioritization of the Activity. Interestingly, the challenge of losing its main partner opened an opportunity for the Activity to develop its own links with the private sector. The Activity needed an approach that brought outreach to various actors across various thematic areas of input, output, capacity building, and markets, and it did that once BRAC was sidelined.

The Activity's design involved engaging government officials and strengthening government institutions such as DLS or BLRI, and this emphasis was promoted in full under implementation. However, poor stakeholder coordination reduced the Activity's potential impact—poor communication and synergy between BLRI and DLS, for example. A common understanding and strategy between the two are needed, and it was missing (see Finding EQ 1b.2 above). For example, KIIs revealed that each agency had different estimates of increases in fodder and milk production since the Activity started. Sometimes, apparent competition and suspicion between government agencies and LSPs surfaced (see Finding EQ 2a 1, 3c 1 and 6.1). It is vital to get unified GOB support in the sector for sustainability of the Activity's private sector–led market development model.[69]

Sometimes, the Activity's partners were shortsighted. For instance, mPower did not match its

[69] USAID has moved from a value chain model (like that of the Grameen Bank) to a market development model.

SHUDOKKHO APP database with that of DLS.[70] At other times, the Activity management itself was in the firing line—a charge leveled by some ULOs during field interviews was that ULOs were not sufficiently involved in the Activity's planning (Finding EQ 1b.1 above).

An opportunity was missed at the time of midterm review, though the study conducted then by ACDI/VOCA and USAID jointly was useful, giving new directions and emphases. However, had the review been independent and objective, without the potential tendency for some uncomfortable truths to be glossed over, the assessment would have been even more useful to chart the way ahead. It would have answered questions about, for example, the reasons LSP training took so long to start. This cadre is crucial to the functioning of the market-oriented business model at the heart of the Activity.

Nevertheless, the ACDI/VOCA team has laid an excellent foundation and now has a robust team with good direction and sound leadership. The team spirit and present coordination is very good, with excellent presentations made to the ET during the in-brief on February 11 and its KII on April 7. The community in the whole catchment area is very positive toward the Activity, trusting ACDI/VOCA officials and keen to follow their advice.

Uneasy institutional relationships arose during the Activity between Activity implementers and GOB though these have generally been well managed by ACDI/VOCA managers. Government officials often complained that they were not involved in Activity rollout. There may be several reasons behind this allegation that drove the two apart:

- Government officials often look down on NGOs, both local and international.
- ACDI/VOCA senior staff are highly educated and receive a better salary from their employer than do GOB officials.
- DLS seems to feel that it was not involved as much as it could have been in Activity planning and execution. Perhaps it was also irritated that the monies were not disbursed through GOB. It may feel that there was a squandered opportunity of government capacity building from both the technical and financial management perspectives.

It is vital for the Activity's expansion that any broken bridges between GOB and USAID/its implementing partner(s) be repaired to sustain the LSP-based market model. Both Activity design and implementation protocols need examination and corrective action. Working at the central level more (the COP with GOB Director Generals) would facilitate implementation at district level and below as central heads then issue instructions to their staff in districts and *upazilas* to be ultra-cooperative. In another USAID-funded program on health and family planning, such a rapport was established, for which USAID received plaudits.

[70] That might have explained why the ULO of Cox's Bazar who introduced the inaugural SHUDOKKHO training session there on February 21, 2021, did not stay beyond delivering his welcome speech to the trainees.

ANNEX 23: TEAM CVS, DISCLOSURES OF CONFLICT OF INTEREST, AND NONDISCLOSURE AGREEMENTS

Name: **John Ashley**
Position: **Team Leader – BMEL S025**

Key Qualifications

Dr. John Ashley is an agriculture expert with more than 45 years of multisector professional experience in agriculture, agribusiness and investment, water, environment, health, education, food security/nutrition/social protection, roads and transport, and local government. His areas of expertise include food and nutritional security, rural livelihoods, strategy and economic development programming (analysis, formulation, review, and implementation), agribusiness/value chains and rural development, natural resources management, action planning, and institution/capacity building/training in both the public and private sectors.

Dr. Ashley has more than 25 years of project cycle management experience and more than 10 years of experience leading teams in 14 countries. He has collaborated with many governments, donors, and international organizations, including USAID, EU, DFID, USAID, IBRD, World Bank/GEF/IDA, UNFAO, IFAD, IDRC Canada, AfDB, AECID, GIZ, DANIDA, SDC, Oxfam, UNCTAD, SIDA, UNDP, UNCCD/Global Mechanism, KIA, President's Office Palestine, and AFD. He is familiar with 9th/10th/ 11th EDF financial and contractual management procedures and regulations.

Dr. Ashley's recent evaluation experience includes Mid-Term Evaluation of Agriculture to Mitigate Migration Program, The Gambia (2020); Final Evaluation MDG1c, The Gambia (2017); Mid-Term Evaluation of the Food Security & Resilience Project, Myanmar (2017); Final Review, MERAP II & III, Jordan, Israel, and Palestine (2016); Mid-Term Evaluation of Sudan Food Security Program (2016); Mid-Term Evaluation of the Economic Recovery in Gaza Strip (2013); Final Evaluation of the EU's Food Facility instrument (2011-2012); EU Food Facility interventions in a safety net program in Ethiopia (2010); Organization Development of four training institutions in north Africa & West Asia (2009-2010); Spanish Government-funded food security and job creation program in Gaza (2008); and the EU-funded irrigation program in Yemen (2008).

In addition to his extensive evaluation experience, Dr. Ashley's program development experience includes: €5 million program for ADF in West Bank, Palestine (2014); €240 million 11th EDF Sector 1 (nutrition & health), Nigeria (2014); transitional program for DANIDA, Palestine (2014); climate change investment project, Palestine (2013); EU economic growth program, Somalia (2011); eight agricultural and three other projects, Liberia (USAID) (2011); ICART agricultural research project in SADC region (2005); projects in Eritrea and Yemen for IFAD (2001), two projects in Uganda for IDRC and CAFOD (1995), and an experimental station in Nigeria (1986) and Somalia (1986). Further, Dr. Ashley has in-depth knowledge of agricultural research, extension, and training in Africa and has authored three university textbooks on food and nutrition security, drought mitigation, and food crops. He has also co-managed a 25-hectare family farm in Uganda (plantation timber trees, food crops, livestock) for over 25 years.

Dr. Ashley holds a Ph.D. in Agronomy from London University and a Bachelor degrees in Psychology and Botany from Cambridge University and London University, respectively.

Education

Ph.D., Agronomy, Imperial College, London University, 1978
B.A., Psychology, Trinity College, Cambridge University, 1969
B.Sc., Botany, King's College, London University, 1967

Selected Professional Experience

Mentor to Community Mobilizer, Pakistan, Mar. 2020-Present. Mentor community mobilizer in building resilience to the Coronavirus outbreak in Sindh. On a voluntary basis, assist Focal Person of

COVID-19 Isolation, Civil Hospital Hyderabad, prepare the community for measures to increase its resilience to the spread of the virus in the city, and hence increase its ability to remain food- and nutrition-secure. This training is being undertaken through focus group meetings, demonstrations, purchase of hand sanitizers, and social media posts. Also, mentor coordinator of a global webinar series for the Kishma Venture virtual platform Life Beyond Corona to improve community resilience to COVID-19.

Food/Nutrition Security & Disaster Risk Expert, Mid-Term Evaluation of Agriculture for Economic Growth and Food Security/Nutrition to Mitigate Migration Flows, SOFRECO/EC, The Gambia, Jan. 2020-Jun. 2020. The three components of this €26 million four-year program are: 1) Agriculture for economic growth, implemented by FAO; 2) School meals and disaster risk management, implemented by WFP; and 3) Support to the 11th EDF agriculture for economic growth and food security/nutrition, implemented by international and local NGOs. The action, which addresses seven of the UN SDGs, is being implemented in four of the country's regions, within a food security/market-led field crop seed & grain (rice and groundnut)/vegetable value chain and climate change perspective. Women and youth are the main actors in vegetable production, benefiting their nutrition and income. Producers, MFIs, processors, farming associations, contract farming entities, and government services are facilitated holistically to improve effectiveness and profitability of the agribusiness value chains, and transform agriculture. Offered suggestions to the client, implementers, and GoTG on how this outcome may be better realized (in late April required to take into account the likely impact of the COVID-19 virus, the first case of which in-country was recorded in March, the challenge laid out in a memo from WFP The Gambia on April 26, "Food Security in the context of COVID-19 – Gambia"). To reduce Disaster Risk, a massive community-led afforestation drive was recommended, together with rollout of fuel-efficient charcoal/groundnut shell-burning stoves, renewable energy solar mirror stoves, Conservation Agriculture practices to control soil and water erosion while improving yield and reducing labor requirement, and water-efficient irrigation practices for vegetables to reduce drawdown of ground water aquifers and saving of labor.

Co-Manager, Family Farm, Uganda, Jan. 2020. Harvested tree plantation areas and ensured regrowth from stumps to maturity within five years.

Nutrition-Sensitive Specialist, Program for Improved Nutrition in Sindh (PINS 1), Pakistan (TA component), Conseil Santé/EC, France, Pakistan, Jan. 2018-Oct. 2019. Nutrition Adviser to the Planning & Development Board, Government of Sindh (and Ministries of Agriculture, Education, Health, Environment). Special focus is the inter-sectoral implementation of the Accelerated Action Plan for Reduction of Stunting and Malnutrition, though preventive rather than treatment measures (*e.g.*, multi-nutrient block feed supplementation for ruminants, biofortified crops, Integrated Pest Management to curtail the current contamination of food and the environment by synthetic pesticides and impoverishment of biodiversity, through use of natural insecticides and other means of biological control). Covered agriculture, livestock, fisheries, WASH, and education, with cross-cutting issues of policy and inter-sectoral dialogue/strengthening/implementation, climate change, and capacity building, working closely with public and private sectors, including four Advisers to the Chief Minister, Sindh. This program prepared for the Budget Support modality to be introduced for Government of Sindh by the EC.

Team Leader, Mid-Term Review of the National Development Plan II (2016-2020), Applus/EC, Uganda, Sept. 2018-Jan, 2019. Diagnostic Studies 1.1-1.4 to inform the Mid-Term Review of the National Development Plan II (2016-2020). Conducted the Agricultural study and led the team which also conducted Studies in Physical Planning & Urban Growth, Environment/Natural Resources/Climate Change/Green Economy, and Governance of the NDP. The secondary purpose of these studies was to inform government on the needful priorities and actions to include in NDP III, formulation of which had just commenced. Field visits were made to Gulu, Kamuli and Jinja Districts for the joint agricultural and governance work. The work was based in the National Planning Authority, Kampala.

Agricultural Economist, Development of the Agricultural Insurance System in Palestine - Pre-Development Phase, PBLH Brussels/EC, Palestine, Nov. 2017-Jan. 2018. Provided protection for farmers and livestock herders against the high risks and damage resulting related to drought and Israeli Occupation, which were disincentives to invest. Provided whole value chain information to help build the roadmap for setting up an agricultural insurance scheme involving the private sector.

