Annual Progress Report

2022-2023

IFAD
Investing in rural people

Office of the Programme Management

CARLEP

KINGDOM OF BHUTAN

COMMERCIAL AGRICULTURE AND RESILIENT LIVELIHOODS ENHANCEMENT PROGRAMME

IFAD Loan: 2000000627

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ANNUAL PROGRESS REPORT

July 2022 – June 2023

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CURRENCY EQUIVALENTS

Currency Unit		Ngultrum (BTN) *
USD 1.00	=	BTN 82.30

**/ The Bhutan Ngultrum (BTN) is pegged with the India Rupees (INR)*

WEIGHTS AND MEASURES

International metric system, unless otherwise mentioned, and except for:

1 kilogram	=	1000 gm
1 kilometre	=	0.62 mile
1 metre	=	1.09 yards
1 square metre	=	10.76 square feet
1 acre	=	0.4047 hectares (ha)
1 hectare	=	2.47 acres
1 *Langdo*	=	1400 m^2

ABBREVIATIONS

ADAO	Assistant Dzongkhag Agriculture Officer
AFD	Administration and Finance Division
AI	Artificial Insemination
AIT	Artificial Insemination Technician
ALD	Agriculture Land Development
AOS	Annual Outcome Survey
APA	Annual Performance Agreement
ARDC	Agriculture Research and Development Centre
ASAP	Adaptation for Smallholder Agriculture Programme
ASF	African Swine Fever
AWPB	Annual Work Plan and Budget
B2B	Business to Business
BAIL	Bhutan Agro Industries Ltd.
BDBL	Bhutan Development Bank Limited
BES	Bhutan Ecological Society
BFDA	Bhutan Food and Drugs Authority
BTN	Bhutan Ngultrum
CAHW	Community Animal Health Worker
CAIT	Community Artificial Insemination Technician
CARLEP	Commercial Agriculture & Resilient Livelihood Enhancement Programme
CEO	Chief Executive Officer
CHBPP	Contract Heifer and Bull Production Program
CM	Component Manager
CMT	Contract Monitoring Tool
CMU	Central Machinery Unit
CSI	Cottage and Small Industries
CSV	Climate Smart Village
DAMC	Department of Agriculture Marketing and Cooperatives
DAO	Dzongkhag Agriculture Officer
DE	District Engineer
DFG	Dairy Farmer Groups
DHI	Druk Holding and Investment
DLO	Dzongkhag Livestock Officer
DNB	Department of National Budget
DoA	Department of Agriculture
DoL	Department of Livestock
DPA	Department of Public Accounts
DPO	Dzongkhag Planning Officer
DT	Dzongkhag Tshogdue
EDMO	Economic Development Officer
EF	Electric Fencing
EFC	Export facilitation Center
ES	Extension Supervisor
FA	Financing Agreement
FCBL	Food Corporation of Bhutan Limited
FG	Farmers' Group
FY	Fiscal Year
GBCL	Green Bhutan Corporation Limited
GCF	Global Climate Fund
GEF	Global Environment Facility
GEO	Gewog Extension Officer
GNHC	Gross National Happiness Commission
GoI	Government of India
GT	Gewog Tshogdue
HPS	Heifer Production Scheme
ICT	Information, Communication Technology

IFAD	International Fund for Agricultural Development
IFPP	Integrated Food Processing Plant
IoT	Internet of Things
JICA	Japan International Cooperation Agency
KIL	Koufuku International Limited
KM	Knowledge Management
LPG	Liquid Petroleum Gas
LSD	Lumpy Skin Disease
LUC	Land Use Certificate
M&E	Monitoring and Evaluation
MCC	Milk Collection Center
MCS	Milk Collection Sheds
MGF	Matching Grant Facility
MIS	Marketing Information System
MoAF	Ministry of Agriculture and Forests
MoF	Ministry of Finance
MPU	Milk Processing Unit
MSP	Multi-Stakeholders' Platform
MYRB	Multi Year Rolling Budget
NBIN	National Bovine Identity Number
NCAH	National Center for Animal Health
NCB	National Competitive Bidding
NDDC	National Dairy Development Center
NEC	National Environment Commission
NGOs	Non-Governmental Organizations
NMC	National Mushroom Centre
NOP	National Organic Programme
NPD	National Programme Director
NPHC	National Post Harvest Centre
NPPC	National Plant Protection Centre
NPSC	National Programme Steering Committee
NSC	National Seed Centre
NSSC	National Soil Service Centre
O&M	Operation and Maintenance
OPM	Office of the Programme Management
PCC	Plain Cement Concrete
PLC	Programme Letter of Credit
PPD	Policy and Planning Division
PPP	Public Private Partnership
PRR	Procurement Rules & Regulations
RAMC	Regional Agriculture Machinery Centre
RAMCO	Regional Agriculture Marketing and Cooperative Office
RGoB	Royal Government of Bhutan
RIMS	Results and Impact Management System
RLDC	Regional Livestock Development Centre
RMA	Royal Monetary Authority
RNR-EC	Renewable Natural Resources Extension Centre
SJI	Samdrup Jongkhar Initiative
SLM	Sustainable Land Management
SOE	Statement of Expenditure
TA	Technical Assistant
ToT	Training of Trainers
UHT	Ultra-High Temperature
VC	Value Chain
WA	Withdrawal Application
WHM	Wengkhar Hybrid Maize
WUA	Water Users' Association
YELP	Youth Engagement and Livelihood Program

MAP OF THE PROGRAMME AREAS

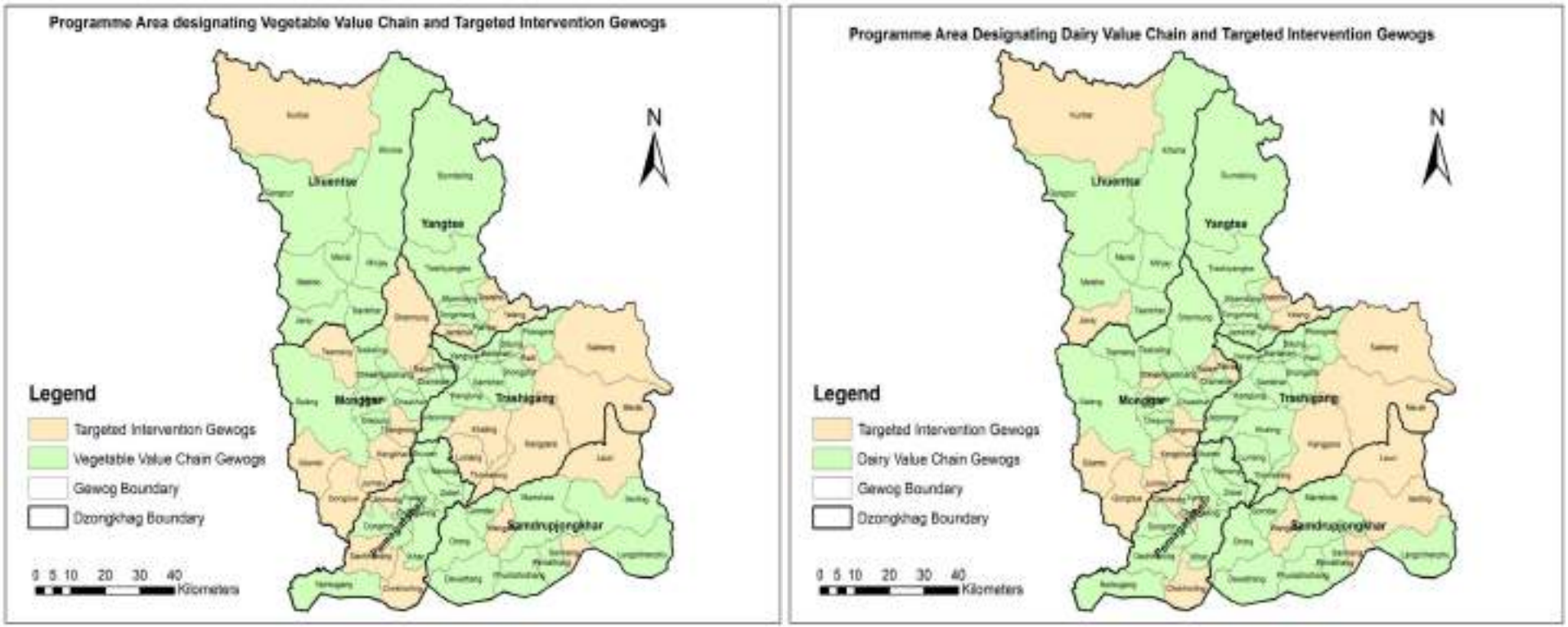


Figure 1. Map showing Programme areas

A PROGRAMME BACKGROUND

Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP) is the eighth agriculture and rural development programme financed by the International Fund for Agricultural Development (IFAD). The Financing negotiation for CARLEP was held from 13-14 July 2015 followed by IFAD Executive Board approval in September 2015 and signing of Financing Agreement on 11 December 2015. In addition, the additional financing agreement was signed on 19th March 2020 and as a result, the project will be completed in December 2025.

The goal of the programme is to reduce poverty by sustainably increasing the income of smallholder producers by way of commercializing agriculture production. The overall development objective of the programme is to increase returns to smallholder farmers through climate-resilient production of crops and livestock in nationally organized value chains and marketing systems. In order to achieve its goal and objective, the programme has 4 major components and eight sub-components with 27 broad activities. The three major components are: i) market-led sustainable agricultural production; ii) value chain development & marketing; and iii) institutional support and policy development. The programme is expected to benefit 28,975 smallholder households (HHs), of which 7,115 HHs will directly benefit from vegetable and dairy value chains. Although CARLEP is extended till December 2025 through the additional funding of IFAD-II, the overall goal and objectives remain unchanged except for some incorporations of entrepreneurship development through diverse agricultural activities.

The main implementing partners are six Dzongkhags & concerned Gewogs, Regional Agricultural Marketing Cooperatives and Office (RAMCO), Agriculture Research and Development Centre (ARDC) Wengkhar, Regional Livestock Development Centre (RLDC) Kanglung and Koufuku International Limited (KIL) Chenery, Trashigang. In line with the programme objective, the implementation of a two-pronged approach has been adopted – i) Commercial or value chain approach to be focused in those Gewogs and village with high production & market potential and ii) Targeted interventions in those far-flung Gewogs and villages having higher incidences of poverty.

The overall programme implementation is being coordinated by the Office of Programme Management (OPM) based at Wengkhar. The OPM is supported and guided by the National Programme Steering Committee (NPSC) at the national level and Regional Programme Implementation Committee (RPIC) at the regional level.The programme is also supported by one focal officer at the Policy and Planning Division (PPD) and one focal accounts officer at the Administrative and Finance Division (AFD) of the Directorate Services in liaising with the RGoB and other external agencies at the national level.

The total programme cost of US$ 31.526 million, over seven years, is financed by - IFAD (US$9.3 million), ASAP (US$ 5 million), RGoB (US$5.767 million), Beneficiaries (US$ 0.659 million) and a financing gap (USD 6 million). In addition, an IFAD has approved additional financing of US$10.28 million as loan and US$ 1.0 million as Debt Sustainability Framework Grant (DSF).

B CHANGES IN IMPLEMENTATION CONTEXT AND DESIGN

There was no major changes in program implementation, besides resigning of Knowledge Management Officer and Program Support Officer and recent transfer of Monitoring and Evaluation Officer as District Agriculture Officer to Mongar Dzongkhag. Currently, their roles and responsibilities are shouldered by the remaining staff through multi-tasking approach to ensure uninterrupted functioning of the OPM.

C PROGRESS AND PERFORMANCE BY COMPONENTS

C.1.1 ACTIVITIES AND OUTPUTS: MAIN ACHIEVEMENTS

COMPONENT 1. MARKET-LED SUSTAINABLE AGRICULTURAL PRODUCTION

Output 1.1 Increased production resilience, diversification and innovation

1.1.1 Climate smart agriculture production and marketing

Adzuki Intensification

Adzuki beans (*Vigna vulgaris*) is an annual leguminous crop that is widely grown in Southeast Asia for consumption as well a source of biological nitrogen fixation for soil fertility in agriculture. It contributes significantly to food and nutrition security of small holder farmers besides contributing to soil and environmental sustainability. In 2022-2023, a 70 acres adzuki bean intensification was carried out in Mongar, Trashigang and Lhuentse. A total of 468 kg of adzuki seeds were distributed to 220 households covering nine gewogs (Tsakaling, Yagneer, Dremetse, Chaskhar, Udzorong,Chali, Jarey, Medtsho & Narang). The total production was 2284 kg (**Table 1**). The productions were bought back through a buy-back initiative in order to ensure a reliable market for farmers. The buyback operation was supported with the financial support fromIFAD-CARLEP.

Table 1. Adzuki Intensification in the Region

Dzongkhag	Gewog	No of HH	Area	Seed Qty (kg)	Actual Yield (kg)
Mongar	Tsakaling	18	9.0	60	455.5
	Chaskhar	44	9.2	61	321.5
	Dremetse	34	9.2	61	160.5
	Chali	44	12.0	80	431.8
	Narang	29	6.5	43	565.5
	Jurmey	1	0.2	0	14.0
Lhuentse	Jarey	10	8.4	56	134.5
	Medtsho	2	3.3	22	66.0
Tashigang	Yangneer	41	10.7	71	18.5
	Udzorong	6	2.1	14	116.5
Total		**229**	**70.4**	**468**	**2284.3**

Upland Paddy Intensification

Upland paddy cultivation has become increasingly popular in the Eastern Bhutan. This cultivation method offers a viable alternative for farmers living at elevations above1800 meters above sea level to diversify their traditional maize-based cropping systems and grow rice locally. In light of changing climatic patterns, such as the drying up of water sources and unpredictable rainfall, there is a growing need to find solutions that mitigate the impact of climate change and ensure self-sufficiency in rice production for households.

Upland paddy cultivation serves as a viable option in areas where there are no irrigated lands or prolonged dry spells. Consequently, the intensification program for upland paddy,through the promotion of improved varieties, aims to boost productivity and ensure self-sufficiency in rice production at the household level. Additionally, this initiative contributes to the production of high-quality upland paddy seeds. A total of 1.52 MT of upland paddy *(Khangma map)* was supported in two gewogs; Khoma and Jarey under Lhuentse districts covering 76 acres (**Table 2** and **Figure 2**). An estimated production of 56 MT is expected from the intensification sites. The intensification program was financially supported by IFAD-CARLEP.

Table 2. Upland paddy intensification in the region

Dzongkhag	Gewog	Area (ac)	Qty MT	Estimated production (kg)
Lhuentse	Khoma	69	1.38	48.3
	Jarey	7	0.14	7.7
	Total	**76**	**1.52**	**56**

Figure 2. Seed distribution to the beneficiaries

Figure 3. Upland paddy intensification

*Wengkhar **Hybrid** Maize 1*

An intensification of Wengkhar hybrid maize-1(WHM 1) was, for the first time, carried out in Tsakaling and Waichur under Mongar districts covering six acres. During the harvest, ARDSC Khangma conducted a yield monitoring and found that the newly released yielded 2.3t ha^{-1}. A total of 13 MT was harvested from six acres. The hybrid outperformed other released maize varieties such as *Yangtsepa*, *Shaphangma*, and *Chaskarpa*. Farmers in these areas expressed their admiration for the performance of WHM 1,which exhibited desirable traits like shorter and uniform plant height and fully covered kernels (**Figure 4**).

Figure 4. Crop cut during the harvest and harvested cobs of WHM-1

1.1.2 Innovation through biogas and permaculture

Strengthening climate smart village in collaboration with Samdrup Jongkhar Initiative (SJI)

Samdrup Jongkhar Initiative (SJI) has taken lead role to strengthen Climate Smart Village:Pheluma, Orong geog at Samdrup Jongkhar through the promotion of organic soil fertility, plant protection technologies and organic cultivation practices in collaboration with ARDC, Wengkhar and gewog agriculture sector. Pheluma CSV has a total of 48 households. A three-day hands-on training on preparation and application of organic soil fertility management and plant protection technologies such as farmyard manure composting, biochar, Jeevamrut and Jholmol (biopesticide) was provided to the farmers (**Figure 5**). Organic cultivation practices such as crop rotation and companion cropping were also taught. They were also trained on orchard and fruit tree management such as planting, training and pruning.

Figure 5. Preparation of Jholmool and Jeevamrut

Seed saving is crucial for developing a strong foundation for the crops by building a stronger gene pool and cutting expenses. It also preserves traditional seeds. Therefore, the farmers were trained on plant selection, flower thinning, maintaining minimum distance between the crops to avoid varietal mixing within the family, and intercultural operations for better seed production. At the end of the training, the seeds were distributed as an initial investment to practice seed saving in the coming days.

Figure 6. Preparation of biochar (left) and training on seed saving

Permaculture Training at LUC Thamdrang

Training on practical aspect of permaculture farm designing which started from 18 January 2023 at LUC, Thamdrang under Silambi Gewog, Mongar dzongkhag was successfully ended on 27 January 2023. A 10-day training was organized by CARLEP Project in collaboration with HASERA Agriculture Research and Training Center, Nepal with an objective to create and design LUC, Thamdrang as Permaculture Model Farm and Learning Center, which will be first of its kind in Bhutan. The training was attended by 12 participants consisting of 5 youth groups from LUC, Thamdrang, ARDC-Wengkhar, Livestock and Agriculture Extension Officers from Silambi gewog, two interns from College of Natural Resources, Lobesa and CARLEP Project.

Figure 7. Practical training session

Installation of fixed dome biogas digester

As part of an overall strategy of promoting climate-smart farming system, the construction of family-sized (4 m^3 and 6 m^3) biogas was facilitated through subsidy support in the form of biogas appliances equivalent to 50 % of the unit cost. Biogas technology not only ensured the production of clean energy for cooking but also enabled household sanitation and the production of bio-slurry fertilizer which can be productively used in vegetable farming. Farmers reported a significant reduction in the purchase of LPG, and use of firewood and electricity for cooking and lighting after adoption of the technology.

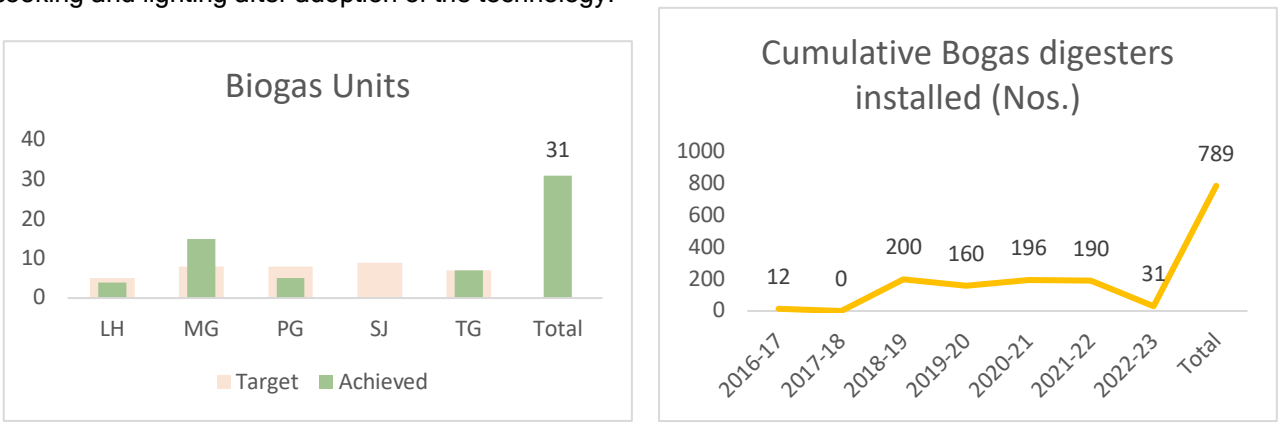


Figure 8. Graph showing Biogas planned and achieved during 2022-23 (Left) and cumulative (Right)

During the FY 2022-2023, 31 households in the Programme areas adopted biogas technology with subsidy support from CARLEP from 37 biogas actually planned, achieving 84% from the planned target. The Dzongkhag wise biogas adoption is depicted in Figure 8. The cumulative biogas digester promoted is shown in Figure 8 (Right).

Poultry for farm resilience

Small-scale poultry farming support was provided to pro-poor and vulnerable households to build their farm resilience besides enhancing household nutrition and income. During this reporting period, the Dzongkhag supported 2 poultry commercial farms of 1000-2000 birds by supplying CGI sheet, feeder, drinker, wire mesh at Kilung and Autsho; supported establishment of 10 native poultry backyard farms of 10-20 birds for poultry housing construction, tools and pullets at Pemagatshel Dzongkhag. In addition, 600-egg capacity mini hatchery was established at Khenadrang under Zobel gewog aimed towards reviving the age-old tradition of rearing local chickens which are resistant to diseases, less input costs and their eggs are mostly preferred by the high-end consumers.

Figure 9. Native Pullets distribution at Pemagtshel

Pilot testing of solar driers

Greenhouse sets along with exhaust fan was supplied to the vegetable growing clusters under Lhuentse and Samdrup Jongkhar Dzongkhag for solar drying of vegetables, fruits and crops so that the surplus produce can be preserved and then marketed during off-season. A total of 27 solar drying units were distributed to the farmers against the planned target of 32 sets, which is 84% achievement.

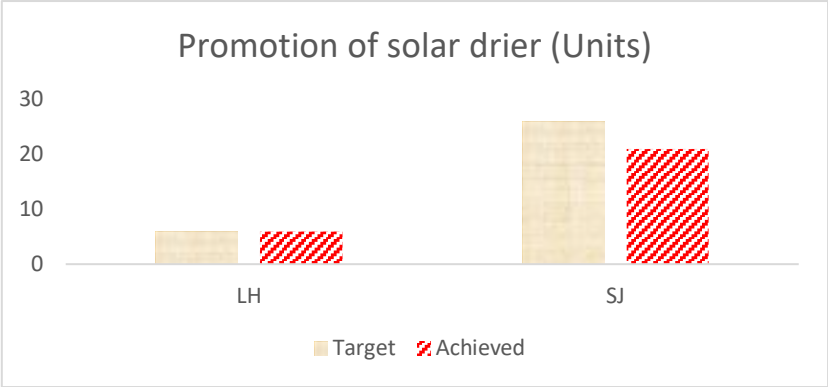


Figure 10. Graph showing solar drier promoted (Planned Vs. Achieved)

Output 1.2 Vegetable production intensified and expanded

1.2.1 Inputs for vegetable and fruit tree production

Water efficient irrigation

The Programme promoted efficient irrigation system for fruits and vegetable intensification through upscaling of drip irrigation technology that uses less water. Under this scheme, the farmers were supplied with sprinklers, sintex tank, HDPE/flexible pipes and drip kits to enhance water usage efficiency thereby ensuring year-round vegetable cultivation. Figure 11 shows Dzongkhag wise efficient irrigation sets planned and achieved during 2022-23 reporting period while Figure 12 shows cumulative efficient irrigation technology promoted.