Team Leader, Final Evaluation of the Improving Food Security Through Crop Production Intensification and School Feeding Program (MDG1c Program), ETI/DAI/EC, The Gambia, May 2017-Jul. 2017. The program's overall objective was to accelerate progress towards meeting the MDG1c target of reducing by half the people who suffer from hunger, within the context of The Gambia being overtaken by Sahelian conditions in its eastern half. The agricultural production component was assigned to FAO to manage, and the school feeding component to WFP. Counterpart agencies were the Ministry of Agriculture and the Ministry of Basic & Secondary Education respectively.

T**eam Leader, Mid-Term Review, Food Security & Resilience in Myanmar, Transtec/EC, Myanmar, Jan. 2017-Mar. 2017**. Providing a roadmap to the EU Delegation (DEVCO and ECHO) for its future interventions in food security and resilience across various fields in the LIFT program inter alia (including agriculture, disaster risk reduction, land issues, urban environment, nutrition, gender, WASH).

Author, Elsevier/SOC, UK and Uganda, Sept. 2016-Nov. 2017. Prepared a follow-up book to "Food Security in the Developing World," under contract to Elsevier, published by Academic Press in May 2018. This was "Human resilience against food insecurity," dealing with the anthropological and social factors which condition our resilience to climate change and food/nutrition insecurity, with a focus on the developing world. The book includes chapters on the circular economy, through more sustainable food systems, reduced waste and food miles and the paramount need to stem decline in soil fertility through use of non-polluting agricultural methods, such as rotation, green manure, and fallow to increase soil organic carbon.

Team Leader, Final Review, Middle East Regional Agricultural Program (MERAP) II & III, Italtrend/DANIDA, Jordan, Palestine, Egypt, and Israel, Jun. 2016-Aug. 2016. MERAP comprised a regional agricultural cooperation program, 1999-2015. Phase III focused on using the new skills learned in Phase II, through implementation with farmers, and institutionalizing ongoing activities within governments, this comprising the exit strategy. Small ruminants, aquaculture, horticultural value chains, and small cooperatives were major program components. The evaluation was pursued through interviews with government implementers in three countries, field visits and writing nine detailed case studies, SWOT analysis, survey of farmers trained, OECD-DAC indicator compliance *etc*., focusing on program quantitative and qualitative impact and outcome rather than outputs.

Team Leader, Mid-Term Evaluation of the Sudan Food Security Program – Rural Smallholder Component, COWI/Prospect CS, Brussels/EC, Sudan, Apr. 2016-May 2016. Conducted an overall assessment of the performance of the program, identifying lessons learned and recommendations to improve current and future action. The program is implemented across four States (Gedaref, Kassala, Red Sea and Blue Nile) by a range of NGOs. Enhancing productivity of subsistence dryland agriculture through Conservation Agriculture is the main issue being addressed, in the context of reducing rainfall leading to decreased browse/graze and lower quantity of crop fodder; artisanal fisheries and irrigated horticulture/fodder interventions in Red Sea State were also evaluated. The evaluation report comprised a project identification proposal for a program extension and new phase.

Author, Elsevier Publications, Palestine and UK, May 2014-Jan. 2016 (intermittent). Prepared the book "Food Security in the Developing World" under contract to Elsevier: published by Academic Press, January 2016. This book comprises an advanced primer for universities and development professionals engaged in promoting the removal of hunger and undernutrition, as per MDG Goal 1, target 1c. The book stresses development rather than humanitarian aid, and the importance to facilitate the

LRRD progression from the latter to the former. It addresses the causes of food & nutrition insecurity, such as climate change and poverty, their removal/mitigation, and community and individual resilience to it. Climate Change is the subject of Chapter 6.9 (p178-89), which inter alia explains the role of the inter-governmental body the IPCC, the UN Framework Convention on Climate Change (UNFCCC) of 1991, and the CGIAR Research Program on Climate Change. The book's companion website also includes a chapter on Conservation Agriculture.

Agro-Economist, Feasibility Study on Agro-Food Industry Value Chains of Kyrgyzstan, Tajikistan, and Afghanistan, Geopolicity/UNDP Istanbul International Center for Private Sector in Development (IICPSD), Dubai, Kyrgyzstan and Tajikistan, Oct. 2015-Dec. 2015. Conducted country studies in Kyrgyzstan and Tajikistan to assess the agricultural commodity most suitable for a value chain intervention by IICPSD. Comparative advantages and potential for export and incremental employment were among the criteria used to select the key commodity in each country. The value chain mapping exercise determined potentials and constraints within the agro-food industries, and where investment should best be made to increase value chain productivity.

Agricultural Expert, Italtrend/AFD, Palestine, Nov. 2014-Jan. 2015. Feasibility Study for a Local Economic Development Project in West Bank (Area C). Formulated and costed an agribusiness project in the Jordan Valley for French Government funding, based on community-identified priorities within a €5 million program, and in line with the PA policy on developing Area C. The project will address both settled and pastoral communities in the Valley. The Ministry of Local Government was the host Agency.

Team Leader, ETI/EC, Nigeria, Sept. 2014-Oct. 2014. Study and technical assistance to support the EUD in addressing malnutrition, poor health, and household resilience through social transfers/social safety nets, as part of a multi-sectorial approach in northern Nigeria. Oversaw the formulation of interventions supporting social transfers in the framework of health sector indicators, nutrition security, and social resilience. Analyzed the institutional and policy environment and socio-cultural context for expanding nutrition- and culturally-sensitive social transfers in northern Nigeria. Analyzed social transfer nutrition-sensitive interventions in six States of northern Nigeria, and applied lessons learned there and elsewhere in Africa. Made recommendations on how the EU, with a €240 million budget over five years under Sector 1 of the 11th EDF, can support the emergence of nationally/state-owned social transfers which contribute to the prevention of undernutrition in northern Nigeria. The National Planning Commission, and Ministries of Agriculture, Health, and Economics were the key public sector partners, at Federal and State levels.

Team Leader, Operational Support to the Ministry of Agriculture for the two projects Assistance to Agriculture – West Bank (AAWB) and Private Sector Reconstruction in Gaza – Agriculture (PSRG-A), IMG/EC, Palestine, Jul. 2014-Aug. 2014. AAWB and PSRG-A enabled eligible farmers to submit claims to EU for reparations arising out of direct Occupation-related damage sustained in West Bank since September 2010, and in the Gaza Strip during the Israeli Operation Cast Lead, December 2008-January 2009, and other subsequent damage. Focused on facilitating the startup of the AAWB pilot project in Burin, Nablus governorate, by resolving some issues in the project's Administrative Framework, strengthening policy analysis, management, and reporting capacity within the MOA in the West Bank, and improving coherence and complementarity among MOA, EUREP, local government, and affected farmers.

Task Leader/Agricultural Economist, Context Analysis and Mapping of Economic Development (Agribusiness Processing & Services), IMG/DANIDA, Palestine, Feb. 2014-Apr. 2014. Analyzed the context and risks within which agribusiness production, value chain processing, and services are operating, in order to strengthen Palestinian agribusiness capabilities and help promote an enabling environment which is favorable for farmers and agribusinesses to develop internationally-standardized high-value products. This study is to inform the transitional and future assistance development programming of the Danish Representative's Office.

Strategic Planner, HSD/Swiss Agency for Development & Cooperation (SDC)/Oxfam/EC, Palestine, Jul. 2013-Dec. 2013. Preparation of olive subsector strategy. Conducted the value-adding assignment for the MOA, involving desk study, review of the prepared framework, formulation of priorities/strategy/action plan, and capacity building of MOA staff. This work was cognizant of the ever-decreasing annual rainfall in West Bank, a trend noticed over a 40-year period.

Food Security Specialist, Kuwait Food Security Strategy, Linpico/Kuwait Investment Authority, Kuwait, Sept. 2013-Dec. 2013. Provided information on investment opportunities at home and abroad to underpin sustainable food and nutritional security in Kuwait, in perpetuity, especially in relation to emergencies and natural disasters. This involved marketing, storage/food reserves, and distribution structures and information systems, at home and offshore.

Project Designer, HSD/ UNCCD/Global Mechanism, Palestine, Aug. 2013-Sept. 2013. Integrating Climate Change Finance into Sustainable Land Management Investment Strategies in Palestine. Designed two costed projects for UNCTAD funding of the Palestinian Authority—one to use treated wastewater in Jenin Governorate, and another on general agricultural development on the eastern slopes.

Quality Control Reviewer, Assessment of Ministry of Environmental Affairs (MENA) Partners, HSD/UNDP/SIDA, Palestine, Aug. 2013. Developed a costed assessment and action plan for improving overall environmental inspection, monitoring, and enforcement, with five Ministry-level partners and three support institutions (judiciary, courts, police).

Strategic Planner, HSD/UNCTAD, Palestine, Aug. 2013-Oct. 2013. Study on the Palestinian agricultural sector. Prepared a briefing paper for UNCTAD "Impact of Israeli Occupation on the Palestinian Agricultural Sector," covering state of Palestinian agriculture, land and water natural resource base, value chains, productivity and competitiveness, and policy and intervention recommendations.

Team Leader, Mid-Term Evaluation of the Project Economic Recovery in the Gaza Strip Promoting Choice, Resilience, Dignity, HSD/DANIDA, Palestine (Gaza), Mar. 2013-Apr. 2013. The market development project was in the Gaza Strip by OXFAM GB, and addressed socio-economic empowerment and livelihood improvement. It used economic recovery as the main vehicle, through supporting potential economic growth sectors (agriculture, dairy, ICT), promising small-scale enterprises, value-adding trade facilitation for crop and dairy products, and vulnerable families and youth.

Senior Technical Adviser, House for Professional Solutions (HPS), Palestine and Israel, Jan. 2013-Feb. 2013, May 2013-Jul. 2013. Technical Support to Chairmen. Ran ongoing projects in conflict resolution and civic education, and fundraising from donors (EU and USAID) through responding to CfPs. Interacted with peace activists in both countries. Working with Netanya Academic College, Israel, prepared a paper "The connection between Palestinian Culture and the Conflict" and edited other prepared papers for conference from April to November on "Discourse, Culture, and Education in the Israeli-Palestinian Conflict," funded by Germany. Participants included senior peace activists from both countries. Prepared project concept note for civic education on behalf of Arik Institute, Israel, for submission to USAID for funding. This addressed the Middle East conflict at the basic psychological level, on both sides, as an enabling precursory measure to facilitate enhanced participative dialogue, which itself will lead to strong advocacy. The specific objectives were: 1) to increase the mediation and conflict transformation capacity of school students and teachers, and youth in general, in Israel and Palestine, through addressing and mitigating psychological barriers; and 2) to better exploit mass and social media in fostering the conflict transformation process.

Quality Control Reviewer, Final Report of Food Security & Agriculture, HTSPE/EC, Palestine, Dec. 2012. Performed quality control for report. Technical assessment and lessons learned exercise in the occupied Palestinian territory (oPt). This project dealt with value adding in the olive value chain.

Co-Manager, Family Farm, Uganda, Mar. 2012-Oct. 2012. Prepared land, planted, and cared for 30,000 tree seedlings during the first and second rains.

Food Security Specialist, COWI/Safege/DEVCO/EC, Global, Liberia, and Zambia, Aug. 2011-May 2012. Final Evaluation of the European Parliament's Food Facility Program. Reviewed the usefulness of the European Union Food Facility (EUFF), a €1 billion emergency fund disbursed to 49 countries over three years (2009-2011) to address the food price hike crisis which started in 2008. Provided the external cooperation services of the Commission, governments, and the wider public with an independent assessment of the EUFF identifying achievements, and lessons learned in order to improve the current and future food security/nutrition strategies and programs of the Commission. In addition to wider responsibilities, conducted two country case studies during the course of the evaluation (including an FAO-implemented Conservation Agriculture project), assessing results through holding meetings with stakeholder groups in the public (central- and district-level MOA offices, and local government and traditional leaderships in particular) and private sectors, IO & NGO implementers of EUFF projects arising from CfPs, and end beneficiaries, EU Delegation, and other donors. Accorded high priority to Conservation Agriculture in the Final Report, not just on the basis of the FAO-implemented Project in Zambia, but CA work undertaken in that country over the previous two decades.

Senior Agronomist, 10th EDF Supplementary Funding Economic Growth Program Identification Study, IBF, Somalia and Kenya, Aug. 2011-Sept. 2011. The study contributed to the identification and formulation of an Economic Growth Program for Somalia taking into account the Joint Strategy Paper (JSP) (2008-2013) for Somalia, and the value-adding conclusions of the 10th EDF Ad Hoc Review, such as improvement to production, processing, quality assurance and external markets, and the identified needs, constraints, potentialities, and lessons learned from ongoing and past interventions. In addition to site visits, and meetings with 10 Ministers and participatory workshops in Puntland and Somaliland, two Ministers and the city's Mayor were met at Mogadishu airport. Against the backdrop of the ongoing drought in Somalia, itself related to overgrazing and climate change, recommended an overarching "improved watershed management" theme for the Economic Growth Program, and a related program of 19 pastoral livestock and agricultural interventions, supported by supplementary funding to the value of €28.1 million over two years.

Chief of Party/Agriculturist, Economic Growth Corridor Study, Phase 2, Sibley International/USAID, Liberia, Feb. 2011-Aug. 2011. The Growth Corridor desk study conducted in 2010 identified five key growth corridors. Phase 2 of the Study addressed two of these (Monrovia-Ganta and Buchanan-Yekepa corridors), the first mentioned comprising the backbone of the Liberian economy, having some 43 percent of the population. Both potentially link the interior of Guinea and Ivory Coast to major Liberian ports. The team comprised international specialists in agriculture, trade and investment, business, and regional planning, together with 22 Liberian analysts. Using a combination of PRA, questionnaires, focus group discussions, and physical inspection, quantitative and qualitative data were collected to develop a framework for a comprehensive climate change-resilient value-adding growth corridor strategy to underpin Liberia's Economic Growth & Development Strategy, and augment the Lift Liberia Poverty Reduction Strategy. The consultant prepared 10x agricultural (and 1x ecotourism) investment proposals, at pre-feasibility level (with gross margin analyses), designed to attract private and corporate investors, and on which fully fledged bankable business plans could be developed. The value-adding projects involved cocoa, palm oil, vegetables, vanilla, agro-industry, rural markets, warehousing, road transport systems, and eco-tourism at a coastal site. Support to smallholder cash crop farmers' organizations was a major strategy espoused in two of the proposals, to reduce transaction costs and foster confidence in advancing from smallholder farming to semi-commercial, which would transform the food security status of the country. One project formulated, and subsequently implemented by government, was the upgrading of the market in Ganta, Nimba county. The Ministry of Planning & Economic Affairs (the EU NAO) was the host government agency.

Team Leader, AESA/EC, Afghanistan, Aug. 2010-Feb. 2011. Technical assistance to the production of the first Afghanistan National Rural Development Report. Facilitated the formulation of the report itself, marshalling the inputs of many stakeholders, in the public and private sectors, civil society, and donors. Evaluated the status of multi-sectoral components (agriculture, health/nutrition, education, water/hygiene/sanitation, employment and social protection, women's affairs, governance, feeder roads, trade).

Food Security Specialist, SOGES/EC, Ethiopia, Jun. 2010-Jul. 2010. Evaluation of Safety Net Interventions financed under the European Union Food Facility (EUFF). Evaluated the role of the Productive Safety Net Program (PSNP) (2005-2014) partly financed under the Food Facility (a €20 million grant), and its added value in helping people manage risks. Special attention was given to transfers through labor-intensive infrastructural Public Works, hence "productive" safety net, rehabilitating degraded land to a productive asset while stimulating the local economy and facilitating economic access to food (LRRD). This was largely directed towards re-sculpting eroded slopes into terraced land which protects against soil and water erosion, capturing the scant rainfall leading to greater water storage in the soil, resulting in increased crop yields, sward growth, and livestock carrying capacity.

Team Leader, GIZ/IFAD, Jordan, Egypt, Morocco, and Lebanon, Aug. 2009-Feb. 2010. Organizational Development in the Near East & North Africa: Capacity building through OD in a Regional Organization—the Regional Center on Agrarian Reform & Rural Development for the Near East (CARDNE) in Jordan, and three sub-Regional Centers (TAG Training in Jordan; TEAM MISR in Egypt and TEAM MAROC in Morocco), these latter being private sector service providers for agriculture/food security/rural development training and consulting services for IFAD in the IFAD-designated Near East and North Africa (NENA) region (11 countries).

Agriculture Specialist, HSD/FAO, Palestine, May 2009-Jul. 2009. Shared Vision for the Agricultural Sector. Preparing a new Strategy for the Agricultural Sector in Palestine. Multi-stakeholder discussions were undertaken to assess current status of the sector and needs for improvement that can be secured through strategy and policy analysis/upgrading, institutional reform and capacity building.

Assessor, AESA/EC, Jordan/Global, Jan. 2009. Strengthening Civil Society Networking in the International Policy Dialogue for an Increased Food Security. Evaluated concept notes and invited proposals by NGOs under the Food Security Thematic Program Call for Proposals to bid for grant contracts.

Food Security Specialist, Soaring Prices Facility of the European Parliament, HSD/FAO, Palestine, Dec. 2008. Prepared first draft of the Palestine Authority's request for benefiting from the €1 billion Food Facility contingency from the European Parliament, to be made available to 49 most needy countries hit by the 2008 world-wide soaring prices of foods and farm inputs. This addressed agricultural production/productivity, nutrition, and humanitarian aid/social safety nets in Palestine, refugees and non-refugees. Subsequently tabled the draft in a workshop with UNFAO, UNRWA, WFP, and OCHA to develop the final version document (€39.7 million approved by the EC in 2009, all of which was assigned to social safety nets, managed by UNRWA).

Team Leader, Intermediate Evaluation of the Food Security & Job Creation Program in Gaza, HSD/AECID, Palestine (Gaza), Oct. 2008-Nov. 2008. Assessed the performance/present procedures/obstacles/results/impact on food security and livelihoods of the Food Security & Job Creation Project (2002-2007) implemented by Office of the President and Central & Regional Governments of Spain in the Gaza Strip. Set guidelines for future Cash-for-Work job creation interventions in the agriculture and water sectors of the JCP, such that families could grow/afford to buy more food and supplement entitlements under social safety nets.

Food Security Specialist, HSD/FAO, Palestine, Oct. 2008. Evaluated extent and impact of soaring food prices on food security in Palestine. Reviewed and assessed the critical nature of recent food and

livestock feed prices on food security, in this conflict zone which was also suffering the consequences of an ongoing drought and aftermath of severe frosts in winter 2007-2008, with a view to identifying appropriate responses in terms of food production and trade, and related agricultural policies/strategies.

Agronomist/Extensionist, AFC International Consultants/EC, Yemen, Aug. 2008-Sept. 2008. Agronomist/extensionist on mid-term review to evaluate EC Support to Tihama Development Authority, Hoddeidah Governorate. Addressed the need to incorporate an agricultural component into a spate irrigation structure and canal rehabilitation project, to enable Water User Associations (WUAs) to finance WUA dues through incremental production. Worked with TDA Extension, Veterinary, M&E, and Women's Departments to formulate potential for better links between farmers, the Agricultural Research and Extension Authority (AREA) and the General Seed Multiplication Corporation.

Empowerment & Participation Expert, HSD/Office of The President, Palestine, Sept. 2006-Jul. 2008. Strategy and Implementation Plan for the Palestinian Local Administration. Formulated an upgrade of local administrations throughout Palestine. Responsible for literature review of the decentralized empowerment/participation concept in local governments (LGs) worldwide/regionally/in Palestine, and proposed how this aspect can be improved in revitalized LG operations in Palestine.

Interim Program Coordinator, HVA International/EC, Botswana, Zambia, and South Africa, Dec. 2005-Jul. 2006. Implementation & Coordination of Agricultural Research & Training (ICART). Program coordinator on €15 million project under the 9th EDF, based in SADC HQ in Botswana, developing a regional strategy. Set up a PMU and operational phase of a competitive grant program (CfPs) to improve regional cooperation and coordination in agricultural research, and build synergy and capacity within training institutions in the 14 Member States. Prepared and published Invitation to Bid documentation for grant applications. Reviewed this and the context with prospective bidders, by e-mail and in workshop in South Africa. Eleven (11) grants were subsequently awarded in agricultural research and training to NGOs and universities, totaling €6.7 million. Wrote Program Estimate No. 2 (Direct Labor), and prepared TORs for outsourced SADC-wide Situation Analysis of applied agricultural research and training institutions and networks. Conducted pilot run of this in Zambia.

Professor, Palestine and Israel, Aug. 2005. Taught a conflict resolution course. Tutored a mixed group of 40 professionals, organized by the Palestinian Center for Alternative Solutions (PCAS) and the Israeli peace group ESHED Education, in the Salesian Pontifical University in Rome, and Jerusalem.

Team Leader, Food Security Program (FSP) (Phase 2), Agriconsulting/EC, Palestine, Jul. 2004-Dec. 2005. Provided management and institutional support to the Palestinian Authority to formulate Palestine's first National Food Security Strategy, endorsed by Cabinet in August 2005. Food availability, access, nutritional quality/safety, and social safety nets/food aid issues addressed. Formulated strategy in a participatory way, with extensive consultations and four multi-sectoral stakeholder workshops in West Bank and Gaza Strip, involving government, civil society (producer and consumer groups), private sector, and donor partners. Worked with 14 Ministries/Agencies, especially Ministries of Planning, Agriculture, Health, and Social Affairs.

Team Leader, Sustainable Rural Livelihoods Project, GRM/DFID, Afghanistan, Jul. 2003-Jul. 2004. Provided support to strategic planning for Senior Adviser to Minister of Rural Rehabilitation & Development (MRRD). Briefed Minister, and formulated policies and strategies within MRRD, to inform programming and better targeted service delivery to disadvantaged groups.