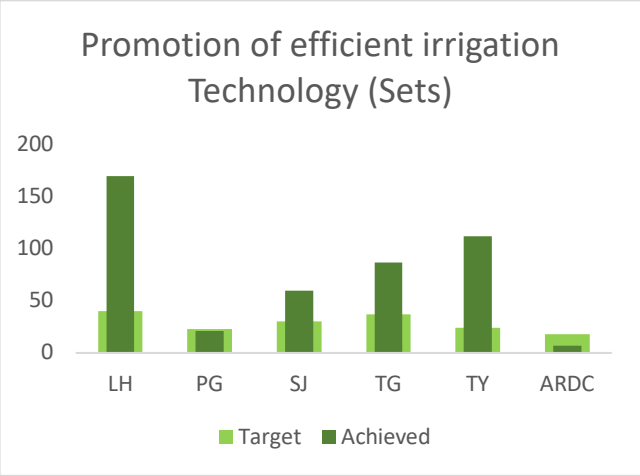


Figure 11. Water efficient irrigation technology promoted during 2022-23 (Planned Vs. Achieved)

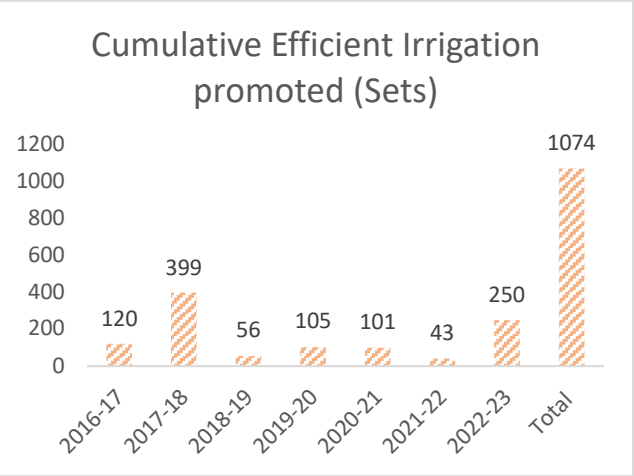


Figure 12. Cumulative efficient irrigation technology promoted

Rooftop rain water harvesting technology promotion

Roof-top rain water harvesting technology was promoted in areas where there is acute shortage of water during winter months. Under this scheme, the farmers were supported with rain water storage tank construction by supplying cement, rain gutter, reducer, pipes and skilled man power while the beneficiaries contributed locally available materials like sand, gravels and labor. The number of households who adopted this technology during 2022-2023 is indicated in Figure 13. In addition, 10 households under Trashigang Dzongkhag have adopted rain water harvesting pond to conserve water to be used during drier seasons. CARLEP supported the beneficiaries with 300 GSM plastic in the pond to prevent seepage while the beneficiaries contributed labor for pond digging.

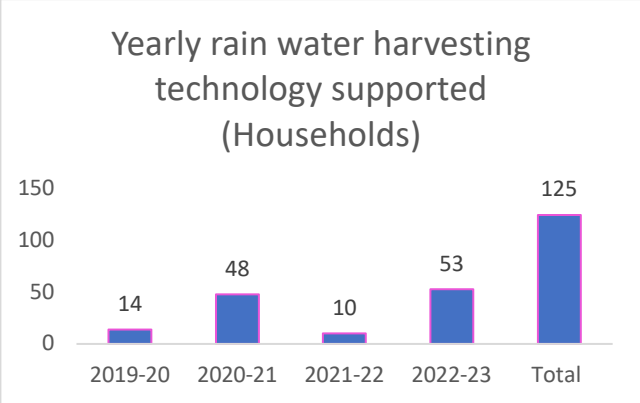


Figure 13. Cumulative rain water harvesting technology promoted

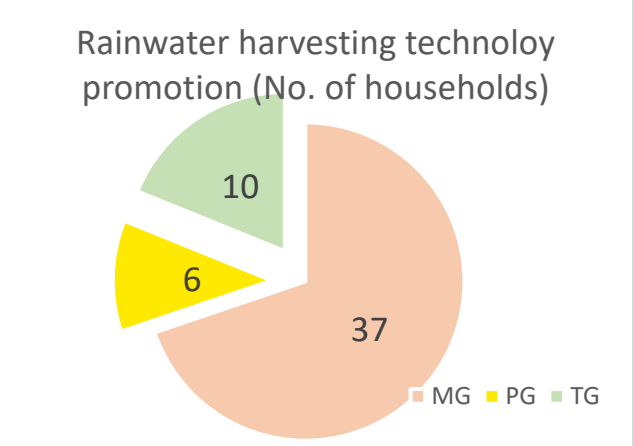


Figure 14. Adoption of rain water harvesting technology

Vegetable seeds support in commercial clusters

Production input (seeds) support for commercial smallholder vegetable growers is being continued to promote vegetable intensification in the Programme areas and ensuring continued supply of vegetables in the market, besides meeting demand of schools and institutions. During this reporting period, the Programme has supplied vegetable seeds covering an area of 140.61 acres. The type of seeds supplied were; Cole crops, chili, tomato, onion and garlic. In Samdrup Jongkhar Dzongkhag, mulching plastic was supplied for 3.5 acres of vegetable cultivation. The Dzongkhag wise planned target versus the achievement is shown in the Figure 15.

Fruit intensification in the Eastern Region

Fruits intensification is one of the important programs in the East, where fruit crops are promoted for both income generation and nutrition security through funding support from CARLEP-IFAD primarily carried out via the establishment of focus villages and contract farms. Depending on type of program, various kinds of supports are provided such as seedlings, inputs supply through cost sharing mechanism and capacity building.

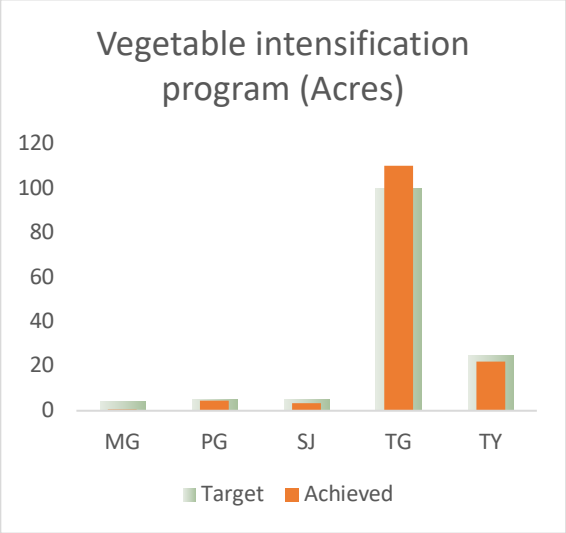


Figure 15. Vegetable intensification (Acres)

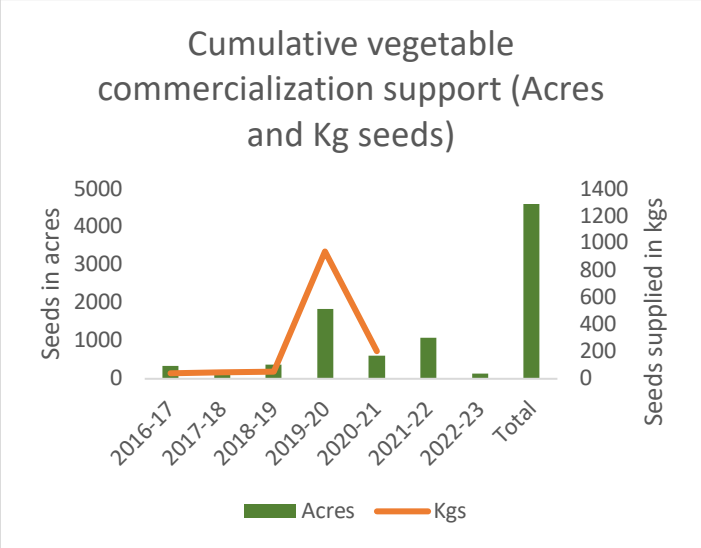


Figure 16. Cumulative vegetable commercialization support (Kg seeds supplied Vs. Area)

Prior to the plantation, orchard layout for each site is carried out by the Centre. A total of 21,156 seedlings was provided benefitting 216 beneficiaries. The implementation includes 25 focus villages, 29 demo-orchards and 10 pineapple farms (the beneficiaries will soon sign contract with BAIL) (**Table 3** and **Figure 17**).

Table 3. Details of orchard established under fruits and nuts intensification program

Particulars	**CARLEP focus village**	**Pineapple farm**
No. of HHs	206	10
Kiwifruit	758	0
Walnut	359	0
Peach	270	0
Dragon Fruit	651	0
Avocado	729	0
Pineapples	0	18,389
Total	**2,767**	**18,389**

Figure 17. Fruit seedlings delivery to the beneficiaries in the eastern region

Provision of fruit tree seedlings to the Dzongkhags

The Dzongkhags and ARDC supplied fruit tree seedlings to the farmers as part of million fruit tree (MFT) program of the Royal Government of Bhutan (RGoB) to ensure collective aggregation and marketing of the produce from the smallholder farmers. A total of 87,160 seedlings have been supplied to the farmers, through DoA, ARDC and Dzongkhags as shown in Table 4.

Table 4. Fruit tree seedlings supply record during 2022-23

Dzongkhag	Types of fruit	No. of seedling	Area (Ac)	Remarks
Samdrupjongkhar	Avocado	2500	25	
Samdrupjongkhar	Kiwi	2240	20	
Trashigang	Passion fruit	1400	2	
Trashigang	Pineapple	2500	1.64	
Lhuentse	Walnut	77	1.22	
Mongar	Kiwi	491	4.37	
Pemagatshel	Dragon fruit	555	1.24	
Trashigang	Kiwi	267	2.38	
Trashigang	Avocado	729	6.49	
Trashiyangtse	Walnut	282	4.46	
Trashiyangtse	Peach	270	1.67	
Mongar	Pineapple	12500	3.09	
Pemagatshel	Pineapple	28349	6.15	
Trashiyangtse	Pineapple	15000	3.71	
Lhuentse	Avocado	2093	20.93	MFTP support thrugh DoA
Mongar	Avocado	9164	91.64	MFTP support thrugh DoA
Pemagatshel	Avocado	8743	87.43	MFTP support thrugh DoA
Total		**87160**	**283.42**	

Protected agriculture

Greenhouses were promoted with the objectives to obtain optimal production of vegetables by enhancing yields, quality improvement and extending the effective harvest period. Seasonality and weather conditions is known to largely influence vegetable farming in the region. Thus, in order to produce vegetables with limited environmental influence, protected agriculture have gained popularity in the Programme areas. While the intervention proved to be successful in general, the investment was reconsidered based on the IFAD Mission's recommendation to assess the sufficiency and reliability of water availability which should be a pre-requisite for approving and initiating any program supported interventions that require irrigation water as an input. Accordingly, greenhouse establishment budget was centralized at OPM and the proposals scrutinised based on the feasibility.

Figure 18 shows greenhouses planned versus the achievement during 2022-23 reporting period. Although Trashigang and Trashiyangtse Dzongkhags planned 38 and 22 numbers of greenhouses respectively, the activity was withdrawn during the mid-year budget review.

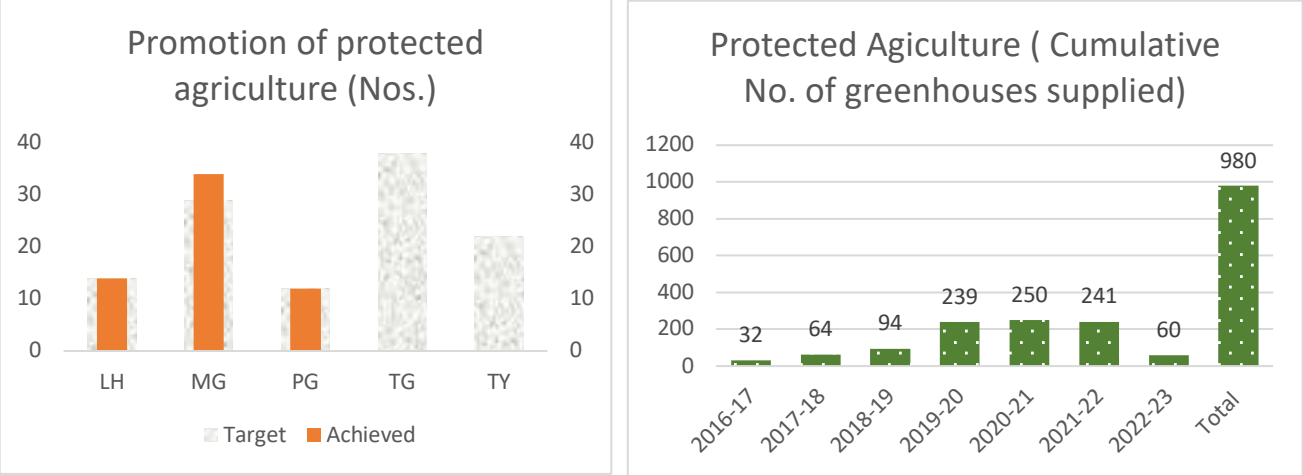


Figure 18. Promotion of protected agriculture during 2022-23 (Left) and cumulative achievement (Right)

1.2.2 Support to regional centers (ARDC)

Construction of vegetables seed processing unit NSC Yangtse

The vegetable processing unit at Regional Seed Centre, Jachephu at Yangtse has been successfully completed. The regional centre will now be able to process and package vegetable seeds which in prior years could be done only at National Seed Centre, Paro. This development will enhance access to inputs, provide assured market for some 16 vegetable seed growers established earlier by ARDC Wengkhar with support of erstwhile HRDP-JICA and later with support of CARLEP-IFAD.

Figure 19. Inauguration of NSC seed Center at Yangtse

To begin with, seeds such as pea, radish, beans, mustard green, zucchini and cucumber will be processed and packaged at the farm and expand into others. So far, an amount of Nu. 7.68 million has been supported from CARLEP-IFAD for equipment and processing infrastructure. Equipment such as seed germination chamber, seed cleaner and pouch packaging machine, spiral gravity separator, gravity separator, pallets and processing infrastructure were provided. The activity is implemented jointly by NSC and ARDC Wengkhar (**Figure 19**).

Development of training and extension materials

The research communication section coordinates the development, submission and publication of research articles, success stories and extension materials. In order to disseminate breakthroughs in agricultural research and development, the Centre develops and publishes research articles, success stories and extension materials to reach out the knowledge and information to the end users. The following eight articles were submitted to Department of Agriculture to be published in Sanam Drupdrey Magazine and CARLEP Magazine and one journal article will be published in an international journal (**Table 5**).

Table 5. List of articles published

Title	Authors	Published in
Contract Farming in the East Assures Farmers with Market for Pineapple and Passion fruits	Tshering Pem, Lhap Dorji, Pema Thinley and DawaChogyal	Sanam Drupdrey
Empowering Power Private Nursery Operators in the East for RuralLivelihood Enhancement	Tshering Yangchen, Tshering Pem and Lungki	Sanam Drupdrey
Fruit Intensification and Expansion in the Eastern Region	Tshering Yangchen and Tshering Pem	Sanam Drupdrey
Promotion of organic soil fertility andplant protection technologies to enhance climate resilience in the Eastern Region	Dorji Wangmo, TsheringPem and Pempa Lhamo	Sanam Drupdrey
Bhutan Releases a New Onion variety; Wengkhar Gop	Thinley Wangdi, Yeshi Lhadon, Tshering Pemo, Karma Yangzom, Loday Phuntsho, Laxmi Thapa, Duptho Wangmo, Tshering Dema and Tshering Pem	Sanam Drupdrey
Upland Paddy: Enhancing Food Sufficiency and climate resilience	Tshetrim Gyeltshen, and Passang Wangmo	Sanam Drupdrey
The Incredible Story of How a MatchingGrant Scheme Helped a Young Man Find a New Passion	Tshering Yangchen, ChhimiLhamo and Tshering Pem	CARLEP Magazine
A Youth Finds Success in Horticulture Nursey: A Case of Khemsar Horticulture Nursery at Wengkhar	Tshering Yangchen, ChhimiLhamo and Tshering Pem	CARLEP Magazine
Morphological characterization of indigenous chili varieties in Bhutan	Karma Yangzom, Loday Phuntsho, Pema Yangdoen,Kelzang Lhadon and Karma Tenzin	The Indian Journal of Agriculture Sciences

Capacity development trainings and workshops conducted

Capacity development and trainings are crucial for individuals, teams and organizations to enhance their knowledge, skills and capabilities. It enhances individual and organizational capabilities, foster innovation and engagement, enable effective decision-making and promote continuous learning. They contribute to the long-term success and sustainability of organizations in a dynamic and competitive business environment.

Following three trainings were conducted;

Training of Trainers on installation of SMART irrigation and automationsystem

Agriculture faces a great challenge in coping with growing water scarcity and increasing demands for food production. Various initiatives are being made to increase the efficiency of agricultural irrigation system. With the increased availability of Internet of Things (IOT) and Information and Communication Technology (ICT) it is now possible to real time monitor/control different processes of irrigation and water management in agriculture.

Figure 20. ToT on SMART Irrigation system and automation

Smart irrigation system is basically using water saving technologies such as micro- irrigation system combined with different IoT based technologies for automation. The Training of Trainers (ToT) program aims to equip researchers with the knowledge and skills needed to promote and support the adoption of smart irrigation systems.

Therefore, an eight-day long on-farm ToT program was provided to 12 participants from ARDC Wengkhar on the installation of efficient irrigation at Tshekpa village in Jumery Geog under Mongar Dzongkhag for one-acre mixed fruit (avocado, mango and orange) orchard. The program covered drip irrigation system design, installation techniques, automation and maintenance. Factors such as water pressure, flow rates, spacing between emitters and proper placement of drip lines were also given importance (**Figure 20**).

Training on Nursery Management and Plant Propagation of fruit trees

ARDC Wengkhar conducted a hands-on training on nursery management and plant propagation of fruit trees for three days (27th to 29th March 2023) to 12 participants from Green Bhutan Corporation Limited (GBCL), Bhutan Ecological Society (BES) and new private nursery operators through a joint program funded through GBCL, BES and CARLEP-IFAD support to expand plant nursery development skills and to enhance seedling availability. The training was conducted to step up and improve the plant nursery programs by integrating fruit plants in addition to avenue plants and forestry species, link other small scale nursery growers as assured market to complement each other in meeting the increasing demands of fruit saplings within the country and to strength these programs which will help reduce import and improve quality of locally developed seedlings (Figure 21).

Figure 21. Hands-on practice on scion wood selection

Restoration of Wengkhar approach road

The approach road to Wengkhar was severely damaged at one section with complete wash out of the section during monsoon season (September) of 2021, requiring major repair (**Figure 22**). A temporary measure was put in place but will not last long and will be further affected in the coming monsoons. Therefore, it became a matter of urgency to repair the washed-out section with proper walls and cause ways and prevent further disaster.

The restoration of Wengkhar approach road worth Nu. 32.516 million was awarded to M/S Palbar builders for a contract period of four months from 6th April, 2023. The works included construction of PCC wall (50 m3), earth work, stone soling, construction of RMM wall (600 m3) and shuttering (Figure 24). The work was completed before schedule.

Figure 22. Flash flood of September, 2021 damaging approach road

Figure 23. Completion of restoration work of Wengkhar approach road

Output 1.3 Dairy and fishery production intensified and expanded

1.3.1 Dairy and fishery production inputs

Dairy equipment, milking machine, milk can, chillers

Dairy value chain equipment was supplied to the dairy farmer groups (DFG's) in the Programme areas. During this reporting period, a total of 38 sets of dairy equipment have been supported to dairy farmer groups and cooperatives (Figure 24). The types of dairy equipment supplied is shown in Table 6.

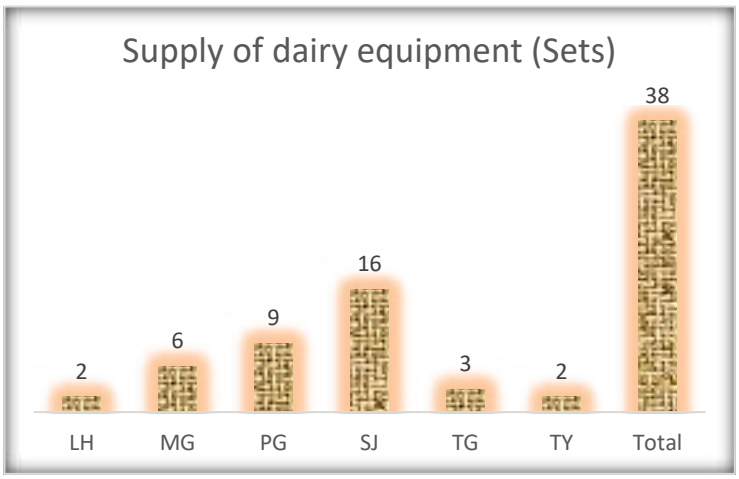


Figure 24. Supply of dairy equipment

Table 6. Dzogkhag wise supply of dairy equipment by types

	LH	MG	PG	SJ	TG	TY	Total
Milking bucket		130			15		**145**
Cool box	10				10	13	**33**
Batch pasteurizer			2				**2**
Milk can		124		105	32	185	**446**
Refrigerator		2					**2**
Yoghurt Incubator			1				**1**
Yoghurt cup sealer			1				**1**
Display chiller		1	4			4	**9**
Milk analyzer		1					**1**
Digital bench scale		9			8	1	**18**
Lactometer		32					**32**
Vacuum packaging machine			2				**2**
Deep freezer			6		2	7	**15**
Rice cooker			6				**6**
Milk chiller					4		**4**
Milk pump					6		**6**

Improved dairy shed

CARLEP continues to support dairy farmers in construction of hygienic cow sheds not only to promote stall feeding and reduce overgrazing in the forests but also to facilitate clean milk production and proper management of cow dung- for use in biogas production. During this FY 2022-2023, CARLEP facilitated construction of 147

hygienic cow sheds through Dzongkhags. Figure 25 shows Dzongkhag wise support to hygienic dairy shed construction and cumulative figure since the start of the Programme.