Strategic Planner, Food Security Program (Phase 1), Facilitation of the National Food Security Strategic Plan, Agriconsulting/EC, Palestine, Jan. 2003-Jul. 2003. Assisted the Palestinian Authority to develop an institutional food security strategy (NFSS) for West Bank and Gaza, addressing food availability, access (economic/physical/ ocial safety nets), and use/quality, through a stakeholder analysis and participative meetings with key stakeholders. Arranged with Deputy Minister of Finance to include Food Security as a national planning priority.

Interim Vice-Chancellor, Kabale University, Uganda, Jul. 2002-Jan. 2003. Developed a new University (Kabale University) in the SW highlands, looked after its institutional assets, formulated policy and built capacity of the University into an east and central Africa regional service provider, in coordination with Kabale district local government (Bank of Uganda).

Evaluator, Mid-Term Review, QD/CEEWA HQ, London, Uganda, Jun. 2002. Evaluated an East African NGO addressing gender-related development issues; recommended more focused service delivery, and relocation of staff office from Kampala to a rural constituency.

HQ Project Manager, Protected Area Management Project, GRM/WB/GEF, Yemen, May 2002-Jun. 2002. Worked with implementation team and Government counterparts of the Environmental Protection Agency to delineate a national park in a unique dryland tropical forest at Jebel Bura'a on the Red Sea coast, and formulated a community-based management plan.

Project Designer, Gash Barka Livestock and Agriculture Development Project Formulation Mission, GRM/IFAD, Eritrea, May 2001-Jul. 2001. Identified best options for investment in productive agriculture in arid border region in which 95 percent of population are receiving 100 percent emergency food aid, largely as a result of ongoing dispute with Ethiopia. As a result of structural poverty, farmers were unable to till sufficient land even when the rain did come, as their draught camels had been killed, stolen, or sold. MOA was the counterpart agency.

Ugandan Envoy to Khartoum, Sudan Comprehensive Peace Agreement, Office of the President, Uganda, Sudan and Uganda, Feb. 2001. As part of intermittent work with the Office of the President (1995-2001), served as envoy to Sudan to explain to GOS' Head of National Security that Uganda had no territorial designs on south Sudan (followed by a series of initiatives, culminating in a final agreement in January 2005 between GOS and the SPLM/A).

Project Designer, Dhamar Rural Districts Development Project Formulation Mission, GRM/IFAD, Yemen, Feb. 2001-Apr. 2001. Identified strategies for investment in crop and livestock agriculture to increase profitability/reduce poverty, while sustaining the fragile dryland environment. Proposed strategic measures to increase resilience to drought, as part of the proposed project. These strategies were to be adopted by the Ministry of Agriculture which would coordinate and manage the implementation.

Team Leader, Agricultural Research and Extension Project, Masdar/WB/IDA, Nepal, Apr. 1999-May 1999. Improved the organization/management and capacity of agricultural services through developing an adaptive agricultural technology and outreach strategy, improving the service delivery system, and capacity building research and extension staff within the MOA.

Coordinator, Agricultural Extension and Farmer Support Program, Masdar/Presidency/PTF, Nigeria, Jan. 1999-Mar. 1999. Countrywide initiative to improve delivery of extension services and associated inputs to rural areas and promote food security. Gave attention to organization and management of the national extension services and conducting training needs assessment countrywide.

Natural Resources Adviser, Gulmi and Arghakhanchi Rural Development Project, TYPSA/Capita Symonds/EC, Nepal, Aug. 1996-Jun. 1998. Undertook various natural resource initiatives across two districts in the foothills of the Himalayas and promoted farmer-managed on-farm trials of improved technologies. Supervised a competitive grant procedure including training of farmers' groups in tender evaluation, to support development initiatives proposed by communities (such as biogas), and implemented by CBOs and local contractors. Less predictability about the onset and depth of monsoon season rains and floods required mitigation and adaptation strategies rather than BAU, for both summer rainy season and winter cropping; variety selection was a strategy employed to address this climate change issue.

Project Designer and Team Leader, Agriculture and Environment Project, CAFOD & KMB Linz/Catholic Diocese of Fort Portal, Uganda, Jun. 1995-Jul. 1996. Conducted needs identification exercise in Kabarole and Bundibugyo districts. Formulated project proposals promoting food security through improvement in crop varieties, introduction of small livestock enterprises, and promotion of cottage agro-industries. Implemented same.

Agricultural Planner, Fertilizer Marketing Study, Maxwell Stamp/EC, Tanzania, Kenya, and Uganda, May. 1995-Jun. 1995. Fertilizer Marketing Study to forecast likely demand in the East African region for phosphatic fertilizer produced as a result of the proposed rehabilitation of the fertilizer factory at Tororo in eastern Uganda. Assessed needs of the agricultural sector, while formulating regional need and likely purchases in the medium and long term.

Adviser, University of Gunma, Maebashi, Japan, Feb. 1995-Apr. 1995. Consultant to medical school. Evaluated and strengthened the language capability of individual doctors, resulting in enhanced standard of manuscript submissions to international medical journals.

Project Designer, IDRC, Uganda, Jan. 1995. Prepared draft project document "Conservation of Medicinal Plants Diversity in Uganda." This project was run from the Ministry of Health, and aims to characterize the status of 15 species commonly used in traditional medicine, with a view to cultivating them on-farm, thereby conserving them in the wild.

Barley Agronomist, Uganda Wheat and Barley Development Project, Danagro/Scanagri/AFDB, Uganda, Jul. 1991-Dec. 1994. Conducted field research trials in highlands to determine best agronomic package for barley farmers, aimed at national self- sufficiency in grain and malt, while simultaneously creating income-generating activities for poor farmers. Change in climate patterns in Uganda became clear during the lifetime of this project, evidenced in temperature rise and unpredictable rainy season onset, for example, requiring change in agronomic practice and variety selection.

Farm Management Specialist, North East Arid Zone Development Programme (NEAZDP), Danagro/Scanagri/EC, Nigeria, Mar. 1991-Apr. 1991. Multi-disciplinary study for extension of the NEAZDP. Study for an 11,000 km^2 extension of NEAZDP in Borno State, much of which is in the Sahelian climatic zone. This project sought to combat natural and man-induced desertification/climate change by devising livestock and crop strategies to best address agricultural, fuelwood, and livestock forage constraints, so enabling better utilization of scarce resources.

Deputy Program Manager and Agricultural Team Leader, Kosi Hills Development Program, Atkins International / ODA/DFID, Nepal, Oct. 1987-Dec. 1990. Program aimed at raising rural community incomes in four eastern Kosi Zone Districts (Dhankuta, Terathum, Bhojpur, and Sankwasaba) in the foothills of the Himalayas. Specifically responsible for providing management/technical inputs under the DFID group formation and strengthening strategy, including guidance and training to MOA extension staff, and improvement in their organization and management. The overall program comprised rural roads, agriculture, forestry, and vocational training components.

Agriculturist, Atkins International/IBRD, Yemen, Oct. 1986-Dec. 1986. Wadi Hadramaut Rehabilitation Project. Responsible for investigating irrigated farmland on seven wadis in the Wadi Hadramaut area of arid south Yemen, following widespread damage during the disastrous 1982 spate flood, and making drought mitigation crop and livestock management recommendations for wadi rehabilitation ().

Agronomist, EC, Somalia, Jul. 1986-Aug. 1986. Design study for Baardeere Agricultural Experimental Station in arid Northern Juba Valley, assessing research priorities for food crops, as a strategy to maximize sustainable production once dam was commissioned.

Project Designer, Atkins International/Balfour Beatty Construction, Nigeria, Jun. 1986. Planned a sorghum-based irrigated demonstration farm at Balanga dam in Bauchi State.

Head of Research, Organic Agriculture Research Center, David Astor Foundation, UK, Jul. 1984-Aug. 1985. Developed low-cost low-pollution organic agricultural farming practices for cereals and vegetables for a niche market.

Adviser, Farming Systems Research, FAO, Kenya, Apr. 1982-Jun. 1984. National Dryland Research and Development Station (NDRDS), Katumani, Machakos. Responsible for studies on intercropping of maize and legumes in on-farm and on-station trials.

Adviser, Crop improvement Project, FAO, Libya, Aug. 1979-Mar. 1981. Responsible for screening germplasm for adaptability to rain-fed and irrigated conditions in the coastal strip and desert settlements. Crops included legumes, oilseeds, and fodder crops. Assisted with agricultural planning for the national 1981-1986 five-year plan.

Tutor, National Extension College, UK, Sept. 1975-1979. Tutored Environmental Studies. Conducted distance learning for mature students, while writing-up Ph.D. and other papers.

Lecturer, Faculty of Agriculture & Forestry, Makerere University, Uganda, Aug. 1969-Aug. 1975. Conducted six years of undergraduate training (agronomy, crop physiology, human nutrition, ecology), and research on groundnut and soyabean in the Grain Legume Improvement Program. Agricultural correspondent for the Voice of Uganda newspaper (ODA/DFID/GOU).

Selected Publications

Ashley, J.M. (1973): Groundnuts for the confectionery trade. Acta Horticulturae, 33, 161-70.

Ashley, J.M. (1974): The Mwanamugimu Nutrition Clinic. Intermediate Technology, 2, 16-18.

Khan, T.N. and Ashley, J.M. (1975): Factors affecting plant stand in pigeonpeas. Expt. Agric., 11, 315-22.

Ashley, J.M. (1976): Orchid collecting in Uganda. Amer. Orchid Soc. Bull., 45, 881-8.

Ashley, J.M. (1978): Growth features of groundnuts in relation to yield. PhD thesis, University of London. February 1978.

Ashley, J.M. (1979-81): 14 Technical Reports submitted to the Libyan Government concerning grain legume improvement in Libya.

Ashley, J.M. (1980): The culture of Vanilla in Uganda. World Crops, 32, 124-9.

Ashley, J.M., Gintzburger, G.A.A. and Hossain, E. (1982). Ophrys lutea (Gouan.) Cav. Var minor Guss., and Ophrys fusca Link subsp. Fusca Nels. – new records for Libya. Amer. Orchid Soc. Bull., 51, 15-20.

Ashley, J.M. (1984): Groundnut. In: The physiology of tropical field crops, eds. P.R. Goldsworthy and N.M. Fisher. John Wiley, London. Chapter 13, p 453-94.

Ashley, J.M. and Galal, L.N. (1990). Crop agricultural potential of the Arun catchment north of Hedangna. Presented to the Arun III Environmental Study Workshop, Dhankuta, Nepal. August 15-16. 8pp.

Ashley, J.M. and Khatiwada, B.P. (1992). Local wheat makes the grade in Nepal. Appropriate Technology, 18(4), 30-32.

Ashley, J.M. (1993): Drought & crop adaptation. In "Dryland Farming in Africa" by J.R.J. Rowland (Ed.), Macmillans, UK. Ch.3, 46-67.

Ashley, J.M. (1993): Oilseeds. In "Dryland Farming in Africa" by J.R.J. Rowland (Ed.), Macmillans, UK. Ch. 12, 240-259.

Ashley, J.M. and Shugaba, M.A. (1994): Coping with drought in north-eastern Nigeria. Appropriate Technology, 21(2), 30-33.