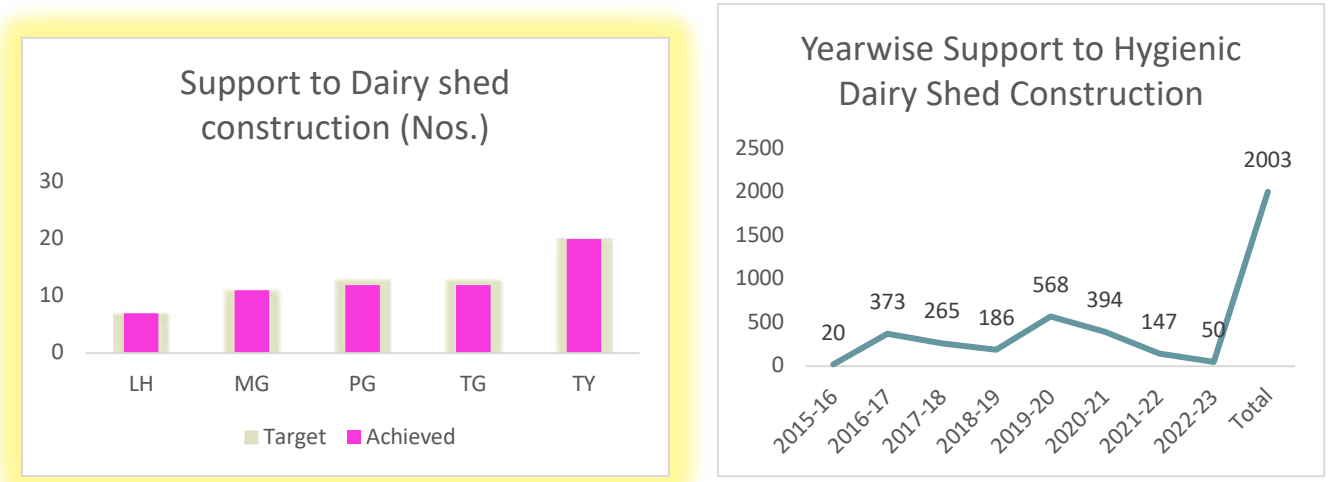


Figure 25. Hygienic dairy shed construction supported during 2022-23 (Left), cumulative dairy shed constructed from 2015-2023 (Right).

Supply of improved cattle breed

Increasing milk supply base is made possible through subsidised support to purchase of quality dairy cows and improving the genetics through breed upgradation. Dairy cows and Heifer importations was initiated pre-COVID-19 pandemic as a fast-track mechanism to increase the smallholder dairy herds thereby enhancing milk production. Post COVID-19, internal sourcing of dairy animals was carried out by the Dzongkhags whereby CARLEP supported 30 % of the cost, while the beneficiaries contribute for 70 %. Figure 26 shows Dzongkhag wise number of dairy cows supplied through 30 % CARLEP subsidy and the households benefited during this reporting period and cumulative number of dairy cows supplied over the years.

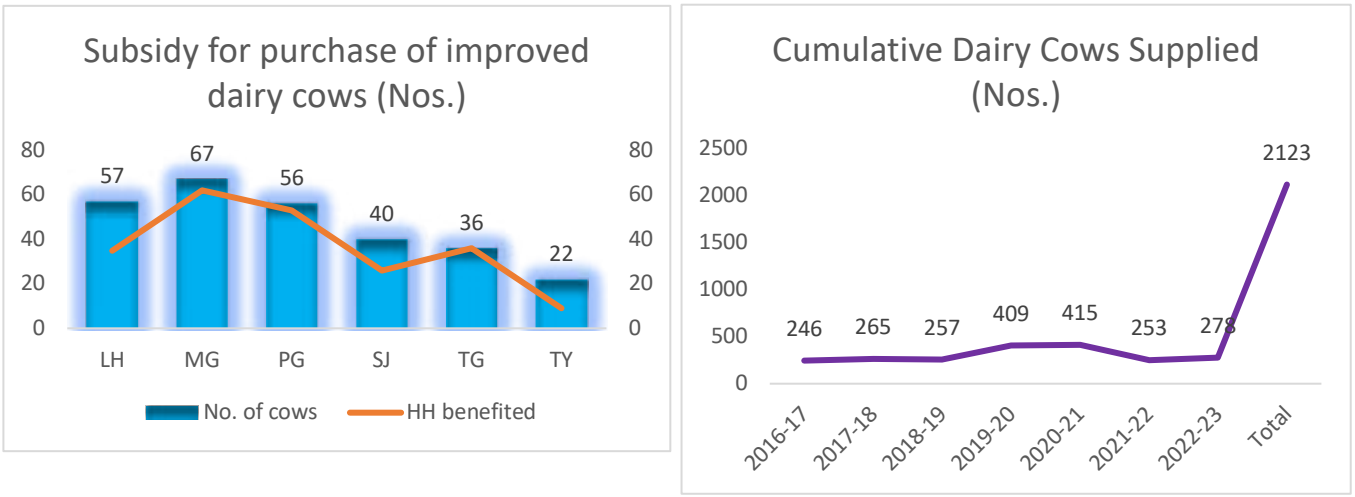


Figure 26. Supply of improved dairy cows (Left); Cumulative dairy cows supplied (Right)

1.3.2 Dairy breed enhancement

Breed intensification through CHBPP

A new CHBPP & HPS was established in two potential gewogs, one in Pemagatshel (Norbugang) and other in Balam Mongar. The program was expanded in Dewathang and Orong gewogs Samdrup Jongkhar. The potential site selection was carried in collaboration with the respective Dzongkhag and Gewog Livestock sectors. The program was mainly aimed to achieve cattle breed intensification in the region in view of the rising demand for heifers and non-sustainability of dairy cows import.

A total of 1039 animals were selected and provided with the National Bovine Identification Number (NBIN) and registered under NDIS .These animals will be entitled for insemination with imported Jersey semen and sex sorted semen. Through the program, awareness were conducted for the dairy farmers on various aspects including CHBPP & HPS guidelines, animal selection criteria, roles as selected animal owners, heat detection in the cattle and AI timing and progenies born reporting system.

In this reporting period, 4000 doses of sex-sorted semen have been supplied to the CHBPP areas and the cumulative doses of semen supplied is as shown in Figure 27.

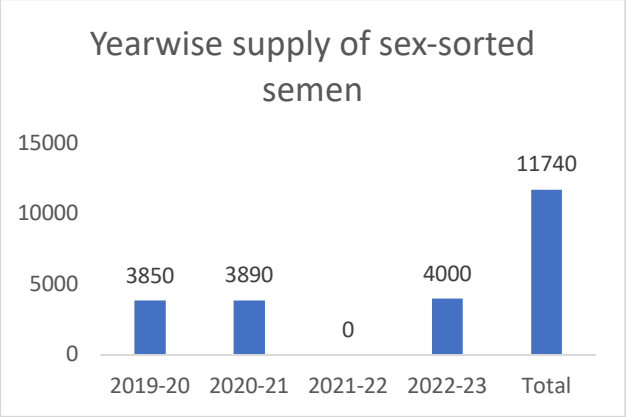


Figure 27. Year wise supply of sex-sorted semen

1.3.3 Improved livestock service outreach

Animal Health refresher training course

The refresher training course for animal health workers in the Eastern Region was conducted with the objective of aligning their knowledge and skills with the 13th Five-Year Plan (13FYP) and standardizing animal health service delivery in the region. The training is aimed to enhance the participants' understanding of animal health, relevant guidelines, disease prevention and control plans and standard operating procedures. It is imperative that we standardize animal health service delivery. Standardization will ensure that the animal health services provided are consistent, efficient, and effective. It will also ensure that they meet the needs of our clients while adhering to the highest standards of animal health and increases the confidence of the clients and also build the trust. The training was organized by the Regional Livestock Development Center (RLDC) with the fund support from CARLEP and the resources from being from National Centre for Animal Health (NCAH), National Veterinary Hospital and RLDC.

AI refresher course for livestock staff

To reach the AI technology further towards the farmers and to expedite cattle genetic improvement; AI Refresher training was organized for 15 field AITs in region by Regional Livestock Development Centre (RLDC, Kanglung) in close collaboration with National Dairy Development Centre (NDDC, Yusipang) with fund support from CARLEP Project. The AI Refresher course was conducted for refinement of skills, advance knowledge and keep abreast with latest techniques in cattle reproductive biotechnologies for our field colleagues

Training of Community Artificial Insemination Technician (CAIT)

With the rapid growth of livestock sectors in the country, there is a high demand for veterinary services. Community Artificial Insemination Technicians (CAIT) have been the drivers in upgrading dairy breeds, particularly in the Community Heifer and Bull Production Programme (CHBPP) areas. CAIT was instituted in the Programme areas to reach the technology to unreached dairy farmers. Artificial Insemination is slowly gaining popularity among dairy farmers due to higher success in conception rate and satisfying services by the CAITs,

the training of more CAIT is of paramount importance. During FY 2022-2023, A total of 17 CAIT's from the Programme areas were successfully trained on artificial insemination of cattle at Nanong gewog under Pemagatshel Dzongkhag. They have joined the pool of existing CAIT's spread across six Programme dzongkhags.

1.3.4 Feed and fodder production

Improved pasture development

Pasture development in fallow and marginal land is being facilitated through the supply of improved pasture seeds. Sub-tropical *(Ruzi, molasses and stylo)* and temperate *(Grass mixture which includes Italian Rye grass, Tall fescue, Cocksfoot, white clover)* pasture seeds were supplied to the dairy groups. The amount of pasture seeds supplied versus area of improved pasture developed during 2022-2023 FY is indicated in the Figure 28.

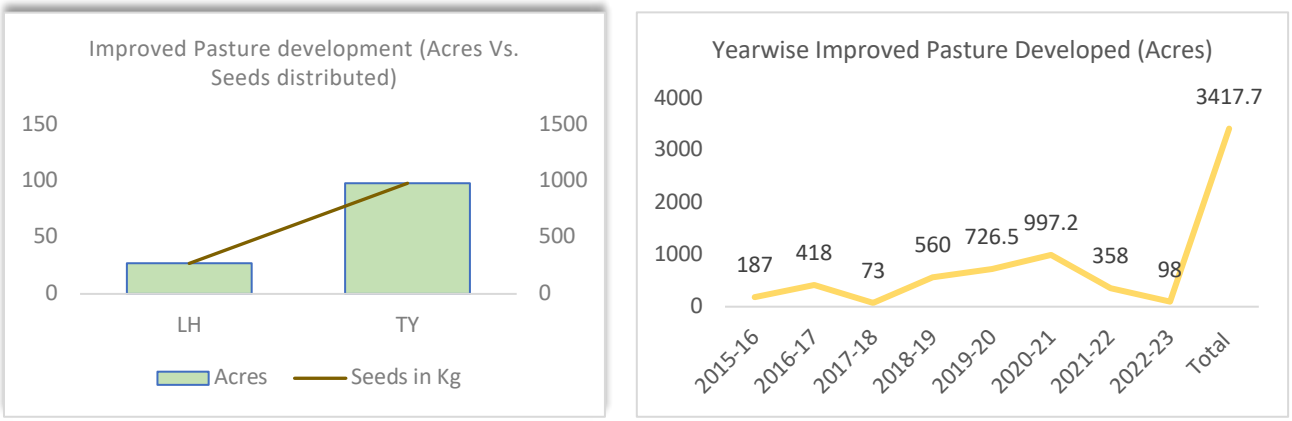


Figure 28. Improved pasture developed during this reporting period (left) and cumulative achievement (right)

Fodder slips propagation (Napier)

Napier and *Gautemala* grass have become one of the major sources of forage for cattle in the eastern region. Until recently, *Pakchong* variety has been introduced for propagation in the farmers field as it has higher nutritive value besides higher biomass. During the FY 2022-2023, 188 acres of fodder cuttings were propagated in fallow and marginal land by supplying 1880000 number of cuttings as shown in Figure 29.

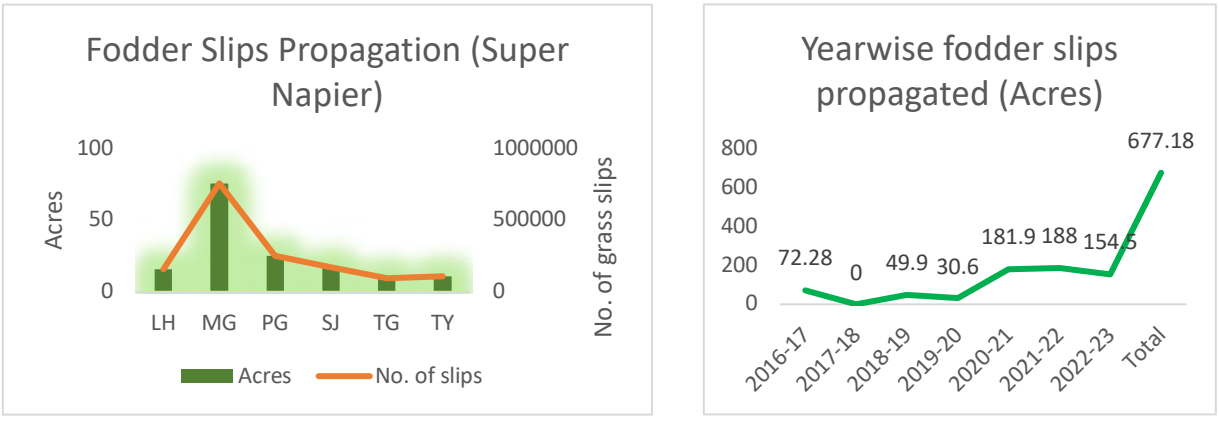


Figure 29. Fodder slips distribution during 2022-23 (Left) and cumulative achievement (right)

Winter fodder promotion

Oat cultivation during winter, after agriculture crop harvest, has helped marginal farmers to utilize agriculture land effectively for winter fodder production. Naked oat is known for its high nutritive value and is considered as an important fodder for dairy animals. CARLEP has been promoting winter oat cultivation through supply of Oat seeds to dairy farmer groups. For example, 39,995 kgs of oat seeds were supplied to dairy groups, covering an area of 1142.71 acres, during 2022-2023 FY alone for cultivation after crop harvest. The Dzongkhag wise quantity of seeds supplied and area under Oat cultivation is indicated in the Figure 30. So far, oat seeds covering an area of 3996.2 acres have been supported by the Programme.

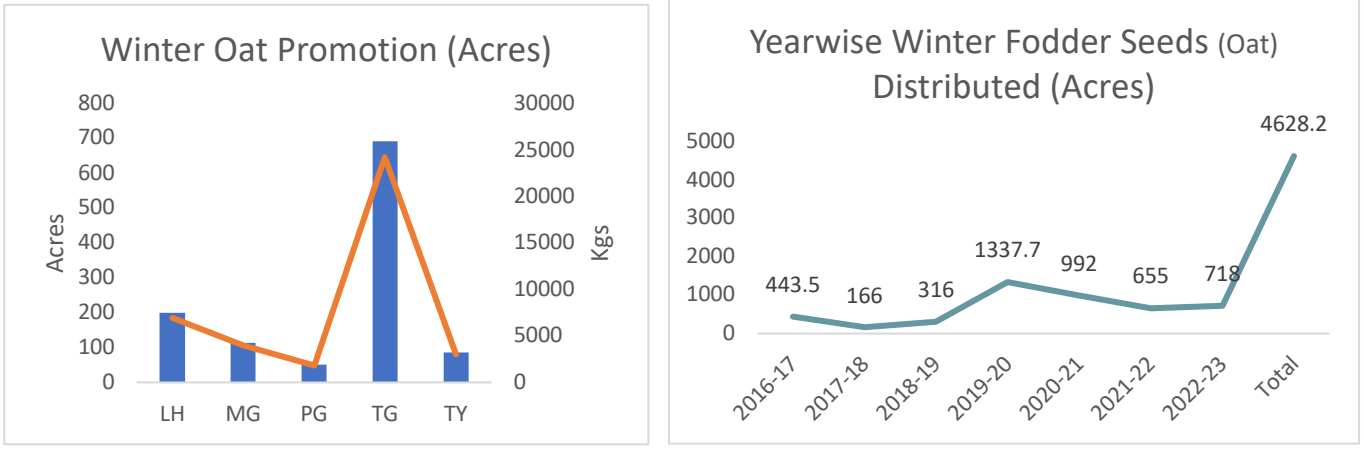


Figure 30. Winter oat seeds distribution during 2022-23 (left); cumulative seeds distributed (right)

Crop residue enrichment

Fodder conservation such as silage making and maize stover/paddy straw treatment were carried out by dairy farmer groups mainly to enhance winter fodder base while at the same time maintaining optimum milk yield. With CARLEP supporting fodder conservation inputs, a total of 1659 MT of fodder were reported to have conserved for feeding dairy animals during lean season (winter) when the fodder resource is scarce. Dzongkhag wise amount of fodder conserved is as shown in Figure 31.

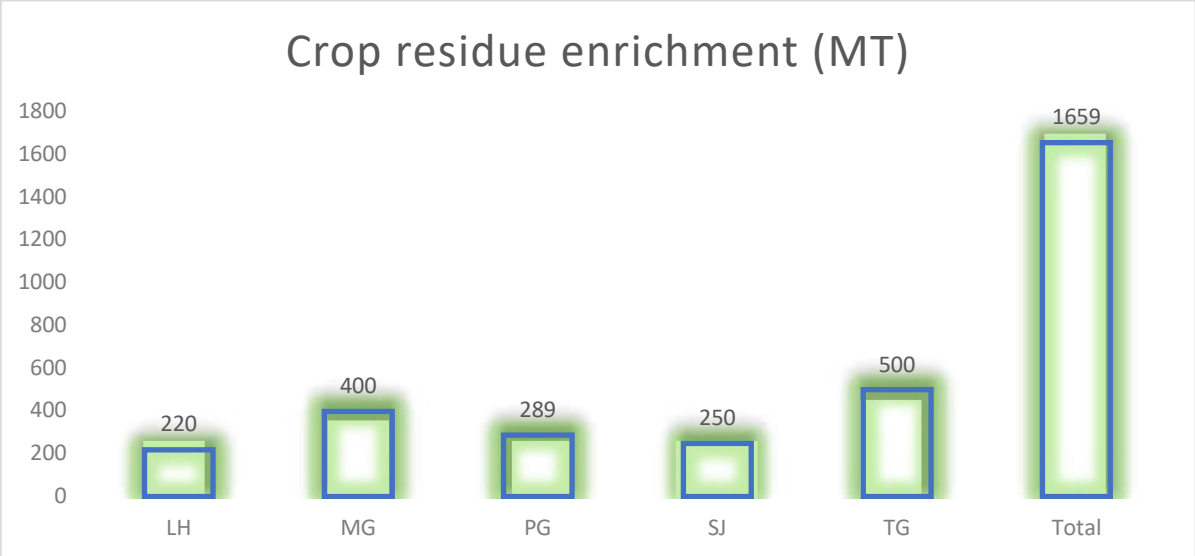


Figure 31. Crop residue enrichment in MT during this reporting period

Output 1.4 Production related infrastructures

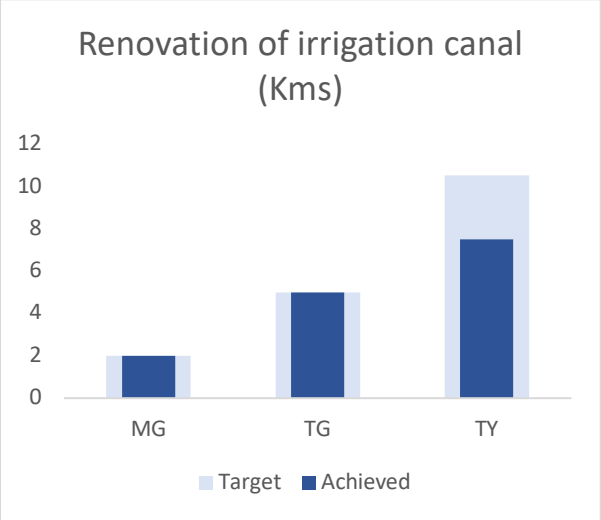
1.4.1 Irrigation improvement

Feasibility studies and surveys

Feasibility studies and surveys was conducted for 5 irrigation schemes for Mongar (1 scheme) and Trashigang (4 schemes).

Renovation of irrigation canal

During 2022-23 fiscal year, 23.5 kms of irrigation canal was renovated with command area of 370.412 acres benefitting 465 households. The length of irrigation canal renovated during 2022-23 is shown in Figure 32 (Left). Figure 32 (Right) shows cumulative length of irrigation canal renovate thus far.



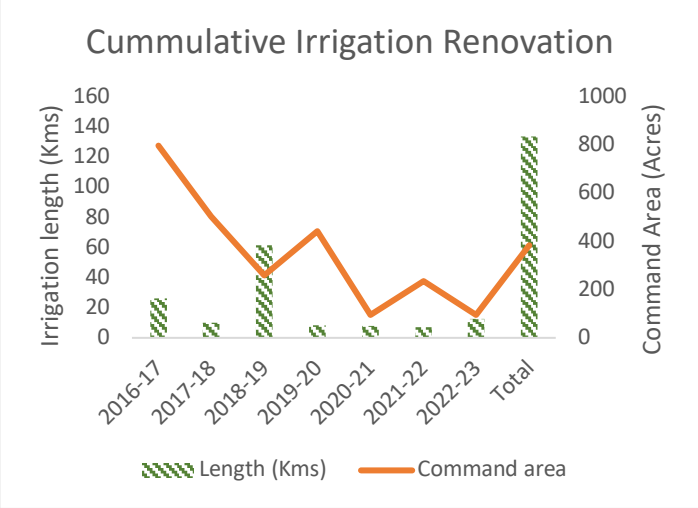


Figure 32. Renovation of irrigation canal (Target Vs. Achieved) (Left); Cumulative irrigation canal renovated (left)

Dry land irrigation (Piped network)

Table 7. Table showing support to dry land irrigation

Dzongkhag	No of schemes	Description
Lhuentse	1	The program was initially proposed for dry land irrigation however, the program was prioritized to support irrigation items (81 sets of sintax, HDPE pipe and drip set) for 81 greenhouse sets supported by the Department of agriculture.
Pemagatshel	1	Construction of open irrigation channel and piped networking at Gongribali benefitting 31 households
Samdrup Jongkhar	1	Carried out reservoir tank construction, distribution tank, pipe networking spanning 2.8 kms with command area of 46 acres.
Trashiyangtse	1	Reservoir tank construction, distribution tank, pipe networking spanning 2.8 kms with command area of 46 acres.
Total	**5**	

Support to dry land irrigation through spring water harvesting

A total length of 6.5 km dryland irrigation has been constructed through perennial water source tapping at Seckpa, Jurmey under Mongar Dzongkhag in collaboration with Tarayana Foundation, Geog Agriculture Sector, Geog Engineer and Dzongkhag Agriculture Sector. The total material cost for the dryland irrigation is Nu. 0.533 million and the beneficiaries contributed 560 man-days of labor contribution (average of 70 man-days per beneficiary). The dryland irrigation benefits eight households.

The main reservoir tank can store about 15,000 liters of water connected to the individual service tank of each beneficiary. Rectification work such as construction of new source tank to avoid contamination, connection of three outlets at the main reservoir tank, installation of controlling valve at individual distribution line for equal distribution of water and proper use of overflow from the main reservoir tank by connecting it to the old reservoir tank (**Figure 33** and **Figure 34**).

The beneficiaries have come together and formed a Water User Association (WUA) and the operational by-laws has been drafted. With the completion of the dryland irrigation future implementation plans such as promotion of climate smart technologies, organic soil fertility, crop protection measures and intensification of climate resilient crops such as fruits and vegetables has been planned.

Figure 33. New source collection tank (left) and service tank (right)

Figure 34. Gate valve for mainline (left) and reservoir tank (right)

1.4.2 Matching grant facilities

Fencing of agriculture land

Human-wildlife conflict is one of the major challenges faced by farmers in production enhancement. Farmers are losing significant portion of their crops to wild animals every year. The menace of crop depredation by wildlife has gained national importance in combating the challenges nationwide. As an immediate solution, electric, barbed wire and chain-link fencing is being promoted by the Programme to curb human-wildlife conflict and reduce crop losses. In this fiscal year, a total of 61.593 kms of fencing was supported against the planned target of 84 kms as shown in Figure 35. Trashigang Dzongkhag has piloted 1.093 kms of chain-link fencing at Lamzang, Udzorong covering a command area of 12.11 acres benefiting 45 households. Although chain-link fencing is effective and sustainable compared to other fencing, the investment cost is huge as the expenditure incurred to fence little more than a kilometer was Nu. 2.33 million.

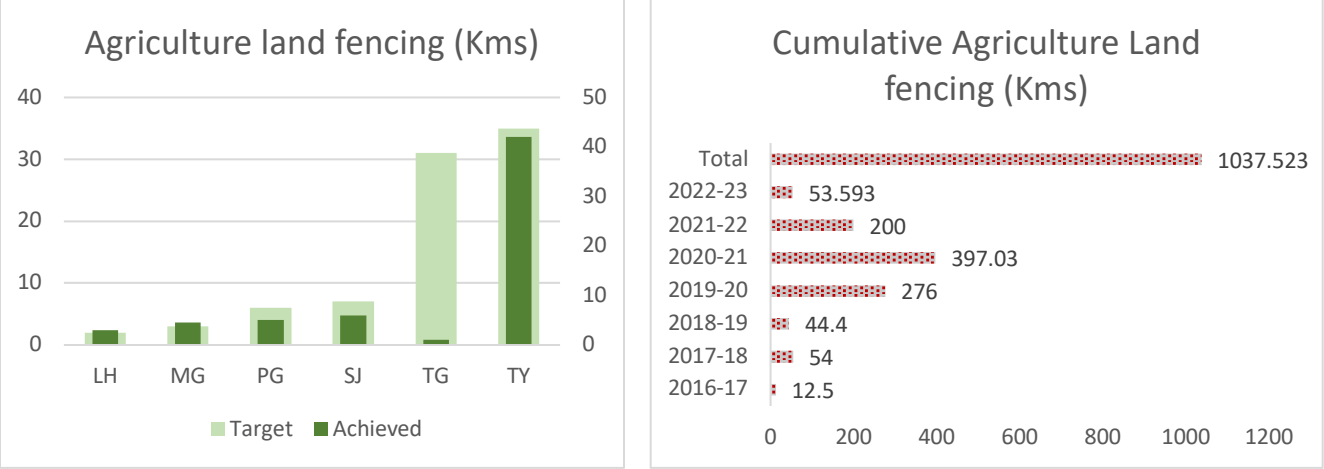


Figure 35. Agriculture land fencing (Planned Vs. Achieved) during 2022-23 (Left); Cumulative achievement (Right)

Installation of concrete poles electric fencing in collaboration with Tarayana Foundation

A 4.2 km long electric fencing installation using concrete poles benefitting 16 householdsof Langabi, Yangsibi and Nunmaling at Maenbi gewog under Lhuentse Dzongkhag has been successfully completed. The farmers were provided hands-on training on the management and operation of the electric fencing (**Table 8 and Figure 36**). The electric fencing was installed through cost sharing mechanism.

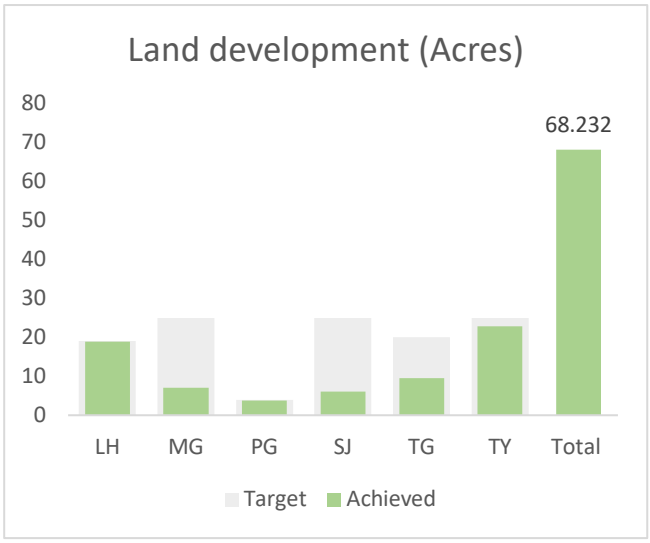
Table 8. Beneficiaries of the electric fence

Village	No. of Households	Geog	Area (in km)
Langabi	8	Maenbi	1.5
Yangsibi	3	Maenbi	1.2
Nunmaling	5	Maenbi	1.5
Total	**16**		**4.2**

Figure 36. EF using concrete poles installed

Land development, terracing and consolidation

The terrain of the land in 6 eastern Dzongkhags is characterized by steep slopes and surface stones making farm mechanization very difficult. Even the wet land terraces are too narrow and difficult for deploying farm machinery. In line with 12th FYP, CARLEP has prioritized land development as one major intervention for cereal intensification and vegetable commercialization. Agriculture Land Development (ALD) has been implemented based on three categories such as dryland terracing, Wetland consolidation and fallow land reversion. A total of 98.232 acres of land has been developed (wetland and dryland) in this fiscal year from the planned target of 99 acres (99% achievement). The Dzongkhag wise planned target and actual achieved is indicated in the Figure 37.



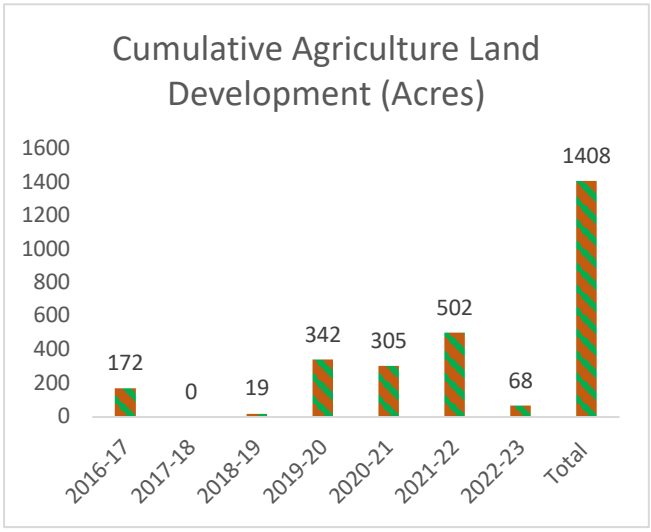


Figure 37. Land development (2022-23 Target vs. Achieved) (Left); Cumulative agriculture land developed (right)

Supply of chaff cutter

Chopping of fodder has always been labor intensive and time-consuming discouraging farmers to conserve fodder for use during lean season. As a solution, subsidy on chaff cutter was provided to dairy farmers to encourage fodder conservation and drudgery reduction, especially for women since women are involved more than men in tending cattle and household chores. A total of 160 chaff cutter sets were supplied to the dairy farmers on cost sharing mode *(60% CARLEP support and 40% beneficiary contribution).* This intervention has benefited 160 household out of which 47% were women beneficiaries. The Dzongkhag wise chaff cutter planned and achieved is shown in Figure 39 (Left), while Figure 39 (Right) shows cumulative progress.

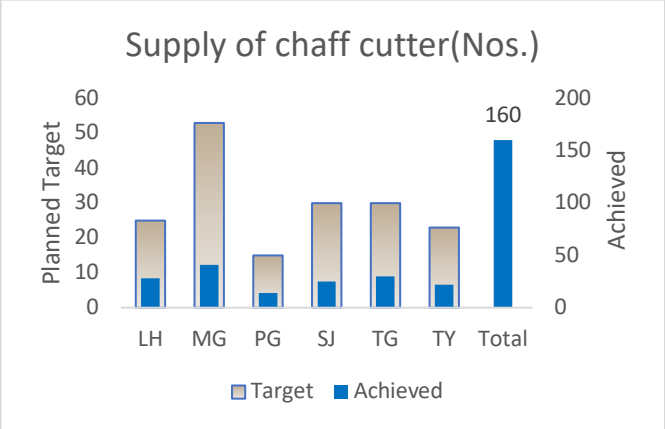


Figure 39. Supply of chaff cutter (2022-23 planned Vs. Achieved)

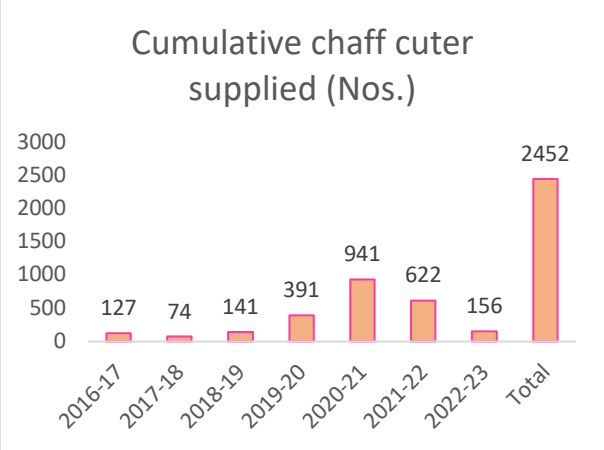


Figure 38. Chaff cutter supplied (Cumulative)

Small post-harvest equipment

Samdrup Jongkhar Dzongkhag supported Arecanut peeling machine to the youth group consisting of 3 members. The group will operate the machine by charging nominal fee for peeling. While youths get gainful employment, farmers benefit from the sale of value-added products in terms of increased price. The Dzongkhag also supported 7 sets paddy reaper to rice growing areas of Phuentshothang, Pemathang and Samrang.

COMPONENT 2. VALUE CHAIN DEVELOPMENT AND MARKETING

Output 2.2 Agriculture commercialization and enterprise development strengthened

2.2.1 Support to agriculture enterprise development

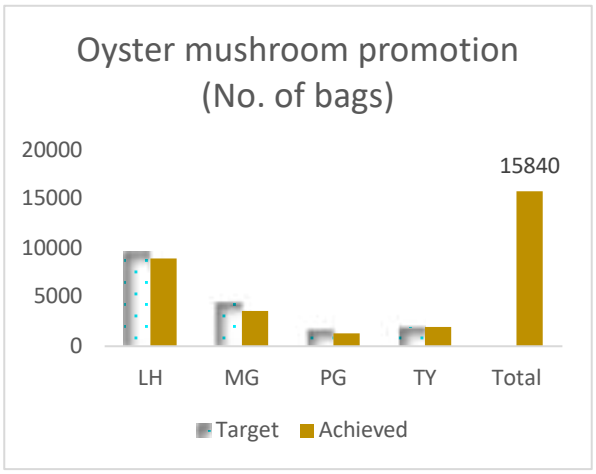
Through the matching grant program, CARLEP has initiated a number of programs in collaboration with the Dzongkhag administration and Regional Offices to address youth unemployment. Three enterprises mostly involving youths have been supported by CARLEP through the matching grant. CARLEP will continue supporting youth to seek meaningful and economically viable careers in rural areas.Table below shows details of entrepreneurs supported by CARLEP during this reporting period.

Table 9. List of entrepreneurs supported through CARLEP Matching Grant

Name of Entrepreneur	Location	Name of Enterprise	Brief description
Karma Tshering	Zobel	Elite Heifer Breeding Farm	He established Heifer Production Farm with matching grant support of Nu. 0.5 million and his own investment of Nu. 0.7 million. Currently, he owns 8 Jersey cows from which 3 female progenies were born from sex-sorted semen while 3 cows were impregnated with sex-sorted semen. He earns Nu. 12,000 per month from sale of milk. The earnings could be significantly increased after he starts selling heifers.

Support to oyster mushroom enterprise development

The past intervention in Shitake mushroom cultivation proved to be unsuccessful in most of the cases, probably due to spawn quality. As a result, most of the Shitake mushroom farmers were not able to earn income as desired. However, Oyster mushroom cultivation picked up among the entrepreneurs earning reasonable income from the sale of mushrooms. In order to upscale the production, the Programme supported the beneficiaries in terms of production inputs such as substrate (Paddy straw), mushroom spawn, plastic bags and green nets. During 2022-23, 11700 bags of Oyster mushrooms have been promoted from the 17,800 bags planned as shown in the Figure 40. The Figure on the right shows cumulative progress.



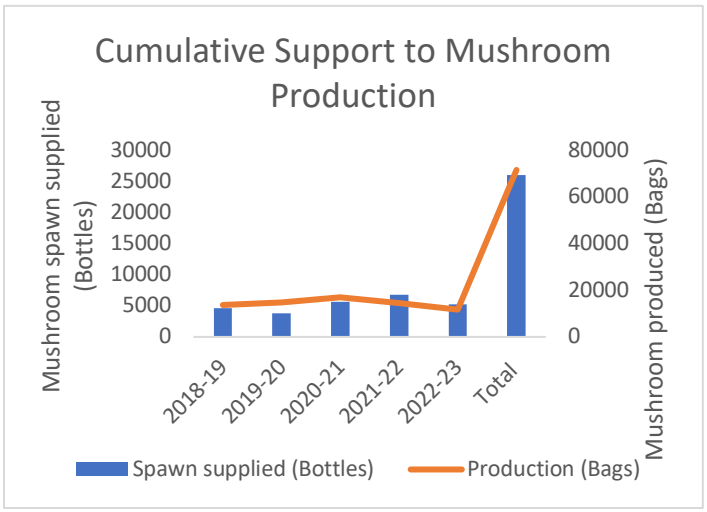


Figure 40. Left: Support to Oyster mushroom production during 2022-23 FY (Planned Vs. Achieved); Right: Cumulative progress

Establishment of mushroom enterprise through skilling and post-skilling

Mushroom is a high value crop which has a great scope for enterprise. For income generation through mushroom enterprise, eight youths were selected from six eastern Dzongkhags through expression of interest and Extension agents for mushroom enterprise skilling and post skilling. They were provided hands-on training on spawn production and inoculation of mushroom. The raw materials worth Nu. 1.200 million was supported by CARLEP-IFAD to set up mushroom enterprise. The details of eight youths are given in **Table 10**. From the eight youths trained on mushroom production, the adoption rate was 100%, meaning 8 youths established mushroom enterprise.

Table 10. Details of youth engaged in mushroom skilling and enterprise development

Name	Village	Geog	Dzongkhag
Karma Wangdi	Berpa	Khoma	Lhuentse
Pema Gyelpo	Dungkar	Jurmey	Mongar
Neten Dorji	Thredangbee	Saling	Mongar
Tshering Delkar	Namdaling	Decheling	Pemagatshel
Karma Wangchuk	Sukuni	Phuntshothang	S/Jongkhar
Singye Wangchuk	Bayling	Yangtse	T/Yangtse
Pema Yangchen	Rongthung	Kanglung	Trashigang
Dechen Wangmo	Chasker	Chasker	Mongar

Figure 41. Mushroom production unit

Contract farming with Bhutan Agro Industries Limited for pineapple and passion fruit

The Bhutan Agro Industries Limited (BAIL) has initiated signing of contract farming agreement establishing a market linked production planning with 11 pineapple groups and 10 passionfruit growers of the east consisting of 53 households and covering an area of 26.5 acres in partnership with ARDC Wengkhar and Dzongkhag/Geog Agriculture Sector (**Table 11**).

These orchards under contract farming will produce organic fruits and will be certified organically with technical guidance from ARDC Wengkhar and Geog Agriculture sectors.The canned juice production from these naturally grown crops have already started at Lingmethang plant. The buy-back price of pineapple at farmgate is Nu. 37 per kg and Nu.42 per kg at factory gate while the buy-back price of passion fruit at farmgate is Nu. 38 per kg at farm gate and Nu. 43 per at factory gate.

Table 11. Statement on the total number of contract farming agreement signed with the farmers in Eastern Bhutan.

Name of the Group	Dzongkhag	Total Households
Pineapple growers		
Pineapple Growers of Ngarupongtang	Mongar	20
Yangbari Pineapple Growers Group	Mongar	60
Jurmey Pineapple Growers Group	Mongar	32
Durungri Pineapple Growers Group	Pemagatshel	45
Yagjur Pineapple Growers Group	Pemagatshel	19
Khenadang Pineapple Growers Group	Pemagatshel	26
Nanong Pineapple Growers Group	Pemagatshel	20
Khangma Pineapple Growers Group	Pemagatshel	19
Khamdang Pineapple Growers Group	Trashiyangtse	11
Chudawoong Pineapple Growers Group	Trashigang	27

Marpheng Youth Commercial Farm	Trashigang	2
Sub-total		*281*
Passion fruit growers		
Phosorong Vegetable Group	Mongar	1
Mongar Passion fruit Growers Group	Mongar	8
Chali Zarula (Passion fruit) Group	Mongar	11
Jarey Passion fruit Growers Group	Lhuntse	3
Minjay Passion fruit Growers Group	Lhuntse	7
Yalang Passion fruit Growers Group	Trashiyangtse	3
Denchi Passion fruit Growers Group	Trashiyangtse	16
Kurichilu Passion fruit Growers	Trashigang	1
LUC Kherey	Trashigang	2
Pam Passion fruit Growers	Trashigang	1
Sub Total		*53*
Grand Total		**334**

While some of the areas are already cropped from past development interventions, the remaining groups have been jointly supported through CARLEP-IFAD, RGoB grant supports in gewogs and Dzongkhags, price support from MoAL and beneficiary contributions. A total of 37,460 numbers of pineapple seedlings was provided to four pineapple grower groups covering an area of 10.4 acres and benefitting 55 households (Table 12).

Table 12. Pineapple seedlings distributed under contract farming

Dzongkhag	Group	No. of HH	No. of seedlings	Area (ac)
Tashiyangtse	Khamdang Pineapple Growers group	11	15,000	3.7
Mongar	Pineapple Growers of Ngarupongtang	20	12,500	5
Pemagatshel	Khangma Pineapple Growers group	20	3,670	1
Pemagatshel	Druk Pineapple group	4	6,290	0.7
Total		55	37,460	10.4

Establishment of Commercial Passion fruit model farm

2.4 acres of leased land is developed into a commercial passionfruit model farm at Telung, Pemagatshel owned by Pema Tshewang. The farm accommodates 540 numbers of passion fruit vines. The beneficiary was provided seedlings, and both input and technical support on the installation of efficient automated irrigation system and trellising (**Figure 42**). The farm was established on cost-sharing mechanism on the materials supported. The trellising cost amounted to Nu. 0.428 million while the irrigation cost amounted to Nu. 0.171 million. Hence, the cost sharing amount from the farmer subsequently totaled up to Nu. 0.299 million.The fruits from the farm will be linked to BAIL, Lingmethang for processing passion fruit juice.

Figure 42. Layout for Trellis installation (Left) and trenching for laying out pipes (Right)

Output 2.3 Community-driven strategic market infrastructure development

2.3.1 Investment support in vegetable value chain infrastructure

Construction of large market facility/aggregation Centers

With the expenditure of Nu. 1.773 million, RAMCO has utilized the fund for renovation of large market facility (Vegetable Market Shed) at Wamrong under Trashigang Dzongkhag and facelift of Gangola vegetable shed under Mongar Dzongkhag.

In addition, the construction of integrated farmers sale outlet is underway at Gyelpozhing, Mongar with expenditure of Nu. 7.5 million incurred so far. The overall cost of the construction is estimated at 17.876 million from which 47% is being funded by RGoB while CARLEP supports 53% (Nu. 9.5 million) of the cost.

2.3.2 Investment support in dairy value chain infrastructure

Product aggregation plays a crucial role in channelizing fresh milk from farms to dairy processing units. Due to the smallholding nature of dairy farms and scattered settlements, multiple product aggregation points are unavoidable. In this reporting period, the program supported construction of 7 milk collection sheds and 8 milk collection centers. These facilities are expected to motivate farmers in collective marketing of dairy products besides improving hygiene. The Dzongkhag wise number of dairy value chain infrastructures constructed against the planned target is shown in the Figure 43. Figure 44 shows cumulative dairy value chain infrastructures constructed so far.