Ashley, J.M., Kasande, J., Kilduff, J. (1998): Comparative usage of natural resources in the Rwenzori and Nepalese Himalaya. In: The Rwenzori Mountains National Park, Uganda (eds. H.Osmaston et al.), pp 333-53.

Ashley, J.M. (1999): Food crops and drought. The Tropical Agriculturalist Series. Macmillans UK/ CTA Netherlands. 133pp.

Ashley, J.M. and Jayousi, N. (2006): Setting a Palestinian National Food Security Strategy. Palestine-Israel Journal, 13(3), 112-118.

Ashley, J.M. and Jayousi, N. (2013): The connection between Palestinian Culture and the Conflict. In book "Discourse, Culture and Education in the Israeli-Palestinian Conflict". Netanya Academic College, Israel/ Freidrich Ebert Stiftung. p 49-59. December 2013.

Ashley, J.M. (2016), Food security in the developing world. Elsevier/ Academic Press, USA. January 2016. 209 pages & 100pp+ companion website.

Ashley, J.M. (2018). Human resilience against food insecurity. Elsevier/ Academic Press, USA. May 30, 2018. 260pp.

Languages

English (native speaker), French (good)

APPENDIX B: CONFLICT OF INTEREST (COI) VERIFICATION

(please fill/sign/date the form below)

Name:	**John Michael Ashley**
Title: **Organization:**	Consultant ME&A, Inc.
Evaluation Position: **Evaluation Award Number:** *(or RFTOP or other appropriate instrument number)*	Team Leader (BMEL S025) GS-10F-154BA (ORDER NO. 72038819M00001)
Project(s) Evaluated: *(Include project name(s), implementer name(s) and award number(s), if applicable)*	Final Performance Evaluation of Feed the Future Bangladesh Livestock Production for Improved Nutrition Activity
I have real and/or potential conflict of interest to disclose:	☐ YES **X NO** ☐ NOT APPLICABLE
If yes answered above, I disclose the following: *Real or potential conflicts of interest may include, but are not limited to:* *1. Close family member who is an employee of the DoS operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated.* *2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation.* *3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project.* *4. Current or previous work experience or seeking employment with the DoS operating unit managing the evaluation or the implementing organization(s) whose project(s) are being evaluated.* *5. Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose project(s) are being evaluated.* *6. Preconceived ideas toward individuals, groups, organizations, or objectives of the particular projects and organizations being evaluated that could bias the evaluation.*	
Signature: **Date: January 19, 2021**	

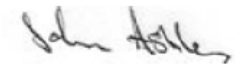
APPENDIX C: USAID SENSITIVE DATA NONDISCLOSURE AGREEMENT (AID 545-5 (10/2014)

AN AGREEMENT BETWEEN

John Michael Ashley
(Name of Individual - Printed or typed)
AND THE UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

1. Intending to be legally bound, I hereby accept the obligations contained in this agreement in consideration of my being granted access to sensitive data. As used in this Agreement, sensitive data is marked or unmarked "sensitive but unclassified information" (SBU), including oral communications, that meets the standards set by Office of Management and Budget (OMB) Circular A-130 Appendix 3 and the U.S. Agency for International Development (USAID) Automated Directives System (ADS.) I understand that any data or systems of records protected from unauthorized disclosure by the provisions of Title 5, United States Code Sections 552 (often referred to as "The Freedom of Information Act") and 552a ("The Privacy Act") is/are sensitive data. In addition, other categories of information, including but not limited to medical, personnel, financial, investigatory, visa, law enforcement or other information which, if released, could result in harm or unfair treatment to any individual or group, or could have a negative impact upon individual privacy, federal programs, or foreign relations is sensitive data. The term includes data whose improper use or disclosure could adversely affect the ability of the Agency to accomplish its mission, as well as proprietary data and information received through privileged sources or procurement sensitive or source selection information, as those terms are defined by the Federal Acquisition Regulations.
2. I understand and accept that by being granted access to sensitive data, special confidence and trust has been placed in me by the United States Government.
3. I acknowledge I have been given access to USAID sensitive data to facilitate the performance of duties assigned to me for compensation. I understand it is my responsibility to safeguard sensitive data disclosed to me, and to refrain from disclosing sensitive data to persons not requiring access for performance of official duties. Before disclosing sensitive data, I must determine the recipient's "need to know" or "need to access" sensitive data. I will not use any sensitive data for personal financial gain.
4. I have been advised that any breach of this Agreement may result in the termination of my access to sensitive data, which, if such termination effectively negates my ability to perform my assigned duties, may lead to the termination of my employment or other relationships with the Departments or Agencies that granted my access. I am aware unauthorized release or mishandling of sensitive data may be grounds for adverse action against me. In addition, I have been advised unauthorized disclosure of data protected by the Privacy Act may constitute a violation, or violations, of United States criminal law, and that Federally affiliated workers (including some contract employees) who violate privacy safeguards may be subject to disciplinary actions, a fine up to $5,000.00, or both.
5. I understand all sensitive data to which I have access or may obtain access by signing this Agreement is now and will remain the property of, or under the control of the United States Government. I agree that I must return all sensitive data which have, or may come into my possession or for which I am responsible because of such access:
   (a) upon demand by an authorized representative of the United States Government; or
   (b) upon the conclusion of my employment or other relationship with the Department or Agency that last granted me access to sensitive data; or
   (c) upon the conclusion of my employment or other relationship that requires access to sensitive data.

Unless and until I am released in writing by an authorized representative of the United States Government, I understand that all conditions and obligations imposed upon me by this Agreement apply during the time I am granted access to sensitive data, and at all times thereafter.
6. These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to a Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling.

WITNESS		ACCEPTANCE	
THE EXECUTION OF THIS AGREEMENT WAS WITNESSED BY THE UNDERSIGNED		THE UNDERSIGNED ACCEPTED THIS AGREEMENT BEFORE ACCESSING SENSITIVE DATA OF THE UNITED STATES GOVERNMENT.	
SIGNATURE	DATE	SIGNATURE 	DATE January 19, 2021

Rehan Uddin Ahmed Raju **Nationality:** Bangladeshi **Affiliation:** ME&A
Position: Nutrition Specialist

Education

- **PGDIR**, Postgraduate Diploma in International Relations, University of Dhaka, Bangladesh 2014
- **Master's in Public Health**, State University of Bangladesh, Dhaka 2005
- **M.A. in History**, University of Rajshahi, Bangladesh 1986
- **B.A. (Honors) in History**, University of Rajshahi, Bangladesh 1982

Key Qualifications

Mr. Rehan Raju has more than 20 years of experiences in the health and nutrition development sector in leadership and project management, design and implementation, financial management, social and behavior change communication (BCC/SBCC), strategic communication, training management, organizational capacity building, and monitoring and evaluation (M&E). He has worked with numerous international and local organizations including Plan International, Chemonics International, Pathfinder International, United Nations Population Fund (UNFPA), BBC Media Action, Save the Children, Caritas Bangladesh, HIV/AIDS and STD Alliance Bangladesh (HASAB), and Voluntary Health Services Society (VHSS), including 15 years of experience working with USAID-funded projects in Bangladesh. His USAID experience includes managing two USAID-funded projects as Project Director/Chief of Party: the Improving Nutrition through Community-Based Approaches (INCA), and the Advancing Adolescent Health (A2H), implemented by the Plan International Bangladesh Approached (A2H) Activity. Mr. Raju also worked with the USAID flagship project, Smiling Sun Health, in Bangladesh for 10 years in various capacities as the BCC/SBCC, Communication and Marketing Specialist/Technical Officer (SSFP, NSDP and RSDP).

Mr. Raju's sector-related experience includes developing information, education, communication (IEC)/SBCC materials on adolescent sexual and reproductive health (ASRH), nutrition, Expanded Program on Immunization (EPI), maternal, newborn, and child health (MNCH), family planning, and HIV/AIDS at both the national and project levels. This includes organizing campaigns and health promotional activities engaging the community and other stakeholders as well as national and international all-day observation campaigns on specific issues and themes in collaboration with the Government of Bangladesh (GOB), various United Nations (UN) bodies, and other national and international stakeholders. Mr. Raju's training expertise includes training needs analysis (TNA), curriculum design and development, the development of training materials and manuals, and implementing and evaluating trainings. Mr. Raju has conducted numerous trainings of trainers (TOTs) for senior managers, and has used cascade-training approaches to train large number of healthcare providers around the country using modern participatory training methods including audiovisual aids, simulation games, microteaching, and individual assignments.

He also has significant experience analyzing organizational development issues and providing technical assistance for organizational capacity building for local and international NGOs and provided technical assistance using a variety of methods such as Organizational Capacity Assessment Tool (OCAT) and Modified Organizational Capacity Assessment Tool (MOCAT) tools. These involved focus group discussions (FGD) with the leaders and managers, In Depth Interview (IDI), and Key Informant Interview (KII).

Mr. Raju's evaluation experience includes conducting evaluations, research, studies, and/or rapid assessments of health, nutrition, and family planning projects. He is proficient with app-based data collection tools, household surveys, and conducting focus group discussions (FGDs) with the local community with a variety of intended audiences, including adolescents, mothers, parents, host communities, the Rohiynga community, local leaders, and project managers. In addition, he has significant experience utilizing in-depth interviews (IDIs), and key informant interviews (KIIs) to gather information from management and key personnel.

Professional experiences

Consultant, Malteser International, January 2021-February 2021. Conduct a mid-term evaluation of Malteser funded project "Improving the health and nutrition situation of refugee in Cox's

Bazar and contribution to the peaceful coexistence of refugee and host communities" implemented by Gonoshasthaya Kendra (GK) with Rohingya and host in Cox's Bazar.

Consultant, Pathfinder International, October 2021-January 2021. Developed a training package for health service providers of Ready Made Garments (RMG) clinics and health centers on sexual and reproductive health and rights (SRHR), including nutrition, under the Directorate General of Family Planning (DGFP), Ministry of Health and Family Welfare (MOHFW). The package included the Trainer and Participant Manuals, presentation, pre-test, post-test, session evaluation, and M&E tools.

Consultant, Aparajeo Bangladesh, November 2020-December 2020. Developed the Communication and Campaign Strategy and messages on adolescent and youth rights promotion for the Y-Moves project of Aparajeo Bangladesh (National NGO), supported by Plan International.