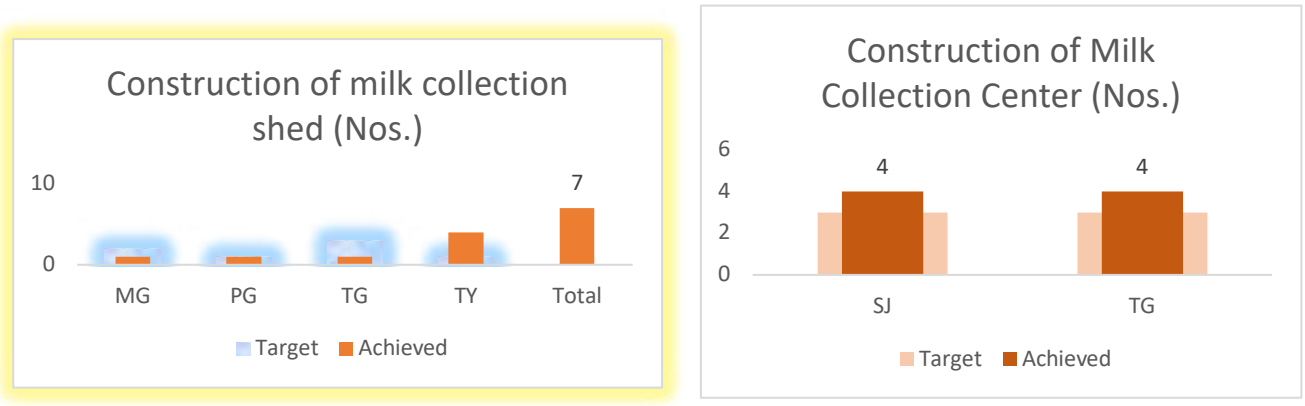


Figure 43. Dairy VC infrastructures constructed during 2022-23 (Planned Vs. Achieved)

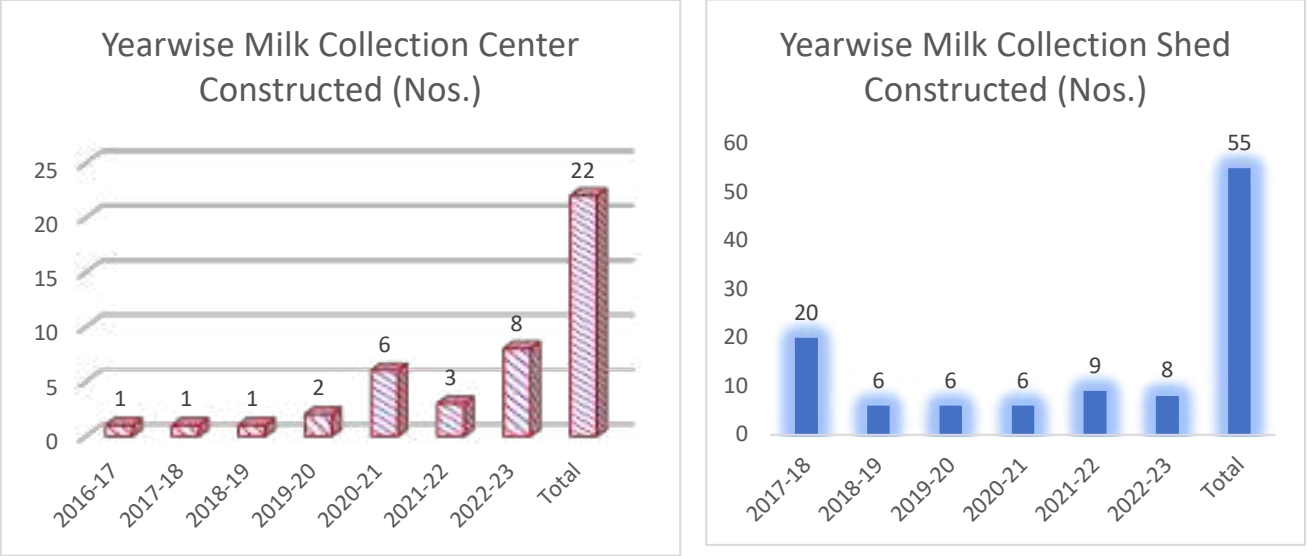


Figure 44. Cumulative DVC infrastructures constructed (Nos.)

C.1.2 PROGRESS TOWARDS COMPONENT OUTCOME (S)

According to the Annual Outcome Survey 2021, the findings were as follows:

Annual income, expenditure, and loans availed

The monthly average household income is Nu. 14,511 and Nu. 10,995 for the treatment (n=759) and control groups (n=600) respectively. The monthly household income of the treatment group was significantly higher than the control group (at P value of 0.001). There is an increasing trend in household income levels over the last 3 years. The household income significantly increased by 30.92 % from Nu. 8809 in 2018 to Nu. 8844 in 2019; and to Nu. 12,753 in 2020.

The overall monthly household expenditure is Nu. 10,589 (N=1359). The household expenditure for the treatment group (n=759) is Nu. 10,623 and Nu. 10,555 for control group (n=600). There is no significant difference between the control and treatment groups. The monthly household expenditure increased by 22.1% from Nu. 4352 in 2018 to Nu. 5,587 in 2019. The expenditure further increased by 59% from Nu. 4352 in 2018 to Nu. 10,589 in the year 2020. In 2020, the main expenditure incurred by households was on purchase of food items, expenses on health, and children education.

Pemagatshel and Trashiyangtse have the highest household income levels, followed by Mongar, Lhuentse, and Trashigang. On an average, the treatment group annual household income stands at Nu. 180,555.00; as compared to the income levels of Nu. 137,320 of the control group gewogs. On an average the annual household expenditure level for the treatment group stands at Nu. 128,861; while the expenditure for the control group is Nu. 127,098.

Loan – In the year 2019, approximately 11% of the total respondents availed loan purely for agricultural purposes. Overall, 11% of the households in the region availed loans in the year 2020. In the treatment group (n=759) 12% of the households availed loan, whereas 9% of the households in control group (n=600) availed loan. The average amount of the loan availed by a household for treatment group (n=759) is Nu. 26,510.79 and for control group (n=600) is Nu. 23,133. The range of loans availed by a household in the treatment group is Nu. 4000 to 66000, and in the control group the range is from Nu. 3000 to 42000.The loans were availed mainly for purchase of farm machinery, purchase of inputs, crop production, and purchase of improved cattle that is the same percentage of households in 2019 and 2020.

Food self-sufficiency status

Eighty-five percent of the households (n=759) in the treatment group reported food self-sufficiency, while 69% of the households in control group (n=600) were food self-sufficient. One hundred and fifty-nine households reported improvements in the food security over the year last few years. The self-sufficiency level slightly decreased to 93.7% in 2019 from 94% in 2018. There was a further decrease in self-sufficiency level to 85% in 2020. Most of the gewogs reported food shortages from January to March in the treatment group. The food shortage months in the control group are from January to March and October to November.

Land Use and irrigation

The land use in the project areas is predominantly dryland (84%) followed by wetland with 16%. Fallow dryland constitutes 33% of the total dry land area. The average dryland land holding size of a household is 2.39 acres and wet land average holding is 0.46 acres. The overall average land holding size per household is 1.42 acres. Average dryland holding size in control group (n=600) is 2.78 acres and treatment group (n=759) is 2.39 acres. The total dry land under control group is slightly higher than the treatment group, whereas the total wetland is higher in treatment group.

In 2020, 29% of the households from the treatment group (n=759) and 26% of households from the control group (n=600) used irrigation system for crop production. About 19% of the treatment group households cultivate vegetable after rice harvest, where as 23% of the households from control group grow vegetables after rice in 2020. Compared to 2018 and 2019, the number of households using irrigation system in the treatment group in 2020 has decreased from 36% in 2018 and 38% in 2019 to 29% in 2020.

In terms of trend in area under irrigation and crop productivity, majority of the respondents (74% from the treatment group and 80% from the control group) stated that the situation has remained the same over the years. About 20% of the treatment group households and 15% of the control group households reported increase in area under irrigation. On crop productivity trend, 34% from treatment group and 43% from the control reported a decrease in crop productivity.

Crop & Livestock Production

In the project gewogs, all 759 households from the treatment sample group cultivated vegetables in 2020 in an area of 381 acres. The Control group re-presented by 600 households grew vegetables in 284 acres during the same period. The vegetable cultivated area per household on an average is 0.49 acres in the treatment group, while the area on vegetables per household is 0.44 acres in the control group. In 2018, the percent of HHs engaged in vegetable cultivation was 98% in treatment group, as compared to 94% in control group. In 2019 the same percentage (98%) of HHs were engaged in vegetable cultivation in the treatment group as compared to 92% in the control group.

The survey covered 14 types of vegetables promoted by the Project. The annual production of vegetables in the year 2020 ranged from 5,485 kgs of tomatoes to 187,246 kgs of chillis in the treatment group; while the annual production in control group ranged from 3,016 kgs of tomatoes to 58,596 kgs of chillis. Chillis, cabbages, radish, cauliflower topped the list of the vegetables in terms of quantity and sold. Bulks of the vegetables produced were sold. In the treatment group the percentage of produce sold ranged from 44 to 87, while in the control group percentage sold ranged from 27 to 85.

Thirty-one percent of the households listed wild animal damages to rice, 24% of the households mentioned irrigation water shortages, followed by 17.5% labour shortages and landslide, and 10% of the households cited insect damages. Main reasons stated by the households for both the treatment and control group include wild animal damages, irrigation water shortages, and labour shortages.

Cattle ownership and Milk production

87% of the HHs from the treatment group and 82% of the HHs from the control group own cattle. The average number of cattle per HH in both the treatment and control group is 3. Out of the total cattle population of 4092, 47% are improved breeds.

In 2018, 85 % of the HHs in treatment group (n=200) own cattle as compared to 53% in control group (N=200). In 2019, 85 % of the HHs in treatment group (n=200) own cattle as compared to 72% in the control group (n=200). In 2020, 87% of the HHs in treatment group (n=759) and 82% of the HHs in control group (n=600) owned cattle. The number of households owning cattle increased from 85% in 2018 to 87% in 2020 in treatment group; while the number of HHs owning cattle in control group increased from 53% in 2018 to 82% in 2020.

All households owning cattle produce milk that is 87% from the treatment group (n=759); and 82% from the control group (n= 600). In summer months the total milk produced is 3168 liters in the treatment group as compared to 2377 liters in control group. During the winter months the milk production is reduced to 2353 liters in treatment group and 1851 liters in the control group. The milk yield per household per day is 4 liters in summer and 3 liters in winter months.

In 2018, in the treatment group, 1850 litters of milk was produced in summer and 1099 litters in winter; while for control group, it was 863 litters in summer and 552 litters in winter. In 2019, in the treatment group, 1517 liters of milk was produced in summer and 735 liters in winter; while for the control group, it was 914 liters in summer and 478 liters in winter. In 2020 the overall milk production has increased compared production in 2018 and 2018.

Introduction of new technologies.

All households (100%) from the treatment group (n=759) adopted improved technologies promoted by the project. Some of the households adopted more than one technology. Within the treatment group 16-30% of the households adopted sprinkle irrigation, improved vegetable cultivation methods, and green house poly tunnels. In the control group (n=600), 559 households (93%) adopted crop production technologies. Within the control group 15-42% of the households adopted sprinkle irrigation, improved vegetable cultivation methods, and green house/poly tunnels.

In 2018, approximately, 72% of HHs in treatment group (n=200) adopted new technologies in dairy development as compared to 30% of HHs in control group. In 2019, approximately 66% of HHs in the treatment group adopted at least one new technology in dairy development as compared to 70% in the control group.

Among both the treatment groups in livestock production, improved fodder production, winter fodder, and improved cattle sheds were the improved technologies adopted by higher percentage of farmers. In the treatment sample group 752 households (99%) adopted new technologies where as 356 households (60%) in the control treatment group adopted new technologies. In the treatment group, the area covered under improved fodder grass was 107 acres and the area under winter fodder was 71 acres. A total of 93 MT of silage was produced during the year. In the control group the area under improved fodder grass and winter fodder was 86 acres and 67 acres respectively; and a total of 69 MT of silage was produced.

Majority of the households (36%) from the treatment and control groups reported having concrete floor, CGI roofing with manager and trough. Mud floor with *single* roofing (29%) is the next type of popular housing for cattle. One hundred and sixty-four households (12%) reported not having any improved cattle shed.

A range of farm inputs in agriculture and livestock production have been used by the households. The use of farm inputs is higher in the treatment group compared to the control group in terms of quantity used and the cost of the inputs

Eighty-eight percent of the HHs from the treatment group (n=759) and 96% from the control group (n=600) did not keep farm records. The percentage of farmers keeping farm records has not increased over the last 3 years.

In 2018, approximately, 83% of HHs did not keep written records on expenses in inputs, farm production and income earned from sales of farm produce in the market.; while in 2019 approximately, 89.6% of HHs (N=394) did not keep written records on farm production and income earned from the sale of farm produce. The main reasons for not keeping farm records stated in both the control and treatment groups are: low literacy rates (44%), not aware on benefits of keeping farm records (29%), no knowledge on book keeping (18%), and time consuming (8%).

Marketing of crop and livestock produce

A total of 551 households (72.6%) from the treatment group and 366 households (61%) from the control groups sold vegetables in the year 2020. One hundred forty-eight households (19.5%) reported selling vegetables in "Groups" in the treatment group, while 93 households (15.5%) from the control group reported selling vegetables in "Groups". In 2018, 33% of HHs ranked Local Market as number one marketing point for the vegetable growing farmers, followed by Schools and Institutions linkage (32%). Local market was ranked number one with 50% of HHs (N=121) selling dairy products in locality, followed by Trader (16%) and Schools and institutions (16%). In 2019, local market within short vicinity continued to be ranked as the topmost among the markets for selling the vegetables, followed by schools and institutions.

Schools and institutions, nearby local markets, and nearby town/Thromde were the top 3 markets. The households from the treatment group ranked Schools and Institutions as the top ranked market. A total of 409 households (54%) from the treatment group and 251 households (42%) from the control groups sold dairy products in the year 2020. One hundred and four households (14%) reported selling dairy products in "Groups" from the treatment group, while 18 households from the control group (3%) reported selling dairy products in "Groups". Three hundred and five households (40%) from the treatment group and 233 households (39%) from the control group marketed dairy products individually.

Nearby local markets, nearest town market, and schools and institutions were the 3 top ranked markets for dairy products under the treatment group. For the Control group the top 3 markets were nearby local markets, schools and institutions, and middle men were the top 3 markets.

Seventy-three percent of households (72.6%) from the treatment group and 61% from the control groups sold vegetables in the year 2020. One hundred forty-eight households (19.5%) reported selling vegetables in "Groups" in the treatment group, while 93 households (15.5%) from the control group reported selling vegetables in "Groups. This implies that individually households organize their own markets.

Three hundred thirty-three households (56%) from the treatment and control groups combined reported that they do self-marketing. Twenty-four percent of households stated the middle-men as marketing agent and 20% of households mentioned extension as marketing agents. The Extension Agent and Middleman have not improved the access to markets. In the treatment group, the average distance to the nearest market is 9.46 kms with a range of 1.8 to 29 kms, while the average distance within the control group households is 10.16 kms with a range of 2.3 to 26.0 kms.

Trend analysis of major parameters of annual outcome survey

Gender - In 2018, 48% of the respondents (N=192) were male while 52% (N=208) were female. In 2019, 51.5% of the respondents (n=206) were male while 48.5% (n=194) were female. In 2020, 64% were female, while 52% of the head of the households were male.

Income - In the year 2018, the average monthly income of the HHs in the region was Nu..8809 (N=399, Max=75375, Min=125). Average monthly income of the HHs in the region in 2019 was Nu..8844 (N=400, Max=79333, Min=0), with a marginal increase by 0.4% as compared to 2017. In 2020 the monthly average household income was Nu. 14,511 and Nu. 10,995 for the treatment (n=759) and control groups (n=600) respectively. The monthly household income of the treatment group was significantly higher than the control group (at P value of 0.001). There is an increasing trend in income levels over the last 3 years. The household income significantly increased by 30.92 % from Nu. 8809 in 2018 to Nu. 8844 in 2019; and to Nu. 12,753 in 2020.

Expenditure - Average monthly HHs expenditure was Nu..4352 (N=400) in 2018, and Nu. 5,587 in 2019. In 2020, The overall monthly household expenditure is Nu. 10,589 (N=1359). The household expenditure for the treatment group (n=759) is Nu. 10,623 and Nu. 10,555 for control group (n=600). There is no significant difference between the control and treatment groups. The monthly household expenditure increased by 22.1% from Nu. 4352 in 2018 to Nu. 5,587 in 2019. The expenditure further increased by 59% from Nu. 4352 in 2018 to Nu. 10,589 in the year 2020. In 2020, the main expenditure incurred by households is on purchase of food items, expenses on health, and children education.

Loan – In the year 2019, approximately 11% of the total respondents availed loan purely for agricultural purposes. Overall, 11% of the households in the region availed loans in the year 2020. In the treatment group (n=759) 12% of the households availed loan, whereas 9% of the households in control group (n=600) availed loan. The average amount of the loan availed by a household for treatment group (n=759) is 26,510.79 and for control group (n=600) is Nu. 23,133. The range of loans availed by a household in the treatment group is Nu. 4000 to 66000, and in the control group the range is from Nu. 3000 to 42000.The loans were availed mainly for purchase of farm machinery, purchase of inputs, crop production, and purchase of improved cattle that is the same percentage of households in 2019 and 2020.

Food self-sufficiency – In 2018, 94% of the HHs (n=399) in the region were food secure. The proportion of HHs facing food shortages was higher in control group (7%, n=200) as compared to treatment group (5.5%, n=200). In the year 2019, the food self-sufficiency level slightly decreased to 93.7%. The percentage of HHs facing food shortages was higher in the control group (6%) compared to the treatment group (5.5%). In 2020, 85% of the households (n=759) in the treatment group reported food self-sufficiency, while 69% of the households in control group (n=600) reported food self-sufficiency. One hundred and fifty-nine households reported improvements in the food security over the year last few years. The self-sufficiency level slightly decreased to 93.7% in 2019 and there was a further decline in self-sufficiency level to 85% in 2020. Most of the gewogs reported food shortages from January to March in the treatment group. The food shortage months in the control group are from January to March and October to November.

Land use – The average land holding was 3.3 acres per HH in 2018. Approximately, 45% of the HHs had land registered under woman. The region was dominated by dryland agriculture characterized by 2.7 acres of dryland and only 0.3 acres of wetland per HHs on average. Approximately less than 50% of land was left fallow in 2018. The 2020 land use in the project areas is predominantly dryland (84%) followed by wetland with 16%. Fallow dryland constitutes 33% of the total dry land area. The average dryland land holding size of a household is 2.39 acres and wet land average holding is 0.46 acres. The overall average land holding size per household is 1.42 acres. Average dry land holding size in control group (n=600) is 2.78 acres and treatment group (n=759) is 2.39 acres. The total dry land under control group is slightly higher than the treatment group, whereas the total wetland is higher in treatment group.

Irrigation use- In 2018, approximately 36% of HHs in treatment group used irrigation system as compared to 16% in control group. 31% of HH in treatment and 29% of HHs in control group reported increased in area under irrigation as compared to previous year. In 2019, approximately 38% of HHs in the treatment group used irrigation system as compared to 17% in the control group. As compared to 2017, the area under irrigation has increased by about 14% in the treatment group, while 6% increase in the control group. In 2020, 29% of the households from the treatment group (n=759) and 26% of households from the control group (n=600) used irrigation system for crop production. About 19% of the treatment group households cultivate vegetable after rice harvest, where as 23% of the households from control group grow vegetables after rice. Compared to 2018 and 2019, the number of households using irrigation in the **treatment gro**up in 2020 has decreased from 36% in 2018 and 38% in 2019 to 29% in 2020. In 2020, a total of 222 sample households from the treatment group (n=759) and 158 households from the control group (n=600) provided the responses on the trend. Majority of the respondents (74% from the treatment group and 80% from the control group stated that the situation has remained the same over the years. About 20% of the treatment group households and 15% of the control group households reported increase in area under irrigation. On crop productivity trend, 34% from treatment group and 43% from the control reported a decrease in crop productivity.

Vegetable cultivation – In 2018**, t**he percent of HHs engaged in vegetable cultivation was 98% in treatment group, as compared to 94% in control group. In 2019 the same percentage (98%) of HHs were engaged in vegetable cultivation in the treatment group as compared to 92% in the control group. However, in 2020 all 759

households (100%) from the treatment sample group cultivated vegetables in 2020 in an area of 381 acres. Also 100% of the control group households (n=600) grew vegetables in 284 acres during the same period. In 2018, Treatment group had 0.4 acres per HH allocated for vegetable production as compared to 0.2 acres per HH in control group. In 2019, treatment group had 0.23 acres per HH allocated for vegetable production as compared to 0.21 acres per HH in control group. **In 2020, t**he vegetable cultivated area per household on an average is 0.49 acres in the treatment group, while the area on vegetables per household is 0.44 acres in the control group. In 2020 the survey covered 14 types of vegetables promoted by the Project. The annual production of vegetables in the year 2020 ranged from 5,485 kgs of tomatoes to 187,246 kgs of chilis in the treatment group; while the annual production in control group ranged from 3,016 kgs of tomatoes to 58,596 kgs of chilis. Overall, the production of vegetables per household is 615kgs and 351 kgs in the treatment and control groups respectively.

Cattle Ownership and Milk production - In 2018, 85 % of the HHs in treatment group (n=200) own cattle as compared to 53% in control group (N=200). In 2019, 85 % of the HHs in treatment group (n=200) own cattle as compared to 72% in the control group (n=200). In 2020, 87% of the HHs in treatment group (n=759) and 82% of the HHs in control group (n=600) owned cattle. The number of households owning cattle increased from 85% in 2018 to 87% in 2020 in treatment group; while the number of HHs owning cattle in control group increased from 53% in 2018 to 82% in 2020. The milk yield per household per day is 4 liters in summer and 3 liters in winter months.

The Figure 45 shows milk production trend from dairy farmer groups and cooperatives and milk flow trend to Koufuko Dairy Plant. The production decline during 2020-21 was due to the inability of the farmer groups and cooperatives to collect milk during COVID-19 lockdowns and movement restrictions.

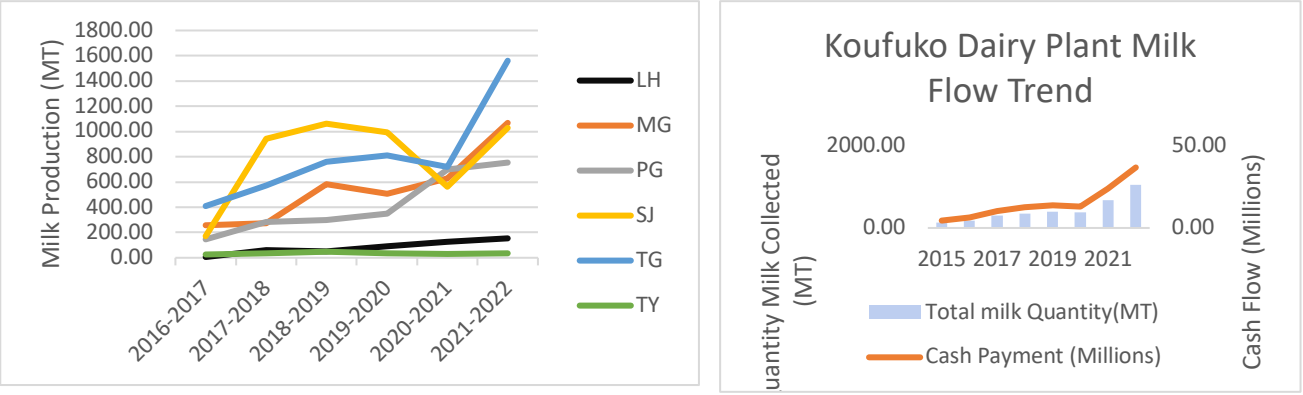


Figure 45. Farmer Groups milk production trend (MT) (Left); Milk supply cashflow trend to Koufuko (MT)

New technologies – In 2018, approximately, 72% of HHs in treatment group (N=200) adopted new technologies in dairy development as compared to 30% of HHs in treatment group. In 2019, approximately 66% of HHs in the treatment group adopted at least one new technology in dairy development as compared to 70% in the control group. In 2020 All households (100%) from the treatment group (N=759) adopted improved technologies promoted by the project. Some of the households adopted more than one technology. Within the treatment group 16- 30% of the households adopted sprinkle irrigation, improved vegetable cultivation methods, and green house poly tunnels. In the control group (N=600), 559 households (93%) adopted crop production technologies. Within the control group 15-42% of the households adopted sprinkle irrigation, improved vegetable cultivation methods, and green house/poly tunnels.