Project Director (Chief of Party), Improving Nutrition through Community-based Approaches (INCA) Activity, USAID/Caritas Bangladesh, December 2018-June 2020. The project focused on MNCH (1000 days) nutrition, child marriages, and water, sanitation, and hygiene (WASH) with the goal of improved nutritional status of women and children in targeted vulnerable areas and improved nutritional practices during the first thousand days of life through SBCC intervention and service provision. The project worked in 11 selected upazilas in the districts of Bhola, Lakshmipur and Noakhali. Project beneficiaries included pregnant women, lactating mothers, children under age 2, husbands, fathers, in-laws, adolescent girls, members of community nutrition support Community Clinic (CC) groups, and health and nutrition service providers of community-based health facilities. Project accomplishments:

- Reached 398,722 beneficiaries including pregnant women, lactating mothers, mothers of children under age 2, and adolescent girls.
- Provided service to 113,649 pregnant women, 94,010 lactating mothers, 161,996 children under age 2, and 29,067 adolescent girls.
- Worked with 372 government health facilities (302 CCs and 70 Union Health and Family Welfare Centers [UHFWCs]) in remote areas to ensure quality health and nutrition services for (1000 days) pregnant women, mothers, children, and adolescents. The service included antenatal care (ANC), prenatal care (PNC), safe delivery, iron folic acid, calcium tablet, contraceptives, and necessary medicines.
- Developed comprehensive SBCC materials on community nutrition.
- Established Women Information Centers (WICs) at the community level through women entrepreneurship development focusing on promotion of health and nutritional and health products to the rural community (women and adolescents). Promoted home gardening, pond fisheries, and duck, chicken, goat and cow rearing to ensure nutritious food for pregnant women, children, and adolescents.

Project Director (Chief of Party), Advancing Adolescent Health (A2H), USAID/Plan International Bangladesh, October 2017-December 2018. Managed USAID-funded ($6 million) A2H project to improve the health and nutrition and well-being of Bangladeshi adolescents through improving community attitudes regarding the delay of early marriage and by improving access to sexual and reproductive health (SRH), MNCH, FP, and Nutrition, and other health information and services. Worked to improve the overall health and health-seeking behavior for adolescents. Developed BCC strategy, BCC materials, and organized training and capacity building activities. Worked with Directorate General of Health Services (DGHS), Directorate General of Family Planning (DGFP), Institute of Public Health Nutrition (IPHN), National Nutrition Council (NNC), Community-Based Health Care (CBHC), Directorate General of Family Planning (DGFP), Union Parishad, on Adolescent-friendly health and nutrition advocacy and governance. Worked in eight upazilas in Rangpur district with 277 government health facilities (200 CCs, 75 UHFWCs, and 2 mother and child welfare centers [MCWC]) in remote areas.

BCC Mapping and Situation Analysis Specialist, USAID's BKMI, BCCP, March 2015-April 2015. Worked with Bangladesh Knowledge Management (BKMI) funded by USAID and conducted

mapping of existing interventions by GOB, USAID implementing partners (IPs), and others related to health communication and behavior change, including available services.

Training Consultant, BBC Media Action, July 2013-October 2013. Conducted TNA through FGDs, KIIs, and document review. Assisted in preparing TOT manual and training module and developed tools for capacity building of frontline health and family planning worker under national health & FP program. Developed KII questionnaires. Developed FGD guidelines. Conducted KIIs, IDIs, and FGDs. Prepared TNA report and Training Manual.

Public Health Communication and Training Specialist, Center for Research and Development (CRD), February 2015-January 2016 and March 2013-June 2013. Developed communication strategy, training manuals, and IEC/BCC materials. Provided technical support to conduct advocacy meeting and school health education sessions in primary school in 64 districts under health campaign of the Bureau of Health Education (BHE) of the DGHS. Conducted study on Best Practice documentation on Violence Against Women (VAW) in Workplace, a project of the International Labor Organization (ILO), Dhaka. Developed KII questionnaires and FGD guideline, conducted IDIs and FGDs, and prepared report.

Marketing/Communication Specialist, SSFP Project, USAID/Chemonics International, October 2007-December 2012. Worked with Smiling Sun Franchise Program (SSFP) of Chemonics International, funded by USAID, and provided technical assistance to the non-governmental organization (NGO) partners on health/social marketing, BCC/communication, capacity building, and community mobilization. Developed Communication and Marketing plan, brand strategy, and training guideline/manual and provided training on marketing, branding, resource mobilization, BCC, etc. Worked with 400 Smiling Sun Clinics to promote ANC, PNC, FP, nutrition, and child health.

Consultant, Save the Children, May 2013-July 2013. Reviewed the TOT manuals, training modules, teacher guide, and IEC materials under the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM)-funded HIV/AIDS program through IDIs and FGDs with different participants and beneficiaries. Developed IDI questionnaires and FGD guideline, conducted IDIs and FGDs, and prepared report with recommendations.

National Consultant, Advocacy and BCC, Save the Children-USA, April 2007-October 2007. Under a GFATM grant, provided technical assistance to the National AIDS/STD Program (NASP) under the DGHS of the Ministry of Health and Family Welfare (MOHFW) of the GOB.

National Consultant, Advocacy and BCC, Save the Children-USA, April to 30 October 2007. Under GFATM grant and provided technical assistance to NASP under the DGHS of the MOHFW of the GOB.

Program Communication and Documentation Officer, NGO Service Delivery Program (NSDP), USAID/Pathfinder International, September 2002-March 2004. Assisted NSDP management and facilitated policy and decision-making process of NSDP on BCC, community mobilization, and advocacy issues. Organized and facilitated seminars, workshops, orientations, and training as well as advocacy and networking with the GOB and other development partners. Maintained regular communication and linkage with eight regional field units.

Technical Officer-Behavior Change Communication (BCC), Rural Service Delivery Partnership (RSDP), USAID/Pathfinder International. From 10 November 1999 to 31 July 2002. Provided technical assistance to USAID funded RSDP-NGOs in developing and implementing BCC and community mobilization/campaign and marketing activities. Developed BCC and training materials and organized and facilitated orientations/workshops/training, and advocacy and networking with GOB and other development partners.

Selected Research and Evaluation Experience

- May 2015-June 2015: Worked for Friends of SPCS (UK) and conducted an assessment study of community-based health project and clinic operated by SPCS in Kotalipara under Gopalganj district.

- May 2015-June 2015: Worked for BNNRC and conducted an assessment study of training program organized to build capacity of Community Radio in Bangladesh.
- 2014: Prepared a research paper on "Study on role of China during Liberation of Bangladesh in 1971" as part of PGDIR course.
- May 2013-June 2013: Worked for ILO for one month to document success story and lessons learned from the VAW project implemented through GOB and private sector.
- May 2013: Conducted training on Interpersonal Communication and BCC for Islamic Relief Bangladesh staff.
- September 2010-October 2010: Conducted an evaluation of a project on Gender and Women Empowerment of Koinonia (a national NGO).
- October 2009: Conducted Midterm Study on Knowledge, Attitude, and Practice towards Gender-Based Violence against Women in Koinonia Project Area.
- May 2008-June 2008: Developed curriculum/manual for HIV/AIDS program of Koinonia (a humanitarian organization).
- September 2007-October 2007: Conducted an evaluation of a project on Gender and Women Empowerment of Koinonia, a national NGO.
- 2005: Conducted a KAP survey on STD/AIDS as part of MPH program.
- 2005: Conducted a Rapid Assessment of messages on HIV/AIDS.
- August-September 2002: Worked as a facilitator for TOT on Primary Eye Care, organized by MOH&FW, supported by Sight Savers International.
- August 2002: Developed BCC material for ORBIS International through VHSS.
- 1999: Worked as a facilitator for Stakeholder workshop on HPSP for GOB.
- 1998: Worked as a consultant-facilitator for workshop on National Health Policy.
- 1997-1998: Worked as a consultant-facilitator for orientation on "Facts for Life" with the United Nations Children's Fund (UNICEF).
- 1997: Worked as a national facilitator for workshop on the Fifth Health and Population Program (HAPP-5).
- October 2001: Conducted a Study on Missed Opportunity at RSDP clinics in Bangladesh.
- April 1985: Worked as a Field Investigator of a socioeconomic survey of Barind Track under Rajshahi division.

Language Skills:

- Bangla- Mother-tongue
- English- Excellent

Dr. Raihan Habib **Nationality:** Bangladeshi **Affiliation:** ME&A

Position: Livestock Specialist

Education

- Post-Doc. in Dairy Technology, University of Reading, UK 2016
- Ph.D. in Food and Nutrition Sciences, University of Reading, UK 2011
- Master of Dairy Sciences, Bangladesh Agricultural University, Bangladesh 2001
- B.Sc. in Animal Husbandry, Bangladesh Agricultural University, Bangladesh 1997

Key Qualifications

Dr. Raihan is a professor in the Dairy Science Department of Bangladesh Agricultural University. He obtained his Post-Doc. in Dairy Technology and Ph.D. in Food and Nutrition Sciences from University of Reading, UK. He obtained his Masters in Dairy Sciences and graduated in Animal Husbandry from Bangladesh Agricultural University, Bangladesh. He has worked with several donor assisted projects funded by DFID, World Bank, GOB, Bangladesh Agricultural University Research System (BAURES) and I/NGOs. Altogether, Dr. Raihan has 20 years of professional experience as a livestock specialist. The focus of his expertise and experience is research, designing, managing and evaluating livestock projects involving enterprise/entrepreneurship development, value chain analysis, market development and nutrition activities. He also has experience facilitating livestock related training programs and the assessment of livestock projects for agriculture and food security projects. He has supervised 25 Masters students in the field of Dairy Science, published 27 scientific papers in various journals, and wrote two thesis papers as part of his Ph.D. and MS degrees. He attended several national and international conferences and trainings, where he presented scientific papers.

Professional Experiences

Experience in Dairy Extension, Research and Evaluation

- **Consultant** for Unnayan Prochesta (Satkhira based NGO) on dairy value chain development and dairy business operations, November 2020 to now. Activities include qualitative and quantitative survey methods involving field visit observations at designated areas of Satkhira district, yard meetings, focus group discussions, key informant interviews, in-depth interviews, survey questionnaire, technology dissemination sessions, follow-up surveys, data analysis and report writing. Other tasks include dairy value chain development and dairy supply chain development activities.
- **Lead Consultant** for PKSF (Palli Kormo-Shohayok Foundation) for a survey entitled "Common Services Activities, Technological Intervention and Environmental Interventions Requirements for the Dairy Product Sub-Sector" (Package no PKSF/SEP/S-13.1), July 2019 to now. The activity includes a mixed qualitative and quantitative approach using direct observation field visits at designated clusters throughout Bangladesh, data collection by focus group discussion, key informant interviews, in-depth interviews, survey questionnaire, data analysis, and report writing.
- **Technical Consultant** for PRAN Dairy Ltd. from July 2019 to now. Activities include market assessment, technical troubleshooting, business model development, dairy project design, and report writing.
- **Principal Investigator** of the project titled "Development of Cost-Effective Technology for Making Flavored Stirred Yogurt," funded by the Bangladesh Agricultural University Research System (BAURES). This is a two-year project started in January 2018.