Market place – In 2018, 33% of HHs ranked Local Market as number one marketing point for the vegetable growing farmers, followed by Schools and Institutions linkage (32%). Local market was ranked number one with 50% of HHs (N=121) selling dairy products in locality, followed by Trader (16%) and Schools and institutions (16%). In 2019, local market within short vicinity continued to be ranked as the topmost among the markets for selling the vegetables, followed by schools and institutions. In 2020, schools and institutions, nearby local markets, and nearby town/Thromde were the top 3 markets. The households from the treatment group (n=759) ranked schools and Institutions as the top ranked market in 2020 for vegetables. For dairy products under treatment group (n=759) nearby local markets, nearest town market, and schools and institutions were the 3 top ranked markets.

Vegetable sold – In 2018, 67% of HHs (N=400) sold vegetables for cash income. In 2019, 61% of the HHs in the treatment group (n=200) and 48% of HHs in the control group (n=200) produced and sold vegetables in the markets. In 2020, the main vegetables produced and sold were Chilis, cabbages, radish, cauliflower at the top of the list. In the treatment group (n=759) the percentage sold ranged from 44 to 87, while in the control group (n=600) the % sold ranged from 27 to 85. Similarly, the sale per household is 439kgs and 196 kgs in the treatment and control groups respectively.

Dairy product sold – In 2018, 59% of HHs in treatment and 35% in control group sold dairy products such as milk, butter, cheese and curd. In 2019, 54% of HHs in treatment and 50% in the control group sold dairy products. A total of 409 households (54%) from the treatment group and 251 households (42%) from the control groups sold dairy products. One hundred and four households (14%) reported selling dairy products in "Groups" from the treatment group, while 18 households from the control group (3%) reported selling dairy products in "Groups". Three hundred and five households (40%) from the treatment group and 233 households (39%) from the control group marketed dairy products individually.

Record keeping – In 2018, approximately, 83% of HHs did not keep written records on expenses in inputs, farm production and income earned from sales of farm produce in the market.; while in 2019 approximately, 89.6% of HHs (N=394) did not keep written records on farm production and income earned from the sale of farm produce. In 2020, 88% of HHs from the treatment group (n=759) and 96% from the control group (n=600) did not keep farm records. The % of farmers keeping farm records has not increased over the last 3 years. The main reasons stated in both the control and treatment groups are: low literacy rates (44%), not aware on benefits of keeping farm records (29%), no knowledge on book keeping (18%), and time consuming (8%).

Suggested markets for crop and livestock markets

Based on the feedback of the key informant interviews and the observations during the field visits, the nearest markets for the households of the Project areas are suggested both within and outside of the Project Dzongkhags. Markets within the Dzongkhags mainly include schools, Dratshangs, Gewog Towns, Hydro projects, Bhutan Agro-Industries Limited (BAIL). Outside of the Dzongkhags the markets available are the nearby Dzongkhags, BAIL, OGOP, FCBL Samdrup Jongkhar, Bumthang, and Thimphu.
For livestock produce, the main market is Koufuku International Limited (KIL) in Cheneri Trashigang. The company is not operating in full capacity so they require more milk. They are getting milk supplied from nearby Gewogs of Mongar Dzongkhag. However, the KIL informed that the milk quality is better in Trashigang Dzongkhag.

One Gewog one Product (OGOP) is also one of the potential markets for selected products. OGOP already purchases quinoa, cassava cookies, *kharang*, lemon grass spray and maize cookies from Mongar. And, from Pema Gatshel they purchase cassava flour, and *khamti* rice from Samdrup Jongkhar. While, from Trashigang they purchase kidney beans, roasted peanut and from Trashi Yangtse they purchase *Urka* chilli and *Urka* chilli paste. And, Khololongchu project staffs purchase milk, cheese, butter and agriculture produces in few Gewogs of Trashi Yangtse. For certain fruits and vegetables, Bhutan Agro-Industry Limited (BAIL) is an established market for the farmers if the price and continued supply can be guaranteed by the farmers.

One hundred and eighty-six households own Biogas, out of which 137 is owned by treatment households. On an average the biogas use is 2.05 hours per day for treatment group and 1.76 hours per day for control group. When asked about the trend in use of other sources of energy after the adoption of biogas, 31% of the households reported decrease in use of other sources of energy, while 60% of the households mentioned that the use of other sources has remained the same. Majority of the sample households from the control and treatment group who use biogas responded that the firewood, electricity, and LPG gas were the main sources of energy before the introduction of gas. Majority of the biogas owners rated the efficiency of biogas as good to moderate from both the treatment and control groups. Eighty-one percent of the biogas users reported that there are no technical problems on use of biogas. Biogas owners who responded some technical problems on use, stated that lack of skilled operators, poor equipment design, and insufficient dung as the major problems on use of biogas.

Participation of Women

Among the assets owned by households of both the treatment and control groups, women own land, livestock, cash and savings account, and farm; while, men own farm machinery, vehicles and house. The operation of farm machinery and equipment is mainly done by men. However, women are also involved in operation of farm equipment like mils, dairy equipment, and post-harvest and processing equipment. Majority of the households of treatment and control group responded that women are involved in the entire decision making at the household levels ranging from participation in meetings and trainings to sale of assets and purchases of farm inputs, keeping the household earnings and making investments.

Household involvement in Project activities

Among the treatment group sample households, 544 households (72%) reported involvement in Project activities in the year 2020. Majority of the households reported involvement in Farmers' training on vegetable production, vegetable production inputs and equipment, farmers' training dairy management, and farmers training agri-business, efficient irrigation system management, and sustainable land management.

A total of 316 households (42%) were very satisfied with the project interventions, 216 households (35%) expressed moderate satisfaction. However 41 households (5%) were not satisfied at all and 18% of the households did not give any response. Four hundred forty-five households (59%) of the treatment households were not involved in any other projects. From the control group 511 households (85%) reported that they were not involved in any other projects.

When asked to list 3 major problems faced by households in crop and livestock production. The number one problems faced are wildlife damages to crops and livestock, seasonal irrigation water shortages, and pest diseases. The second problems rated are wildlife damages, water shortages, and pests and diseases.

C.1.3 CONVERGENCE AND PARTNERSHIP

Linking of individual farmer, farmer groups and cooperatives with Financial Institutions (FI's) saw significant contribution towards achievement of program objectives and outcome in terms of a greater number of farmers availing loan for agricultural investment. For instance, 30% support is provided by the Project to purchase improved dairy cows while majority (70%) is contributed by the farmers through credit facilities. The partnership with FI's enabled the project to supply 2123 dairy cows from the appraisal target of 2000 cows, contributing towards enhanced milk production. Similarly, the success rate of the project intervention has increased through partnership with Samdrup Jongkhar Initiative (SJI) in training farmers, soil nutrient management, organic farming and group mobilization and also engagement of Tarayana Foundation in dry land irrigation at Jurmey and mobilization of youth groups.

C.1.4 BOTTLENECKS AFFECTING COMPONENT PROGRESS AND ACTION TAKEN

During this reporting phase, several constrains were identified to be affecting the progress of the activities planned. Despite of CARLEP investment to youths in LUC's, drop-out rates in the LUC sites are generally high, which is mainly due to remoteness of land, long distance market, lack of water availability and conflicts between the members. Owing to these, CARLEP's future investment decision must be looked at from the prism of strategic land location, adequate farming facilities, interest of the youths and their co-investment capacity to ensure efficient resource allocation as well as long-term engagement and success of young farmers.

Further, a poor attitude and work ethic from youth have affected the progress. Many youths lack persistence and quickly lose motivation after an unsuccessful season or crop failure. Youth are portrayed as being unwilling to take risks and incapable to hold the pressure of the harsh farming life. To bridge the gap between the needs of the youth and country's policy priorities, new approaches must be developed that meet the needs and aspirations of rural youth, increase their motivation, and make them identify more with the sector.

Despite CARLEP's effort in increasing dairy herd in the region vis-a-vis milk production, the recent outbreak of Lumpy Skin Disease (LSD) has not only affected the production but also rate of morbidity and mortality is

significant. The disease has spread to all the Programme areas and the likelihood of changing the dairy farming landscape is eminent at the moment. Thus, control of LSD remains a priority and surveillance, biosecurity, vaccination and movement controls will have to be implemented. During 2023-24 FY, the Dzongkhags have proposed for improved dairy cattle sourcing from various places in-country. This activity might undergo reprioritization during the mid-term review as a compliance to national LSD control and prevention strategy, as transport of live animals from one location to other could potentially increase the risk of disease transmission.

D PROGRAMME SUSTAINABILITY

Considering the CARLEP Project closure deadline of December 2025, the OPM has started developing an annotated outline of CARLEP exit strategy. Some of the key exit strategies include:

D.1 Taking CARLEP success into development programs in 13th FYP

In order to ensure sustainability of the CARLEP Programme, the success of the CARLEP will be incorporated in the 13th FYP local government grants to secure program continuity in dairy and crop intensification and value chain establishment, expansion of dry land irrigation, market linked production planning for maize with feed companies and integrating apiculture with mustard and buckwheat intensification to gain synergy. Moreover, integrating climate and energy lessons through adoption of climate smart village (CSV) into the National Adaptation Plans will serve as entry point for securing global climate funds like GCF and GEF in upscaling/replication of CSV's across the country.

In addition, enterprise development will be pursued through national skilling and engagement program through financial literacy training, lead farmer and CAIT, dairy equipment repair Technician as service providers, private nursery and community-based seed growers for sustainable agriculture and livestock inputs linked through NSC, Alpine Seeds or with export companies and linking with the Cottage and Small Industries Support Grants.

D.2 Strengthening the value chain linkages through self-financing mechanisms

Koufuku International as a center for dairy excellence will continue playing crucial role in expanding the dairy value chain and market linkages. As envisioned in Koufuko Internationals Corporate Strategy Paper to bringing onboard dairy farmers as shareholder, dairy farmers in the region will be able to invest more into dairy farming with minimal support from the Government. Similarly, some of the most successful dairy cooperatives, not linked to Koufuko, will come up with a mechanism on how to plough back group savings to their members, so that the members have easy access to fund for purchase of inputs and other expenses.

Contractual farming model, where the Processors invest in establishment of the production farms and the growers supply their produce to them, will propel the agriculture intensification program and market-linkages. Thus, reinvestment strategy should be developed for the replication of the contractual farming model already adopted in the region. For example, linking of pineapple growers with BAIL at Lingmethang.

CARLEP support to vegetable traders and aggregators has strengthened market connection between producers and retailers/consumers. Withdrawing of support could jeopardize the products reaching the market. To ensure sustained support to trader/aggregator association, they will explore avenues for innovative financing scheme through mobilizing from Trade support, rural banks such as CSI, CSR and Aggregators investment.

D.3 Innovative financing through public-private-partnership (PPP)

The PPP model will be pursued to encourage investment in agriculture commercialization through aggregating fruit intensification villages and linking up with import and export agencies and developing business partnership (like apple and citrus export business) and establishment of commercial farms through landscape approach utilizing fallow lands (Land bank concept) under PPP model and also systematically integrating development support and credit investment.

E PROGRAMME MANAGEMENT

E.1 CARLEP Annual Work Plan and Budget 2023-2024 Preparation Workshop

A two-day workshop on preparation of 2023-2024 Annual Work Plan and Budgeting for Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP) ended on 28 february 2023. The workshop was organized by the Office of the Programme Management, CARLEP with an objective to formulate annual work plan and budgeting contributing towards achievement of CARLEP goals in facilitating the transformation of a subsistence-based rural agricultural economy into a sustainable value chain and market-driven productive sector by promoting climate-smart approaches in agriculture and strengthening the capacities of communities and local institutions. The workshop was attended by Regional Heads of ARDC-Wengkhar, RLDC-Kanglung, RAMCO-Mongar, District Agriculture and Livestock sector Heads, Koufuko International Ltd., Finance Officers, Focal Accountants and Economic Development Officers from six Eastern Dzongkhags.

E.2 Regional Programme Implementation Committee Meeting

Figure 46. Participants during AWPB Workshop and RPIC Meeting at Samdrup Jongkhar

In continuation, CARLEP organized a day-long Regional Programme Implementation Committee (RPIC) Meeting on 1st March, 2023. The RPIC is an annual event that delivers a common platform for all programme implementing agencies to review the past progress, scrutinize and endorse the Annual Work Plan and Budget (AWPB) for the next fiscal year for further submission to the National Programme Steering Committee (NPSC) and the International Fund for Agricultural Development (IFAD). The meeting was attended by Dasho Dzongda of Pemagatshel (as the capacity of Chairman), Dasho Dzongda of Trashigang and Samdrup Jongkhar, and Dasho Dzongrab of Mongar and Lhuentse and Regional heads from ARDC Wengkhar, RLDC Kanglung, RAMCO Mongar, Dzongkhag Agriculture and Livestock Sectors, Economic Development Marketing Officers, Finance Officers and CARLEP accountants and CEO of Koufuko international Lt., Trashigang.

Key decisions taken during the meetings were:

1. Land development to be focused in areas where manpower is available.
2. The floor raised an issue of significant Import of agriculture and livestock products. CARLEP to focus on import substitution interventions by enhancing agriculture production and marketing.
3. OPM and KIL to expedite process for establishment of dairy plant at Samdrup Jongkhar. In case, it is not possible to establish new dairy plant, explore avenues to expand current processing plant at Chenari by installation of additional equipment to solve fresh milk marketing issues.
4. CARLEP to emphasize on value addition instead of exporting raw materials at cheaper rate and then importing value added products back at higher price impacting on the increased flow of foreign currency.

5. It was recommended that the proposed AWPB 2023-24 should be substantiated with strong justifications and making it credible so that it gets approved by NPSC and MoF.
6. Concerns were raised with regard to farmers becoming subsidy dependent leading to lack of ownership. It was recommended for gradual phasing out of the subsidy as and when farmers level of income increases.
7. The floor raised an Issue of underutilized infrastructures. It was recommended to carry out detailed feasibility studies. AWPB to be substantiated with feasibility report, design and estimates to avoid slashing of budget.
8. The floor recommended all the implementing agencies in strengthening M&E system to monitor planned activities ensuring timely completion while also maintaining quality.
9. The floor proposed for independent impact assessment of CARLEP interventions by hiring external consultants to justify the investments made so far.
10. Recommended for taking ownership of CARLEP investments (Infrastructures, equipment) by the concerned implementing agencies.
11. The floor recommended for strengthening inter-dzongkhag supply chain for surplus products to solve agriculture marketing issues. In this regard, RAMCO to organize consultative workshop in developing strategy for strengthening inter-dzongkhag supply chain for agricultural produce.
12. Recommended for capacity enhancement of project implementing officials.
13. The chair endorsed the AWPB proposal with a consolidated amount of Nu. 179 million for further submission to NPSC and IFAD for approval.

E.3 National Programme Steering Committee Meeting

CARLEP Program Steering Committee Meeting was convened on 24 April 2023 virtually. The objectives of the meeting were to: Present CARLEP's physical and financial progress for July 2022-March 2023; Report on fund status; Present AWPB 2023-24 for endorsement; Report status of UHT Plant and expansion/upgradation of Koufuko Dairy Plant, Trashigang.

The meeting was attended by Dasho Secretary who chaired the meeting, the Directors from Department of Livestock, Department of Agriculture, Department of Agriculture Marketing and Cooperatives, Chief Planning Officer from Policy and Planning Division, Program Officer from Ministry of finance, Program Director and staff of CARLEP. Key discussions and decisions were as follows:

1. The recent outbreak of African Swine Fever (ASF) across the southern belt has affected the piggery farmers economically, and absence of preventative measures could bear a serious threat to the livelihoods of the pig farmers. Similarly, the poultry farming could also be jeopardized if the bio-security measures are not put in place. Although the CARLEP has no scope in supporting non-Programme areas, it was decided that the CARLEP will take into account bio-security measures while supporting poultry and piggery farmers in the Programme areas. The floor also decided to provide fund support to Samdrup Jongkhar, through Department of Livestock/FDA, for prevention of ASF in terms of purchasing disinfectants, test kits and awareness programs after seeking approval from IFAD in case it entails significant amount.
2. The Department of Livestock raised the need for improving the productivity of dairy animals which will be pursued vigorously in the 13th FYP. One of the strategic interventions, besides other ongoing breed improvement program, will be introduction of new germplasm of dairy cattle. Since this activity syncs well with CARLEP's objective of enhancing milk productivity and institutionalization of dairy value chain, the committee decided that CARLEP provide support to this activity for eastern Bhutan within the framework of breed improvement program.
3. The need for expediting prior approval process from IFAD for construction of Export Facilitation Center (EFC) at Nganglam was raised. The OPM clarified that because of restructuring process going on in IFAD, the "No objection" from IFAD got delayed. Nevertheless, OPM has been constantly following up with IFAD Country Director for issuance of clearance and thus, reassures to get it approved within a week or two. The Committee also noted that the fund approved for EFC cannot be utilized within this FY for which the Director of DAMC requested to allocate only mobilization advance while the balance can be withdrawn but can be included in 2023-24 work plan and budget as spillover activity.
4. With regard to support to establishment of UHT plant at Samdrup Jongkhar, DHI has informed that the business proposal requires thorough review and instead proposed CARLEP support to technology upgradation of KIL plant at Trashigang. The Committee recognizing the importance of KIL in

development of dairy value chain and uplifting the livelihoods of eastern dairy farmers agreed to DHI's proposal on technology plant improvement. OPM was directed to inform DHI accordingly and to expedite submission of technology upgradation proposal with 30 % cost sharing by DHI by DHI/KIL.

5. The Committee deliberated on the issue of human wildlife conflict and the need for sustainable solutions. Chain link fencing is seen as better alternative to electric fencing as the Department of Agriculture is piloting in all the Dzongkhags. As per the AWPB 2023-24, only two Dzongkhags have proposed for chain-link fencing while other Dzongkhags have not. To maintain uniformity and to achieve tangible impact, the Committee recommended to promote chain link fencing in all the CARLEP Programme Dzongkhags which shall be implemented following cost sharing guideline of the Ministry.
6. The Director, DOL, emphasized on the need for training farmers on clean milk production techniques as it directly contributes to lowering the microbial counts in fresh milk and thereby enhances the quality of processed products. Accordingly, the chair endorsed that the budget for training on clean milk production be centralized with RLDC Kanglung for better coordination and effective implementation. The RLDC will collaborate with NDDC, Yusipang for technical support.
7. The Director, DAMC raised the concern of limited proposals being received for agro-based enterprise development despite of repeated calls for expression of interest. This is partially attributed to incompetence of the proponent in developing the proposals besides other factors. With the placement of EDMO's in the Dzongkhags, the likelihood of receiving the proposals might improve for which the proposed budget for enterprise development was recommended to be increased. The Committee also recommended OPM to liaise with EDMO in the Districts for proposal submission.
8. The Committee Chair noted that lot of the activities proposed in 2023-24 budget was routine and thinly spread. Chair suggested OPM, PPD and head of departments to review activities and propose activities that are impactful such as plantation of high value fruit trees, enhancing biosecurity of poultry and piggery farms to protect livelihood of farmers from ASF and H5N1 which has seen high incidence of occurrence in recent months, procurement of germplasm of high yielding dairy cattle, chain link fencing to protect against human wildlife conflict, RNR enterprise etc.
9. It was agreed that the CARLEP Annual Work Plan and Budget would be shared with the Technical Departments to look at optimization and alignment as well as keeping Departments in the loop.
10. The Honourable Chair shared the concern of Ministry of Finance that the CARLEP activities seems to be too thinly spread and Dasho also expressed the same. In view of this, chair recommended to revisit AWPB 2023-24 and focus on more impactful activities and instructed PPD to coordinate the revision in consultation with the line Departments, OPM and the implementing agencies. Although, the proposal has been already incorporated into the MYRB system and is closed for any further changes, OPM clarified that as the AWPB 2023-24 is yet to be submitted to IFAD for approval, there is scope for revision. Subject to the IFAD's approval of the realigned plan, the revision in MYRB system could be done during the 1st quarter of the plan period.

E.4 Human resource management

At the moment, OPM is undergoing acute staff shortage after resignation of Knowledge Management and Project Support Officer besides transfer of M&E Officer to Mongar Dzongkhag as Acting DAO. One round of vacancy announcement was carried out through Ministry's HRD Section but failed to get applicants. Currently, the OPM is in the process of revising the application criteria and terms of reference to readvertise the vacancy of these critical positions. The roles and responsibilities of the staff, who left OPM, is being carried out through multi-tasking approach by the remaining staff. With the recent revision of salary for Civil Servants, the RCSC is advocating on multi-tasking where ever possible until the new recruitment is completed.

In addition, performance management system of the RCSC mandates civil servants to perform above the standards. Failing to do so could tantamount to rating the employee as "Partially Meeting Expectation" (PME). OPM staff were rated Good and Very Good for 2022-23 reporting year and with none in PME category.

E.5 Financial management

The financial achievement during FY 2022-2023 FY is 84% with an increase of 3 % compared to last year's progress achievement of 81.73%. The achievement is based on the annual revised planned target. The details

of financial expenditure by agency, sector, component, category and fund source is shown in Table 13, Figure 47 and 48.