- **Principal Investigator** of the project titled "Development of a Novel Stabilizer Mix for Improving the Quality of Ice Cream," funded by the Ministry of Science and Technology. This was a one-year project completed in June 2017.
- **Principal Investigator** of the project entitled "Development of Low-Cost Technology for Making Processed Cheese," funded by the NATP Phase-2 (World Bank and GoB), Bangladesh Agriculture Research Council (BARC). This was a one-and-a-half years project completed in August 2018.
- **Principal Investigator** of the project titled "Standardization of Technology for Making Cottage Cheese from Low-fat Milk Using Microbial Rennet," funded by the Ministry of Science and Technology. This was a one-year project completed in June 2018.
- **Principal Investigator** of the project titled "Standardization of Dhaka Cheese Making Technology Using Microbial Rennet," funded by the Ministry of Science and Technology. This was a one-year project completed in June 2017.
- **Principal Investigator** of the project titled "Standardization of Mozzarella Cheese Making Technology Using Microbial Rennet," funded by the Bangladesh Agricultural University Research System (BAURES). This was a two-year project completed in January 2018.
- **Principal Investigator** of the project titled "Development of a Cost-Effective Technology for the Manufacture of Milk-Based Toffee," funded by the BAURES. This was a one-year project completed in June 2014.
- **Post-Doctoral Research Fellow** for the project titled "Standardization of Processed Cheese Making Technology Using Dhaka Cheese Base," funded by DFID. This was a six-month project completed in April 2016.
- **Doctoral Research** for the project titled "Standardization of Dhaka Cheese Making Technology," funded by DFID. This was a three-and-a-half years project completed in March 2011.
- **Associate** in a DFID (Department of International Development, UK) project (R6610) titled "Improving the Livelihoods of Poor Dairy Producers in Bangladesh with Integrated Rice/Forage Production and UMB (Urea Molasses Block) Technology" from October, 2003 to February, 2005. Activities included stakeholder group meetings, a baseline survey by yard meetings, focus group discussions, technology dissemination, follow-up survey, data analysis and report writing.
- **Masters Research** for the project titled "Study on Acidophilus Milk and Acidophilus Dahi Prepared from Cow Milk and Powdered Milk' funded by a National Science and Technology Fellowship. This was a six-month fellowship completed in June 2001.
- **Evaluator** of research and development projects at Bangabandhu Sheikh Mujibur Rahman Agricultural University, Bangladesh.

Teaching Experience

- July 2015 to date, **Professor** at the Department of Dairy Science, Bangladesh Agricultural University (BAU), Mymensingh.
- July 2011 to July 2015, **Associate Professor** at the Department of Dairy Science, BAU, Mymensingh.
- March 2005 to July 2011, **Assistant Professor** at the Department of Dairy Science, BAU, Mymensingh.
- October 2002 to March 2005, **Lecturer** at the Department of Dairy Science, BAU, Mymensingh.

Awards and Fellowships

- University Grants Commission Merit Scholarship, 1998, Ministry of Education, Government of the People's Republic of Bangladesh.
- National Science and Technology Fellowship, 2000, Ministry of Science and Technology, Government of the People's Republic of Bangladesh.

- Vice-Chancellor's Gold Medal as Recognition of Merit (distinction) at the Postgraduate Level, Bangladesh Agricultural University, 2001.
- Commonwealth Scholarship for PhD study, Commonwealth Scholarship Commission in the UK, 2007.
- Commonwealth Fellowship for Post-Doctoral research, Commonwealth Scholarship Commission in the UK, 2015.

Relevant Publications

- **R. Habib**, M.N. Hassan, M.A.S. Khan, M.J. Alam and M.A.U. Bhuiyan. (2003) Study on the preparation of acidophilus milk. *Bangladesh Journal of Environmental Science*, 9(2) 292-296.
- M.J. Alam, **R. Habib**, M.M.H. Khan and S.M.E. Rahman. (2003) Protein concentrate for livestock from tannery wastes. *Bangladesh Journal of Environmental Science*, 9(2) 274-276.
- **R. Habib**, M.N. Hassan, M.A.S. Khan, M.N. Islam and T. Hasan. (2004) Preparation of dahi from cow milk and powdered milk by using single bacterial culture of *Lactobacillus acidophilus*. *Bangladesh Journal of Animal Science*, 33(1&2), 101-110.
- **R. Habib**, M.N. Hassan, M.F. Imam, M.A.U. Bhuiyan and M. Kafiluddin. (2004) Fermented dairy products of Bangladesh – a review. *Bangladesh Journal of Environmental Science*, 10(1) 92-97.
- **R. Habib** and M.N. Hassan. (2005) Quality of Dhaka cheese available in Dhaka city markets. *Bangladesh Journal of Animal Science*, 34(1&2), 111-119.
- M.M. Bhuiyan, **R. Habib** and M.F. Imam. (2005) Neural network-based diagnosis of bacterial viral diseases of domestic animals. *Bangladesh Journal of Environmental Science*, 11(1) 42-45.
- **R. Habib**, M.N. Islam, M.A.S. Khan, and M.A. Habib. (2006) Manufacture of table cream from reconstituted milk. *Journal of the Bangladesh Society for Agricultural Science and Technology*, 3(3&4) 21-24.
- **R. Habib**, M.N. Islam, M.A.S. Khan, and M.A. Habib. (2006) Production of low-fat milk in the household by gravity method. *Journal of the Bangladesh Society for Agricultural Science and Technology*, 3(3&4) 29-32.
- **R. Habib**, M.N. Islam, M.A.S. Khan, and M.A. Habib. (2006) Manufacture of peda from sweetened condensed milk. *Journal of the Bangladesh Society for Agricultural Science and Technology*, 3(3&4) 181-184.
- **R. Habib**, M.F. Imam, M.M. Rahman and M. Kafiluddin. (2007) Manufacture of butter oil from reconstituted milk. *Bangladesh Journal of Environmental Science*, 13(2) 284-387.
- **R. Habib**, M.A.K. Azad and M. Kafiluddin. (2007) Ratio of milk powder and water in the manufacture of reconstituted milk. *Bangladesh Journal of Environmental Science*, 10(1) 92-97.
- **R. Habib**, M.M. Rahman, M.N. Islam and M. Kafiluddin. (2007) Use of sweetened condensed milk as a dressing in the cottage cheese. *Bangladesh Journal of Environmental Science*, 13(2) 388-391.
- **R. Habib**, M. Salahuddin, M.M. Rahman and M.A.K. Azad. (2007) Marketing management of cheese in Dhaka city – a case study. *Journal of the Bangladesh Society for Agricultural Science and Technology*, 4(1&2) 251-254.
- **R. Habib**, R.A. Wilbey and A.S. Grandison. (2012) Manipulation of Dhaka cheese curd and effects on cheese quality. *International Journal of Dairy Technology*, 65(3): 372-378.
- **R. Habib**, R.A. Wilbey and A.S. Grandison. (2012) Pressing technique and its effect on the quality of Dhaka cheese. *International Journal of Dairy Technology*, 65(3): 379-386.
- M.N. Hassan, **R. Habib**, M.A.S. Khan, M.F. Imam and A.A. Hossain. (2013) Use of cane brown sugar as a sweetener for making dahi. *Journal of the Bangladesh Society for Agricultural Science and Technology*, 10(3&4): 115-120.
- M.M.R. Shakil, M.N. Hassan, **R. Habib**, M.A. Kabir and M.R. Hassin. (2013) Quality of sweet dahi sold in Bogra town. *Journal of the Bangladesh Society for Agricultural Science and Technology*, 10(3&4): 109-114.

- A.A. Hossain, **R. Habib**, M.N. Islam and M.R.H. Rakib. (2014) Use of date-palm (*Phoenix dactylifera L.*) brown sugar as a sweetener for making dahi. *Bangladesh Journal of Animal Science*, 43(1): 62-67.
- M.R.H. Rakib, **R. Habib**, M.N. Hassan, M.F. Imam and M.N. Hassan. (2014) Development of turbidity index to detect mixing of heated milk with raw milk. *Bangladesh Journal of Animal Science*, 43(2): 123-127.
- **R. Habib**. (2015) Effect of salting method on salt concentration in Dhaka cheese. *Progressive Agriculture*, 26: 79-84.
- M.A. Sabbir, **R. Habib**, M.H. Rashid and M.F. Imam. (2015) Quality of ultra-high temperature treated chocolate milk manufactured in Bangladesh.*Bangladesh Journal of Animal Science*, 45(1): 128-131.
- M.Y. Arafat, **R. Habib**, M.S.R. Siddiki and M.F. Imam. (2015) Quality of ultra-high temperature treated milk available in Gazipur and Mymensingh of Bangladesh.*Bangladesh Journal of Animal Science*,44(3): 132-136.
- M.N. Islam, S. Arefin, M.A.H. Sarker, S. Akhter and **R. Habib**. (2016) Feasibility of using sodium alginate for improving structural quality of sweet dahi. *Bangladesh Journal of Animal Science*,45(2): 66-72.
- M.N. Islam, A.A.M. Muzaid, **R. Habib**, M.A. Mazed and M.A. Salam. (2016) Preparation of dahi from skim milk with different level of carrot juice. *Bangladesh Journal of Animal Science*, 45(1): 36-43.
- M.A. Reyad, M.A.H. Sarker, M.E. Uddin, **R. Habib** and M.H. Rashid (2016) Effect of heat stress on milk production and its composition of Holstein Friesian crossbred dairy cows. *Asian Journal of Medical and Biological Research*, 2(2): 190-195.
- M.S. Rana, M.R. Hoque, M.O. Rahman, **R. Habib** and M.S.R. Siddiki (2017) Papaya (*Carica papaya*) latex – An alternative to rennet for cottage cheese preparation. Journal of *Advanced Veterinary and Animal Research*, 4(3): 249-254.
- M.S. Rana, M.R. Hoque, G.K. Deb, T.N. Nahar, **R. Habib** and M.S.R. Siddiki (2017) Preparation of cottage cheese from buffalo milk with different levels of papaya latex. *Bangladesh Journal of Animal Science*, 46(2): 128-133

Membership in Professional Associations

- Life member of the Society of Dairy Technology (SDT), UK.
- Life member of the Bangladesh Animal Husbandry Association (BAHA), Bangladesh
- Life member of the Bangladesh Society for Animal Production Education and Research (*BSAPER*), Bangladesh.
- Life member of the Welcome to Bangladesh Association of Commonwealth Scholars and Fellows (BACSAF), Bangladesh.

Language Skills

- Bangla- Mother-tongue
- English- Excellent
- French (Basic)

APPENDIX B: CONFLICT OF INTEREST (COI) ***(please fill/sign/date the form below)***

Name	**Dr. Raihan Habib**
Title	Consultant
Organization	ME&A, Inc.
Evaluation Position	Livestock Specialist
Evaluation Award Number *(or RFTOP or other appropriate instrument number)*	BMEL S025
Project(s) Evaluated *(Include project name(s), implementer name(s) and award number(s), if applicable)*	Final Performance Evaluation of Feed the Future Bangladesh Livestock Production for Improved Nutrition Activity
I have a real and/or potential conflict of interest to disclose.	☐ Yes ☑ No N/A
If yes answered above, I disclose the following facts: *Real or potential conflicts of interest may include, but are not limited to:* 1. *Close family member who is an employee of the DoS operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated.* 2. *Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation.* 3. *Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project.* 4. *Current or previous work experience or seeking employment with the DoS operating unit managing the evaluation or the implementing organization(s) whose project(s) are being evaluated.* 5. *Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose project(s) are being evaluated.* 6. *Preconceived ideas toward individuals, groups, organizations, or objectives of the particular projects and organizations being evaluated that could bias the evaluation.*	

Signature:	
Date:	01/20/2021

APPENDIX C: USAID SENSITIVE DATA NONDISCLOSURE AGREEMENT (AID545-5 (10/2014)

AN AGREEMENT BETWEEN

Dr. Raihan Habib

(Name of Individual - Printed or typed)

AND THE UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

1. Intending to be legally bound, I hereby accept the obligations contained in this agreement in consideration of my being granted access to sensitive data. As used in this Agreement, sensitive data is marked or unmarked "sensitive but unclassified information" (SBU), including oral communications, that meets the standards set by Office of Management and Budget (OMB) Circular A-130 Appendix 3 and the U.S. Agency for International Development (USAID) Automated Directives System (ADS.) I understand that any data or systems of records protected from unauthorized disclosure by the provisions of Title 5, United States Code Sections 552 (often referred to as "The Freedom of Information Act") and 552a ("The Privacy Act") is/are sensitive data. In addition, other categories of information, including but not limited to medical, personnel, financial, investigatory, visa, law enforcement or other information which, if released, could result in harm or unfair treatment to any individual or group, or could have a negative impact upon individual privacy, federal programs, or foreign relations is sensitive data. The term includes data whose improper use or disclosure could adversely affect the ability of the Agency to accomplish its mission, as well as proprietary data and information received through privileged sources or procurement sensitive or source selection information, as those terms are defined by the Federal Acquisition Regulations.
2. I understand and accept that by being granted access to sensitive data, special confidence and trust has been placed in me by the United States Government.
3. I acknowledge I have been given access to USAID sensitive data to facilitate the performance of duties assigned to me for compensation. I understand it is my responsibility to safeguard sensitive data disclosed to me, and to refrain from disclosing sensitive data to persons not requiring access for performance of official duties. Before disclosing sensitive data, I must determine the recipient's "need to know" or "need to access" sensitive data. I will not use any sensitive data for personal financial gain.
4. I have been advised that any breach of this Agreement may result in the termination of my access to sensitive data, which, if such termination effectively negates my ability to perform my assigned duties, may lead to the termination of my employment or other relationships with the Departments or Agencies that granted my access. I am aware unauthorized release or mishandling of sensitive data may be grounds for adverse action against me. In addition, I have been advised unauthorized disclosure of data protected by the Privacy Act may constitute a violation, or violations, of United States criminal law, and that Federally-affiliated workers (including some contract employees) who violate privacy safeguards may be subject to disciplinary actions, a fine up to $5,000.00, or both.
5. I understand all sensitive data to which I have access or may obtain access by signing this Agreement is now and will remain the property of, or under the control of the United States Government. I agree that I must return all sensitive data which have, or may come into my possession or for which I am responsible because of such access:
   (a) upon demand by an authorized representative of the United States Government; or
   (b) upon the conclusion of my employment or other relationship with the Department or Agency that last granted me access to sensitive data; or
   (c) upon the conclusion of my employment or other relationship that requires access to sensitive data.

Unless and until I am released in writing by an authorized representative of the United States Government, I understand that all conditions and obligations imposed upon me by this Agreement apply during the time I am granted access to sensitive data, and at all times thereafter.
6. These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling.

WITNESS		**ACCEPTANCE**	
THE EXECUTION OF THIS AGREEMENT WAS WITNESSED BY THE UNDERSIGNED		THE UNDERSIGNED ACCEPTED THIS AGREEMENT BEFORE ACCESSING SENSITIVE DATA OF THE UNITED STATES GOVERNMENT.	
SIGNATURE	DATE	SIGNATURE 01/20/2021	DATE

APPENDIX B: CONFLICT OF INTEREST (COI) *(please fill/sign/date the form below)*

Name	**Biplob Banerjee**
Title	Consultant
Organization	ME&A, Inc.
Evaluation Position	Research/Evaluation Assistant
Evaluation Award Number *(or RFTOP or other appropriate instrument number)*	BMEL S025
Project(s) Evaluated*(Include project name(s), implementer name(s) and award number(s), if applicable)*	Final Performance Evaluation of Feed the Future Bangladesh Livestock Production for Improved Nutrition Activity
I have a real and/or potential conflict of interest to disclose. **If yes answered above, I disclose the following facts:** *Real or potential conflicts of interest may include, but are not limited to:* *1. Close family member who is an employee of the DoS operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated.* *2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation.* *3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project.* *4. Current or previous work experience or seeking employment with the DoS operating unit managing the evaluation or the implementing organization(s) whose project(s) are being evaluated.* *5. Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose project(s) are being evaluated.* *6. Preconceived ideas toward individuals, groups, organizations, or objectives of the particular projects and organizations being evaluated that could bias the evaluation.*	☐ Yes ☐ No✓ N/A

Signature:	
Date:	03/01/2021

APPENDIX C: USAID SENSITIVE DATA NONDISCLOSURE AGREEMENT (AID545-5 (10/2014)

AN AGREEMENT BETWEEN

Biplob Banerjee

(Name of Individual - Printed or typed)

AND THE UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

1. Intending to be legally bound, I hereby accept the obligations contained in this agreement in consideration of my being granted access to sensitive data. As used in this Agreement, sensitive data is marked or unmarked "sensitive but unclassified information" (SBU), including oral communications, that meets the standards set by Office of Management and Budget (OMB) Circular A-130 Appendix 3 and the U.S. Agency for International Development (USAID) Automated Directives System (ADS.) I understand that any data or systems of records protected from unauthorized disclosure by the provisions of Title 5, United States Code Sections 552 (often referred to as "The Freedom of Information Act") and 552a ("The Privacy Act") is/are sensitive data. In addition, other categories of information, including but not limited to medical, personnel, financial, investigatory, visa, law enforcement or other information which, if released, could result in harm or unfair treatment to any individual or group, or could have a negative impact upon individual privacy, federal programs, or foreign relations is sensitive data. The term includes data whose improper use or disclosure could adversely affect the ability of the Agency to accomplish its mission, as well as proprietary data and information received through privileged sources or procurement sensitive or source selection information, as those terms are defined by the Federal Acquisition Regulations.

2. I understand and accept that by being granted access to sensitive data, special confidence and trust has been placed in me by the United States Government.

3. I acknowledge I have been given access to USAID sensitive data to facilitate the performance of duties assigned to me for compensation. I understand it is my responsibility to safeguard sensitive data disclosed to me, and to refrain from disclosing sensitive data to persons not requiring access for performance of official duties. Before disclosing sensitive data, I must determine the recipient's "need to know" or "need to access" sensitive data. I will not use any sensitive data for personal financial gain.

4. I have been advised that any breach of this Agreement may result in the termination of my access to sensitive data, which, if such termination effectively negates my ability to perform my assigned duties, may lead to the termination of my employment or other relationships with the Departments or Agencies that granted my access. I am aware unauthorized release or mishandling of sensitive data may be grounds for adverse action against me. In addition, I have been advised unauthorized disclosure of data protected by the Privacy Act may constitute a violation, or violations, of United States criminal law, and that Federally-affiliated workers (including some contract employees) who violate privacy safeguards may be subject to disciplinary actions, a fine up to $5,000.00, or both.

5. I understand all sensitive data to which I have access or may obtain access by signing this Agreement is now and will remain the property of, or under the control of the United States Government. I agree that I must return all sensitive data which have, or may come into my possession or for which I am responsible because of such access:

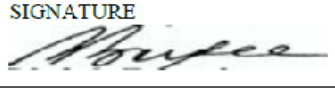
(a) upon demand by an authorized representative of the United States Government; or

(b) upon the conclusion of my employment or other relationship with the Department or Agency that last granted me access to sensitive data; or

(c) upon the conclusion of my employment or other relationship that requires access to sensitive data.

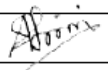
Unless and until I am released in writing by an authorized representative of the United States Government, I understand that all conditions and obligations imposed upon me by this Agreement apply during the time I am granted access to sensitive data, and at all times thereafter.

6. These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling.

WITNESS		ACCEPTANCE	
THE EXECUTION OF THIS AGREEMENT WAS WITNESSED BY THE UNDERSIGNED		THE UNDERSIGNED ACCEPTED THIS AGREEMENT BEFORE ACCESSING SENSITIVE DATA OF THE UNITED STATES GOVERNMENT.	
SIGNATURE	DATE	SIGNATURE 	DATE 03/01/2021

APPENDIX B: CONFLICT OF INTEREST (COI) *(please fill/sign/date the form below)*

Name	**ALPONA SHIRIN**
Title	Consultant
Organization **Evaluation Position**	ME&A, Inc. Research/Evaluation Assistant
Evaluation Award Number *(or RFTOP or other appropriate instrument number)*	BMEL S025
Project(s) Evaluated*(Include project name(s), implementer name(s) and award number(s), if applicable)*	Final Performance Evaluation of Feed the Future Bangladesh Livestock Production for Improved Nutrition Activity
I have a real and/or potential conflict of interest to disclose. **If yes answered above, I disclose the following facts:** *Real or potential conflicts of interest may include, but are not limited to:* *1. Close family member who is an employee of the DoS operating unit managing the project(s) being evaluated or the implementing organization(s) whose project(s) are being evaluated.* *2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose projects are being evaluated or in the outcome of the evaluation.* *3. Current or previous direct or significant though indirect experience with the project(s) being evaluated, including involvement in the project design or previous iterations of the project.* *4. Current or previous work experience or seeking employment with the DoS operating unit managing the evaluation or the implementing organization(s) whose project(s) are being evaluated.* *5. Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose project(s) are being evaluated.* *6. Preconceived ideas toward individuals, groups, organizations, or objectives of the particular projects and organizations being evaluated that could bias the evaluation.*	☐ Yes ☒ No N/A

Signature:	
Date:	3/2/2021

APPENDIX C: USAID SENSITIVE DATA NONDISCLOSURE AGREEMENT (AID545-5 (10/2014)

AN AGREEMENT BETWEEN

ALPONA SHIRIN

(Name of Individual - Printed or typed)

AND THE UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

1. Intending to be legally bound, I hereby accept the obligations contained in this agreement in consideration of my being granted access to sensitive data. As used in this Agreement, sensitive data is marked or unmarked "sensitive but unclassified information" (SBU), including oral communications, that meets the standards set by Office of Management and Budget (OMB) Circular A-130 Appendix 3 and the U.S. Agency for International Development (USAID) Automated Directives System (ADS.) I understand that any data or systems of records protected from unauthorized disclosure by the provisions of Title 5, United States Code Sections 552 (often referred to as "The Freedom of Information Act") and 552a ("The Privacy Act") is/are sensitive data. In addition, other categories of information, including but not limited to medical, personnel, financial, investigatory, visa, law enforcement or other information which, if released, could result in harm or unfair treatment to any individual or group, or could have a negative impact upon individual privacy, federal programs, or foreign relations is sensitive data. The term includes data whose improper use or disclosure could adversely affect the ability of the Agency to accomplish its mission, as well as proprietary data and information received through privileged sources or procurement sensitive or source selection information, as those terms are defined by the Federal Acquisition Regulations.

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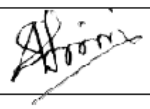
SIGNATURE	DATE	SIGNATURE 	DATE 3/2/2021