Table 13. Financial achievement by agency

AGENCY	REVISED AMOUNT	Total Exp	BUDGET BAL.	Achievement %
ARDC	16.500	16.377	0.123	99%
RAMCO	15.484	15.079	0.405	97%
RLDC	11.500	11.017	0.483	96%
OPM	41.781	39.088	2.693	94%
T/YANGTSE	21.122	19.277	1.845	91%
MONGAR	16.775	14.061	2.714	84%
TRASHIGANG	24.282	18.750	5.532	77%
S/JONGKHAR	18.354	11.660	6.694	64%
P/GATSHEL	14.885	9.812	5.073	66%
LHUENTSE	13.020	7.781	5.239	60%
Grand Total	**193.703**	**162.901**	**30.802**	**84%**

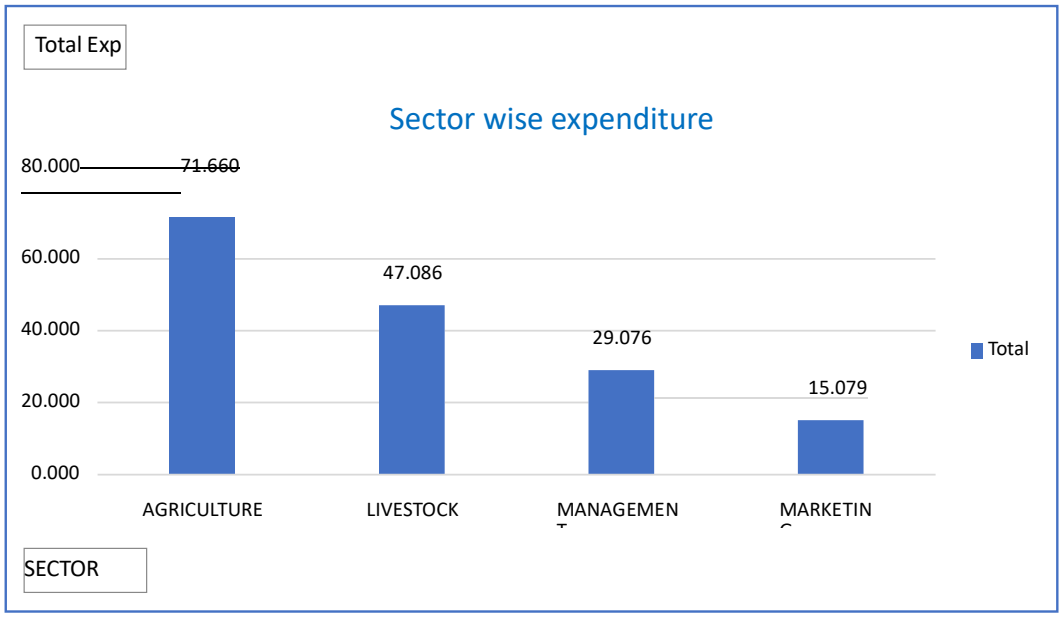


Figure 47. Budget expenditure by sector

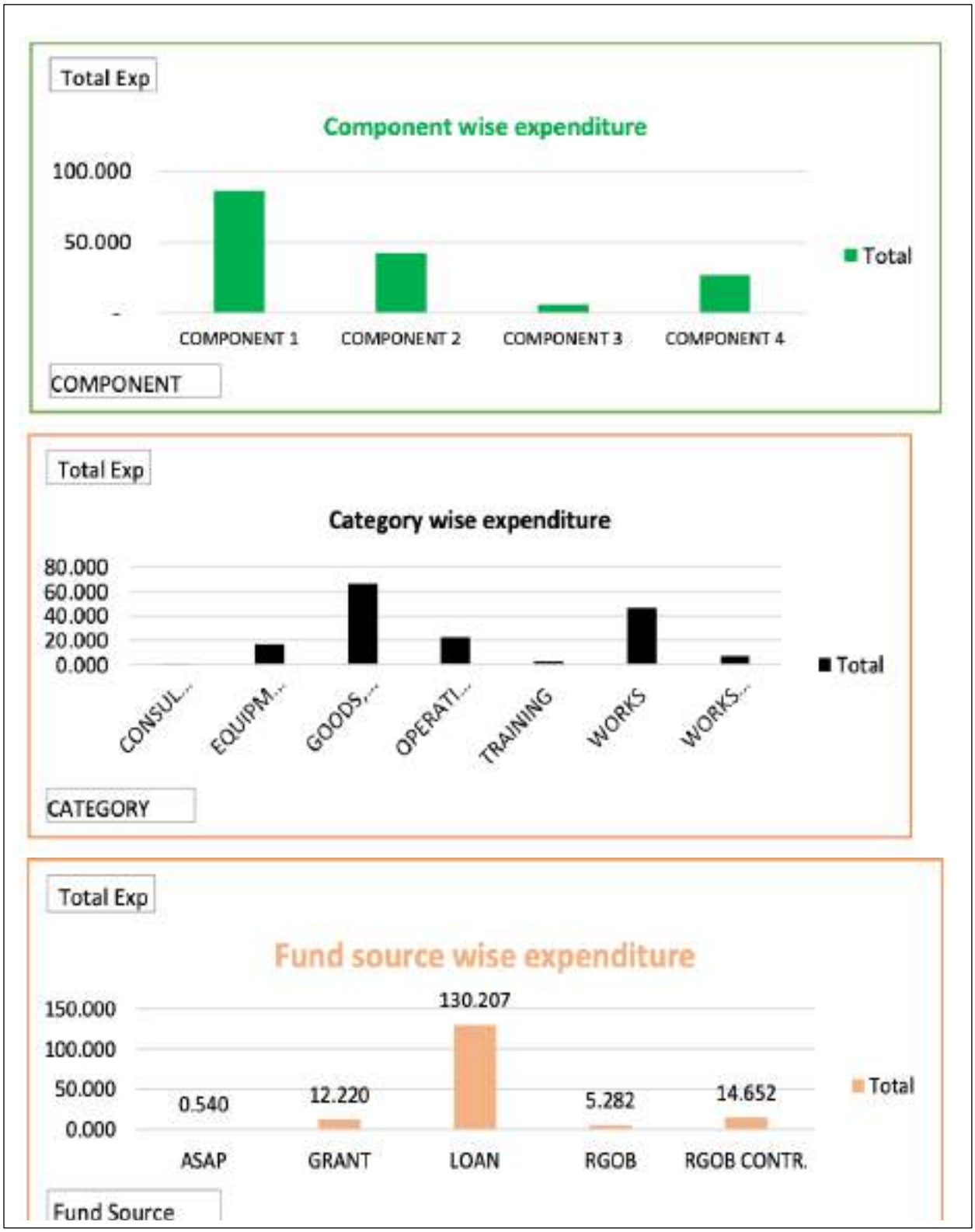


Figure 48. Fund expenditure by component, category and fund source

E.6 Procurement

All the procurement for works, goods and consultancy services were carried out by the respective implementing agencies following IFAD procurement manual and PRR 2019 (Now revised to PRR 2023). The OPM ensured that each and every procurement undertaken by the implementing agencies are updated in the IFAD Contract Monitoring Tool (CMT). The OPM also facilitated implementing agencies in submission of prior review documents for procurement requiring No objection from IFAD. In isolated cases, there had been delays in obtaining no objection which affected the implementation of the activity as per the implementation milestone.

With the introduction of End-End OPEN Procurment system, two official comprising of Program Director and Livestock Component Manager received training in Nepal. Since the system has already been rolled out, the procurement plan for 2023-24 FY has been updated in the system and awaiting IFAD's clearance. Henceforth, procurement documents (both prior and post review) shall be uploaded in the system.

E.7 M&E, Communications, and Knowledge Management

Knowledge Management (KM) is considered an integral part of CARLEP. KM is about facilitating the processes by which knowledge is created, shared, replicated, and used in changing people's attitudes, behaviours and work patterns thereby improving the performance and effectiveness of the programme. This facilitation under CARLEP is guided by the IFAD knowledge value chain concept which advocates a strong connection between KM and M&E.

The programme recognizes the importance of Knowledge and its contribution to the following outcomes such as i) Improved programme performance and results through enhanced learning, knowledge sharing and dissemination/communication; ii) Enhanced information management system (IMS) to ensure better access to reliable information and knowledge iii) Improved engagement, partnership and collaboration with the programme implementing partners in KM.

Since its inception, CARLEP has done substantial work related to knowledge management and dissemination including the compilation of stories, articles, pamphlets and audio-visual documentation.

List of the KM Products produced this fiscal year are listed below:

1. A Youths find Success in Horticulture Nursery: A case of Khemsar Horticulture Nursery. https://carlep.gov.bt/a-youth-finds-success-in-horticulture-nursey-a-case-of-khemsar-horticulture-nursery-at-wengkhar/
2. Lucrative Plant Nursery Business: A Case of Goedoedth Kheunjung Ling Horticulture Nursery. https://carlep.gov.bt/lucrative-plant-nursery-business-a-case-of-goedoedh-kheunjung-ling-horticulture-nursery-at-ridaza-mongar/
3. The Assured Market for Fresh Milk Attracts Attention of Many Dairy farmers in Gongthung. https://carlep.gov.bt/the-assured-market-for-fresh-milk-attracts-the-attention-of-many-dairy-farmers-in-gongthung/
4. The Incredible Story of How a Matching Grant Scheme Helped a Young Man Find a New Passion. https://carlep.gov.bt/the-incredible-story-of-how-a-matching-grant-scheme-helped-a-young-man-find-a-new-passion/
5. A Young Woman Finds Fulfilment in Farming and Inspires Other Farmers to Practice Innovative Farming. https://carlep.gov.bt/a-young-woman-finds-fulfillment-in-farming-and-inspires-other-farmers-to-practice-innovative-farming/
6. Expanding Opportunities for Private Nursery Operators in the eastern region.

Likewise, the programme has also produced AOS 2022 and story of change _issue V. All these KM Products were disseminated through various social media platforms i.e. IFADASIA Facebook page, CARLEP Facebook page, YouTube Channel (KMG Production-ARDC Wengkhar and OPM), Official WeChat Group, Official website and local channels to grasp wider audiences or farmers for more outreach and knowledge dissemination.

E.8 Gender

The project explores and facilitates the promotion of need-based gender-friendly farm machinery, technologies, equipment & tools such as chaff cutter, corn sheller, quinoa de-husking, protected agriculture, electric dryers, electric fryers, weighing and sealing machine, Flexi-biogas, mini-power tillers, and also facilitate the promotion of efficient water use technologies such as drip irrigation, sprinkler, and automated irrigation to ease the burden of women farmers and enhance production. Likewise, training on climate-smart technologies is also facilitated to enhance community resilience to climate change.

CARLEP also supports the formation of women's groups to ensure active participation of women in project-related activities, decision-making bodies and committees. Likewise, the programme promotes a proportionate representation of women beneficiaries in training and capacity development programmes of farmers groups/cooperatives. Moreover, the development of thematic knowledge products related to gender and women empowerment is also given importance and emphasized in gender mainstreaming.

F SUMMARY OF LESSONS LEARNED

Despite strategic aspirations outlined in the National youth policy as well as investments in youth-targeted programs such as land provision under the LUC scheme and the YELP, interest of Bhutanese youth in agriculture remains low. Over 13 youth groups in CARLEP were provided land under the LUC program. Despite a few successful groups, there have been several issues associated with the scheme. Dropout rates in the LUC sites are generally high, which is mainly due to remoteness of land, lack of water availability and conflicts between the members. For future provision of land and investment by CARLEP, these factors must be considered to ensure efficient resource allocation as well as long-term engagement and success of young farmers.

Dairy value chain model, adopted with smallholder milk producers linking to Koufuko International Limited (Dairy Plant) based at Trashigang has been a successful model in the region. KIL serves as an assured market for fresh milk produced by the dairy farmers in the eastern region. As a lesson learnt, vegetable value chain development is also focusing on few crops such as pineapple and passion fruit marketing to the Agro Processing Unit at Lingmethang.

G CONCLUSIONS AND RECOMMENDATIONS FOR FOLLOW-UP

Through the experiences and lessons learned over the project years, following recommendations are critical to ensure greater success of the Programme.

- Support agricultural production enterprises fetching quick returns and lower labor requirements to attract youths. Mushroom and poultry enterprises have proven to gain quicker returns with less labor requirements. The establishment of production enterprises will be stimulated through CARLEP Matching Grant Facility (MGF) which has been revised from earlier version by increasing the threshold, to increase an uptake by youths.
- Continue training farmers in terms of crop and livestock management, financial literacy, book keeping and market assessment.
- The recent outbreak of African Swine Fever (ASF) across the southern belt has affected the piggery farmers economically, and absence of preventative measures could bear a serious threat to the livelihoods of the pig farmers. Similarly, the poultry farming could also be jeopardized if the bio-security measures are not put in place. In addition, the outbreak of Lumpy Skin Disease (LSD) in cattle has been reported all over the country affecting smallholder dairy farmers. In this regard, it has become imperative for CARLEP to support the implementing agencies in terms of bio-security, prevention through vaccination and awareness creation to safeguard the smallholder dairy farmers who are dependent on dairy farming.
- Based on the national priority in curbing human-wildlife conflict, chain-link fencing of farmland will gain impetus, although expensive, which needs reprioritization of the work plan and budget by doing away with free supply of seed and seedlings and other scattered non-impactful activities. Over the years, major cause of land being fallowed is attributed to crop damage by wild animals besides other factors. This intervention will also minimize rural urban migration and attract youth s in farming.

ANNEXURES 1: Physical progress measured against AWPB

Output	Sub-Activity	Indicator	Total program target (Appraisal)	AWPB 2022-22		Progress achievement		Cumulative achievement	% Achievement till date
				Target	Budget (Nu.mil)	Physical	Financial (Nu.mil)	Physical	
1.1. Increased production resilience, diversification a innovation	**1.1.1. Climate smart agriculture produc and management**								
	Upgrading of existing farmer groups (Agriculture)	No. of farmers Groups upgraded	300	0	0	0	0	75	25
	Upgrading of existing farmer groups (Livestock)	No. of farmers Groups upgraded	150	0	0	0	0	22	15
	Training of extension agents	No. of EAs trained	420	0	0	0	0	81	19
	Production inputs for farm resilience and diversification, Vegetable seed (Agriculture)	Area under farm resilience and diversification	7414	0	0	0	0	5596	75
	Production inputs for farm resilience and diversification (Livestock - Poultry)	No of native poultry units promoted	300	15	0.12	10	0.12	830	277
	Production inputs for farm resilience and diversification (Livestock - Piggery)	No. of native piggery units promoted	150	0	0	0	0	30	20
	Promotion of SLM techniques	Area under SLM	200	0	0	0	0	77	39
	Local germplasm collection, conservation and promotion	No. of lines	100	0	0	0	0	78	78
	Crop diversification(Cereals, oil seeds, pulses)	Area under diversification	3000	160	1.01	132.3	0.996	10673.3	356
	Promote integrated nutrition garden	Area under kitchen garden	100	0	0	0	0	116	116
	Green manure crops	Area under green manure	120	0	0	0	0	120	100
	Train CBSP farmers on hybrid maize	No. of people trained	70	0	0	0	0	36	51
	Oyster mushroom intensification	No. of bags	150	17800	0.55	15840	0.729	75726	50484
	Promotion of Pineapple for commercialization	Acres	0	9	1.04	1.64	0.48	26.75	#DIV/0!
	Provision of stress tolerant vegetable seeds	Quantity of vegetable seeds supplied	3000	0	0	0	0	2384	79
	1.1.2. Innovation through Permaculture Biogas								
	Rain water harvesting	No. of HH	800	33	4.503	53	1.4628	125	16
	Tree crop seedlings	Area covered	300	0	0	0	0	728	243
	Inputs for permaculture (agriculture)	Sets of tools supplied	36	0	0	0	0	31	86
	Inputs for permaculture (livestock)	No. of units supported	36	0	0	0	0	14	39
	Bee Keeping	No. of household supported	600	0	0	0	0	520	45 87
	Nursery set up (Agriculture)	No. of nurseries set up	50	0	0	0	0	32	64
	Nursery set up (Livestock)	No. of nurseries set up	6	0	0	0	0	5	83

	Staff training on permaculture	No. of training	2	0	0.6	7	0.54	10	500
	Farmers training on permaculture	No. of farmers trained	250	0	0	5	0	205	82
	Permaculture materials & translation	No. of materials published	25	0	0	0	0	4	16
	Biogas digester	No. of biogas digester	1412	40	1.29	31	0.615	985	70
	Capacity building on biogas technology /a	No. of training	76	0	0	0	0	13	17
	Support to LUCs	lumpsum	6	0	0	0	0	21	350
	Establishment of solar drying facility	Acre	36	19	1.05	20	1.305	29	81
	1.1.3. Innovation through ICT								
	Hand-held tablets, software and soil test kits	No. of ICT tools introduced	100	0	0	0	0	32	32
	Training on report writing documentation and information sharing	No. of training conducted	5	0	0	0	0	3	60
	Pilot e-reporting system	No. of e-reporting system	1	0	0	0	0	1	100
	Information management dissemination	No. of publication	50	0	0	0	0	18	36
	1.1.4 Increase Outreach of Extension Services								
	Strengthening & expansion of the Lead Farmer Model								
	Training of trainers (ToT) (Agriculture)	No. of ToT conducted	14	0	0	0	0	14	100
	Training of lead farmers	No. of lead farmers trained	240	0	0	0	0	250	104
	Development of training material and field manuals	No. of training materials developed	13	3	0.25	8	0.199	9	69
	Expansion of lead farmers	No. of lead farmers trained	1300	0	0	0	0	3339	257
	Farmer field festivals/field day	No. of Farmers field festivals convened	63	0	0	0	0	44	70
	AWPB planning and review workshop	No. of events	20	36	4.99	32	4.645268	58	290
	Documentation and systematization	Documents produced	3	0	0	0	0	2	67
	Protected gear kits for extensions	No. of Kits supplied	100	0	0	0	0	161	161
	Demonstration inputs & equipment for lead farmers		0	0	0	0	0	0	#DIV/0!
	Low-cost greenhouse structure	Area covered under protected agriculture	130	0	0	0	0	4247	3267
	Supported plastic sheet for nursery	No. of poly-tunnels set up	35	0	0	0	0	105	300
1.2. Vegetable production intensified and expanded	**1.2.1. Inputs for vegetabe and and fruit production**								
	Vegetable commercialization (Supply of seeds and mulching plastic)	Acres	3000	172	1.87	140.61	1.665177	4613.22	154
	Efficient Irrigation technology (drip kits, Flexible pipe, sintex, sprinklet)	No. of sets	5400	134	7.833	450	3.047	6254	116
	Promotion of Passion fruit commercialization	Acres	0	10	0.23	4	0.056	26.75	#DIV/0!
	Supply of Kiwi seedlings	Acres	0	14	0.61	20	0.566	26.75	#DIV/0!
	Promotion of protected Agriculture Technology	No. of sets	60	120	5.768	60	1.677898	995	1658

	1.2.2. Farmers capacity development (Agriculture)								
	Awareness and mobilization carried out (Agriculture)	No. of awareness & mobilization conducted	104	0	0	0	0	62	60
	Training on vegetable production techniques	No. of farmers training	390	0	0	0	0	93	24
	Retraining on vegetable production techniques	No. of farmers training	790	0	0	0	0	8	1
	Training on post-harvest management	No. of farmers trained on post-harvest management	390	0	0	0	0	1384	355
	Retraining on post-harvest management	No. of farmers retrained on post-harvest management	790	0	0	0	0	5	1
	Exchange visits for farmers	No. of exchange visits	18	0	0	0	0	12	67
	Training on preparation of bio pesticides	No. of farmers training conducted	20	0	0	0	0	8	40
	1.2.3. Support to ARDC and NSC								
	Training and certification of vegetable seed growers	No. of vegetable seed growers trained on seed certification	130	0	0	0	0	27	21
	Equipment and input support vegetable seed growers	No. of Equipment supplied to veg. seed growers	130	0	0	0	0	19	15
	Retraining of vegetable seed growers	No. of veg. seed growers retrained	195	0	0	0	0	6	3
	Seed processing units vegetable seed farm NSC	No. of seed processing units supported	2	1	1.4	1	1.4	2	100
	Glasshouse construction vegetable seed farms NSC	No. of glasshouse constructed	2	0	0	0	0	1	50
	Training & extension material developed	No. of training & extension materials developed	20	0	0	0	0	10	50
1.3. Dairy production intensified and expanded	**1.3.1. Dairy production inputs**								
	Milk cans	No. of Milk cans supplied	2000	500	0	448	0	1383	69
	Supply of improved cattle breed	No. of cross-breed cattle supported	2600	318	9.78	278	6.871	2123	82
	Improved dairy shed construction	No. of sheds constructed	2000	64	1.226	62	1.717	2015	101
	Dairy equipment, milking machine, milk chillers, etc.	No. of equipment supplied to dairy producer groups	147	65	4.08	68	3.573	406	276
	1.3.2. Dairy breed enhancement								
	Breed intensification through sex sorted semen	No. of units	5100	4000	5.14	4000	5.108	11740	230
	Breed intensification through community breeding bull services	No.of bulls supplied	75	0	0	0	0	36	48
	Breed intensification through CHBPP	No. of breed intensification	2295	200	0.37	4	0.212	1704	74

	1.3.3. Improved livestock service outreach								
	Training on AI	No. of people trained	120	35	1.5	32	1.403	751	626
	CAHW model development and packaging	No. of CAHW model developed	2	0	0	0	0	1	50
	Training of trainers (ToT)	No. of ToT conducted on CAHW & lead farmers	2	0	0	0	0	1	50
	Training of CAHWs	No. of CAHWs trained	105	0	0	0	0	82	78
	Retraining of CAHWs	No. of CAHWs retrained	80	0	0	0	0	0	0
	Kits for AI practitioner	No. of Kits supplied	80	0	0	0	0	32	40
	Transport facilities for CAHWs	No. of CAHWs supported with transport facilities	75	0	0	0	0	0	0
	Training on livestock husbandry	No. of dairy groups or individuals trained on livestock husbandry	150	0	0	0	0	417	278
	Retraining on livestock husbandry	No. of dairy groups or individuals retrained on livestock husbandry	420	0	0	0	0	9	2
	Training on clean milk production	No. of dairy groups or individuals trained on clean milk production	150	0	0	0	0	699	466
	Retraining on clean milk production	No. of dairy groups or individuals retrained on clean milk production	420	0	0	0	0	28	7
	Training on farm record keeping	No. of dairy groups or individuals trained on farm record keeping	65	0	0	0	0	74	114
	Retraining on farm record keeping	No. of dairy groups or individuals retrained on farm record keeping	420	0	0	0	0	18	4
	Establishment of LN2 plant	No. of infrastructure	2	1	7.8	1	9.6	1	50
	Training & Extension materials developed (Livestock)	No. training & extension materials developed on dairy production	78	0	0	0	0	1	1
	Awareness & Mobilization Carried Out (Livestock)	No. of Dairy groups sensitized and mobilized	95	6	0.1	6	0.1	34	36
	1.3.4. Support to Fodder & Feed Production								
	Perennial fodder in fallow and marginal land	Area of fallow & marginal land under perennial fodder	1633	340	2.18	365.5	2.643	3366.5	206
	Winter fodder crop demonstration and seed supply	Area under Winter fodder	1885	830	2.94	1117.71	1.823	4628.2	246
	Training of feed producers	No. of feed producers trained	200	0	0	0	0	60	30
	Training on use of crop residues and feed/fodder	No. of training conducted	40	0	0	0	0	50	125

	Collection of indigenous fodder germplasm	No. of germplasm	45	0	0	0	0	56	124
	Planting native species fodder	Area under native Fodder spp.	150	0	0	0	0	0	0
	TMR facilities for youth	No. of unit	5	0	0	0	0	0	0
	Inputs for hydroponic production	No. of site	50	3	0.493	4	0.439	33	66
	Inputs supply for fodder conservation such as silage making	MT	5000	1375	0.83	1659	0.791	5509	110
	supply of barbed wire for pasture fencing	Area of pasture land (Acres)	250	0	0	0	0	389	156
	1.3.5. Public health risk mitigation in relation to dairy value chain		0	0	0	0	0	0	#DIV/0!
	Diagnostic equipment for regional centers	No. of sets	5	0	0	0	0	3	60
	Biosecurity for field staff	No. of sets	190	0	0	0	0	150	79
	Sero surveillance of animal diseases	No. of samples	2000	0	0	0	0	1718	86
1.4. Production related infrastructures	**1.4.1. Irrigation improvement**								
	District engineers and extension agents (design and construction)	No. of DEs and EAs trained on climate resilient irrigation	100	0	0	0	0	20	20
	WUA formation	No. of schemes	33	6	0.35	8	0.312	46	139
	Preparation of manual for upgrading irrigation engineering normsManual for upgrading Irrigation Engineering norms prepared	Manual for upgrading Irrigation Engineering norms prepared	1	0	0	0	0	0	0
	Irrigation Feasibility studies & surveys	No. of schemes	2	9	0.5	5	0.125	21	1050
	Renovation of irrigation canal	Kms	3052	25.5	300	21.5	26.881	89.435	3
	Pilot irrigation schemes	No. of Pilots irrigation schemes developed	26	0	0	0	0	4	15
	Quality control and supervision	No. of quality control and supervision conducted	12	0	0	0	0	0	0
	Dry land irrigation	No. of schemes	720	5	6.27	5	5.59	47	7
	Pump irrigation network up to field edge	No. of pump irrigation	20	0	0	0	0	4	20
	Water source protection/catchment area	No. of site	10	0	0	0	0	8	80
	1.4.2. Matching grant facilities								
	Fencing of agriculture land	Kms	5000	54.1	6.57	61.593	5.18	1181.023	24
	Land development: Wetland Consolidation, dry land terracing	Acres	1350	118	3.65	68.232	3.375	1407.621	104
	Chopping machine (for dairy groups)	No. of chopping machines supplied	947	168	3.44	132	2.507	2157	228
	Small post-harvest equipment	No. of small post-harvest equipment promoted	730	4	0.46	10	0.41	56	8

2.1. Resilient vegetable an dairy value chain develope	**2.1.1. Resilient vegetable value chain developed**								
	Vegetable value chain plans prepared	Vegetable value-chain design & business plan in place	3	0	0	0	0	1	33
	Multi-stakeholder platforms and networks developed	No. of platforms & networking established	5	0	0	0	0	2	40
	Vegetable value chain equipment	No. of sets	3	0	0	0	0	0	0
	Value-chain equipment	No. of value-chain equipment promoted	12	0	0	0	0	51	425
	Value-chain infrastructure	No. of value-chain infrastructure put in place	8	5	19.37	3	11.585	31	388
2.2. Resilient dairy value chain developed	**2.2.1. Resilient dairy value chain developed**								
	Dairy value chain business plans prepared	Dairy value-chain design & business plan in place	3	0	0	0	0	1	33
	Construction of milk collection Center (MCC)	No. of MCC constructed	44	7	9.22	8	8.54	69	157
	Construction of milk collection shed (MCS)	No. of MCS constructed	180	7	1.82	7	1.618	42	23
	Milk processing unit (MPU)	No. of milk processing unit established	24	0	0	0	0	15	63
	Milk chilling van	No. of milk chilling van provided	4	0	0	0	0	3	75
	UHT plant at Dewathang	No.of plant	1	0	0	0	0	0	0
	Domestic market study for KIL	No. of studies	1	0	0	0	0	1	100
2.3. Support to entreprene and young farmers	Awareness and mobilization		0	0	0	0	0	0	#DIV/0!
	Development of business model and sustainability plan for service and O&M	No. of business model and sustainability plan developed	3	0	0	0	0	2	67
	Awareness on marketing groups	No. of Marketing groups sensitized	200	0	0	0	0	121	61
	Strengthening of existing marketing and cooperative capacity development packages	No. of marketing & cooperative capacity development packages strengthened	3	0	0	0	0	74	2467
	Formation of vegetable marketing groups	No. of vegetable marketing groups formed	230	0	0	0	0	29	13
	Formation of dairy marketing groups	No. of dairy marketing groups formed	150	0	0	0	0	20	13
	Training in marketing & value-chain	No. of groups or individual farmers trained on marketing & value-chain	450	0	0	0	0	60	13
	Training in packaging & handling	No. of groups or individual farmers trained on packaging & handling	415	0	0	0	0	38	9

	Multi Stakeholders facilitation process	No. of stakeholders engaged or consulted	10	0	0	0	0	196	1960
	Development of training packages for agriculture entrepreneurs	No. of training packages developed for agriculture entrepreneurs	2	0	0	0	0	1	50
	Entrepreneur identification and engagement process	No. of entrepreneurs identified and engaged	1	12	1.8	19	1.604	2	200
	Enterprise developed	No. of enterprise developed	50	5	2	1	0.75	32	64
	Training provided to other groups and entrepreneurs	No. of groups, coops & entrepreneurs trained	50	0	0	0	0	34	68
	Business plan-based planning of market infrastructure	No. of market infrastructure developed based on business plan	3	0	0	0	0	6	200
	Development of business plans for 3 windows shops	No. of Developments windows shops convened	2	0	0	0	0	3	150
Output 3.1. Strengthened value chain and marketing knowledge and communication	Strengthening of the DAMC market information system	DAMC MIS strengthened	2	0	0	0	0	0	0
	Equipment related to Market Information System upgrade	No. of equipment supplied for MIS upgradation	4	0	0	0	0	3	75
	Curricula for RNR Training & Education Institutes Developed	No. of curriculum developed	2	0	0	0	0	0	0
Output. 3.2 Climate change resilience and value chain lessons mainstreamed in agricultural polices and sector strategies	Participatory Policy Development Approaches Developed	No. of participatory policy development process or approach initiated	2	0	0	0	0	0	0
	Policy Notes Developed, incorporating lessons from Climate Resilient Value Chain Development	No. of Policy Notes developed based on Climate resilience & and value chain development lessons	3	0	0	0	0	0	0
	Regulatory Frameworks for PPP	A regulatory framework for PPP developed	2	0	0	0	0	0	0
	National/International TA	No. of TA recruited	4	0	0	0	0	0	0
	Support budget RNR training and education institutes	Amount supported	3	0	0	0	0	0	0
	Support budget climate resilience mainstreaming	Amount supported	4	0	0	0	0	0	0
	Support budget PPP regulatory framework	Amount supported	3	0	0	0	0	0	0

4.1. Project Management U	***Material & Equipment***								
	Vehicles	No. of vehicles purchased	11	0	0	0	0	3	27
	Laptops	No. of laptops purchased	37	0	0	0	0	25	68
	Printer	No. of printers purchased	15	0	0	0	0	10	67
	Scanner	No. of scanners purchased	4	0	0	0	0	1	25
	Photocopier heavy duty	No. of heavy duty photocopier purchased	3	0	0	0	0	1	33
	Office equipment	Sets of office equipment purchased	28	2	0.1	1	0.058	7	25
	Capacity Building		0	0	0	0	0	0	#DIV/0!
	Training on gender	No. of staff trained on gender	3	0	0	0	0	1	33
	Training on knowledge management	No. of staff trained on KM	4	0	0	0	0	3	75
	Training on monitoring and evaluation	No. of staff trained on M&E	5	0	0	0	0	2	40
	Training on financial management	No. of staff trained on FM	12	0	0	0	0	4	33
	Training and workshop for OPM staff	No. of training	12	2	0.185	2	0.168	2	17
	Coordination		0	0	0	0	0	0	#DIV/0!
	Coordination meetings with dzongkhags	No. of Dzongkhags coordination meeting held	20	6	2.25	4	2.055	22	110
	Food Corporation of Bhutan		0	0	0	0	0	0	#DIV/0!
	Material and equipment		0	0	0	0	0	0	#DIV/0!
	Materials and Equipment Procured for FCBL	No. of Materials and equipment procured by FCBL	6	0	0	0	0	2	33
	Monitoring & Evaluation		0	0	0	0	0	0	#DIV/0!
	Baseline and impact studies	No. of baseline & impact studies conducted	1	0	0	0	0	1	100
	Programme Supervision Mission	No. Of Mission	17	0	0	0	0	9	53
	Annual outcome surveys	No. of AOS conducted	7	1	0.518	1	0.518	5	71
	Other surveys/studies	No. of survey/studies conducted	9	0	0	0	0	2	22
	Mid-term review	Mid-term review conducted	1	0	0	0	0	1	100
	Project completion report	PCR prepared	2	0	0	0	0	0	0
	MIS	No. of MIS	4	0	0	0	0	2	50
	Software development for M&E	No. of MIS	2	0	0	0	0	2	100
	Study tours and learning visits (Both in-country and overseas)	No. study tour	9	0	0	0	0	7	78
	Knowledge Management		0	0	0	0	0	0	#DIV/0!
	Printing and publications	No. of quality KM products published	12	1	0.13	1	0.109	32	267
	Setting up IMS (CARLEP Webpage)	Web page established	1	0	0	0	0	1	100
	Workshops and meetings	No. of workshops & meetings conducted	11	0	0	0	0	10	91
	OPM, Mongar		0	0	0	0	0	0	#DIV/0!
	National Program Director	No. of months Paid	126	12	0	12	0	108	86
	Finance Manager	No. of months Paid	126	12	0	12	0	108	86
	Accountant	No. of months Paid	126	12	0	12	0	108	86

	M&E and Gender Manager	No. of months Paid	126	12	0	12	0	108	86
	Project Support Officer	No. of months Paid	126	12	0	6	0	102	81
	KM Officer	No. of months Paid	126	12	0	6	0	102	81
	Component Manager (Agriculture Production)	No. of months Paid	126	12	0	12	0	108	86
	Component Manager (Livestock Production)	No. of months Paid	126	12	0	12	0	108	86
	Component Manager (Value-chain and Marketing)	No. of months Paid	126	0	0	0	0	60	48
	Dy. Manager-RAMCO	No. of months Paid	126	0	0	0	0	0	0
	Office Assistant	No. of months Paid	126	12	0	6	0	42	33
	Driver (x2)	No. of months Paid	252	24	0	24	0	60	24
	Liaison Office, Thimphu		0	0	0	0	0	0	#DIV/0!
	IFAD Focal Officer, PPD	No. of months Paid	126	0	0	0	0	0	0
	IFAD Focal Officer, AFD	No. of months Paid	126	0	0	0	0	0	0
	Operating Cost, Project Management Unit		0	0	0	0	0	0	#DIV/0!
	Vehicle operation and Maintenance	No of Vehicles	0	0	0	0	0	2	#DIV/0!
	Maintenance of Building	Lump sum	0	0	0	0	0	2	#DIV/0!
	Maintenance of Equipment	Lump sum	0	0	0	0	0	2	#DIV/0!
	Utilities - telephone, internet, electricity, water, sewerage, fax, post, etc.	Lump sum	1	0	0	0	0	3	300
	Office supplies	Lump sum	0	0	0	0	0	3	#DIV/0!
	Travel and Meetings	Lump sum	11	0	0	0	0	11	100

ANNEXURE 2: Financial Progress

AGENCY	ACTIVITY	Revised Amount	Total Exp	Budget bal.	Achievement
ARDC	construction of vegetables seed processing unit nsc yangtse][cap]	1.4	1.4	0	100%
	development extension materials][cap]	0.25	0.233	0.017	93%
	efficient irrigationfor fruits and nuts intensification in the region][cap]	1.5	1.499	0.001	100%
	establishment of commercial mushroom enterprise through skilling and engagement][cap]	1.8	1.746	0.054	97%
	establishment of mega greenhouse with gutter connscted system][cap]	1.2	1.2	0	100%
	fruits and nuts intensification in the region][cap]	4.75	4.75	0	100%
	market linked cereal intensification and diversification][cap]	1	0.975	0.025	97%
	organize annual review and planning meeting and write shop][cap]	0.5	0.497	0.003	99%
	strengthen cultivation pratcice and crop suitability mangement smart irrigation soil fertility and plant pro	0.2	0.2	0	100%
	strengthen the identified climate smart agriculture interventions in pilot villages][cap]	1.35	1.344	0.006	100%
	strengthening of mushroom spawn production][cap]	1.7	1.7	0	100%
	support dry land irrigation through spring water harvesting][cap]	0.85	0.833	0.017	98%
ARDC Total		**16.5**	**16.377**	**0.123**	**99%**
LHUENTSE	enterprise development][cap]	0.547	0.195	0.352	36%
	establishment of solar drying facility][cap]	0.58	0.58	0	100%
	establishment of sprinkler irrigation][cap]	0.3	0.3	0	100%
	fodder slips propagation(super napier) and leguminous fodder intensification][cap]	0.35	0.348	0.002	100%
	installation of fixed dome biogas digester][cap]	0.215	0.205	0.01	95%
	land development and slm][cap]	0.8	0.8	0	100%
	oyster mushroom production intensification][cap]	0.288	0.288	0	100%
	piped irrigation network in dry land][cap]	1.05	1.05	0	100%
	renovation of khapachu irrigation channel(spillover)][cap]	4.72	0.3	4.42	6%
	sector coordination and planning workshop][cap]	0.14	0.139	0.001	100%
	sector coordination meetings and planning workshop][cap]	0.14	0.136	0.004	97%
	solar or electric fencing][cap]	0.3	0	0.3	0%
	supply of chaff cutter][cap]	0.45	0.428	0.022	95%
	supply of dairy equipment][cap]	0.17	0.168	0.002	99%
	supply of improved cattle][cap]	2.2	2.144	0.056	97%
	support for crop residue enrichment][cap]	0.1	0.099	0.001	99%
	winter fodder demonstration and seed supply][cap]	0.52	0.452	0.068	87%
	wua formation and training for pump irrigation units][cap]	0.15	0.149	0.001	99%
LHUENTSE Total		**13.02**	**7.781**	**5.239**	**60%**
MONGAR	construction of fixed dome biogas digester][cap]	0.23	0.202	0.028	88%
	construction of milk collection shed][cap]	0.85	0.787	0.063	93%
	crop residue enrichment][cap]	0.08	0.077	0.003	96%
	development of dairy product processing plant][cap]	0.336	0.336	0	100%
	dry land terracing and reversion of fallow land for cultivation][cap]	0.5	0.427	0.073	85%
	electric fencing][cap]	0.7	0.692	0.008	99%
	formation of wua and framing group bylaws][cap]	0.35	0.163	0.187	47%

	initiate and demonstrate roof rain water harvesting to support irrigation in kitchen garden][cap]	1.28	1.112	0.168	87%
	knowledge sharing workshop and meeting][cap]	0.16	0.155	0.005	97%
	mulching plastic for commercial vegetable production][cap]	0.2	0.021	0.179	11%
	pakchong plantation][cap]	0.3	0.3	0	100%
	phrokpalung irrigation tank construction(spillover)][cap]	5.229	5.062	0.167	97%
	renovation of bowchu irrigation in sherimuhung geog][cap]	1.5	1.203	0.297	80%
	sector coordination meeting and workshops][cap]	0.26	0.235	0.025	90%
	sector coordination meetings and workshop][cap]	0.26	0.228	0.032	88%
	supply of chaff cutter][cap]	0.82	0.534	0.286	65%
	supply of dairy equipment to dairy groups][cap]	0.8	0.678	0.122	85%
	supply of improved cattle breed][cap]	1.83	1.087	0.743	59%
	survey design and estimate of irrigation channel][cap]	0.25	0.006	0.244	2%
	upscaling of oyster mushroom cultivation through focused village approach][cap]	0.2	0.136	0.064	68%
	winter fodder demonstration and seed supply][cap]	0.64	0.619	0.021	97%
MONGAR Total		**16.775**	**14.061**	**2.714**	**84%**
OPM	annual outcome survey][cap]	0.518	0.518	0	100%
	annual super vision mission][cap]	1.955	1.936	0.019	99%
	centralization for greenhouse procurement][cap]	3.1	2.928	0.172	94%
	conduct writeshop to document success stories][cap]	0.047	0.047	0	99%
	construction of ln2 plant][cap]	1.516	1.514	0.002	100%
	construction of uht plant at samdrupjongkhar][cap]	0.12	0.004	0.116	4%
	farmers group mobilization and awareness of diary value chain][cap]	0.2	0.084	0.116	42%
	incountry travel and training][cap]	0.232	0.147	0.085	64%
	internet and telephone services][cap]	0.2	0.196	0.004	98%
	media program][cap]	0.5	0.5	0	100%
	million fruit tree project][cap]	3	3	0	100%
	monitoring of field visits and annual auditing][cap]	1.272	1.153	0.119	91%
	monsoon restoration works for road at wengkhar mongar][cap]	2.033	1.708	0.325	84%
	operation and management of the project][curr]	0.627	0.583	0.044	93%
	pay and allowance for project staff][curr]	4.73	4.7	0.03	99%
	permaculture training][cap]	0.55	0.54	0.01	98%
	personnel emoluments for the project staff][cap]	0.555	0.546	0.009	98%
	printing and publication][cap]	0.13	0.109	0.021	84%
	product promotion][cap]	0.05	0.001	0.049	3%
	purchase of office equipments and stationeries][cap]	0.1	0.058	0.042	58%
	rollout of monitoring information portal to dzongkhags][cap]	0.118	0	0.118	0%
	supply of ln2 plant equipments][cap]	1.2	0	1.2	0%
	supply of materials for hygienic dairy shed construction 30percent cost sharing][cap]	1.941	1.941	0	100%
	to attend workshop in nepal][cap]	0.185	0.168	0.017	91%
	workshop on awpb procurement planning financial management rpic and npsc][cap]	2.25	2.055	0.195	91%
	Pay and allowances for the staff under CARLEP agencies(RGoB) contribution	14.652	14.652	0	100%
OPM Total		**41.781**	**39.088**	**2.692**	**94%**

P/GATSHEL	awpb planning review and coordination workshop][cap]	0.34	0.268	0.072	157%
	barbed wire fencing for vegetable commercialization for youth group][cap]	0.54	0.526	0.014	97%
	construction of artificial insemination equipment storage shed][cap]	0.16	0.129	0.031	81%
	construction of market shed at nganglam spillover][cap]	3.5	0	3.5	0%
	construction of milk chilling centre (mcc) and milk collection sheds][cap]	0.375	1.544	-1.169	412%
	construction of milk collection center at nanong spillover][cap]	1.05	0.686	0.364	65%
	construction of milk collection sheds][cap]	0.23	0.23	0	100%
	crop residue enrichment][cap]	0.35	0.35	0	100%
	dairy cows purchase 30 percent subsidy support][cap]	1.29	0.968	0.322	75%
	dry land irrigation at gongribali branching spillover][cap]	2.5	0.972	1.528	39%
	dry land terracing][cap]	0.5	0.5	0	100%
	efficient irrigation technology drip kits sprinkler flexible pipe sintex and vegetable production farms][cap]	0.3	0.3	0	100%
	initiate and demonstrate rain water harvesting to support irrigation in kitchen garden][cap]	0.54	0.291	0.249	54%
	installation of fixed dome biogas digester 50 percent subsidy support][cap]	0.07	0.034	0.036	49%
	native poultry][cap]	0.12	0.12	0	100%
	promotion of hybrid vegetable seeds under vegetable commercialization culstures tomato][cap]	0.12	0.12	0	100%
	supply of chaff cutter 60 percent subsidy support][cap]	0.4	0.38	0.02	95%
	supply of dairy equipments][cap]	1.51	1.51	0	100%
	supply of super napier slips][cap]	0.39	0.288	0.102	74%
	upscalling of mushroom oyster cultivation through focused village approach][cap]	0.05	0.047	0.003	95%
	winter fodder demonstration and seed supply][cap]	0.55	0.55	0	100%
P/GATSHEL Total		**14.885**	**9.812**	**5.073**	**66%**
RAMCO	construction of collection and agrregation centers][cap]	0.2	0.15	0.05	75%
	construction of export facilitation center at nganglam pema gatshel dzongkhag][cap]	1.65	1.468	0.182	89%
	construction of large market facility][cap]	11.35	11.292	0.058	33%
	establishment of semi processed peach and plum jam enterprise at tashigang][cap]	2.184	2.09	0.094	416%
	feasibility study for construction of lmf collection centers and enterprise establishment][cap]	0.1	0.079	0.021	573%
RAMCO Total		**15.484**	**15.079**	**0.405**	**97%**
RLDC	ai refresher course for livestock extension][cap]	0.75	0.691	0.059	92%
	awpb review and implementation workshop][cap]	0.59	0.465	0.125	79%
	cait refresher course][cap]	0.7	0.693	0.007	99%
	dairy animal health and diseases of public health training][cap]	0.89	0.823	0.067	92%
	diagnostic equipment and materials for upgradation of labs in rldc and svls][cap]	1.5	1.444	0.056	96%
	establishment and expansion of chbpp][cap]	0.37	0.213	0.157	57%
	purchase of ai inputs consumables][cap]	0.2	0.2	0	100%
	purchase of ln2 containers][cap]	1.36	1.357	0.004	100%
	purchase of sex sorted and conventional semen][cap]	5.14	5.131	0.009	100%
RLDC Total		**11.5**	**11.017**	**0.483**	**96%**

S/JONGKHAR	arecanut peeling machine][cap]	0.3	0.25	0.05	83%
	avacado seedling supply][cap]	0.63	0.586	0.044	93%
	awpb review and coordination workshop][cap]	0.36	0.172	0.188	96%
	construction of processing house or pack house][cap]	1.5	0.013	1.487	1%
	construction of samderup jongkhar or value added products and sales outlets][cap]	3.1	0.907	2.193	29%
	crop residue enrichment][cap]	0.12	0.117	0.003	98%
	dragon fruit seddling supply][cap]	0.04	0	0.04	0%
	drip irrigation kits supply][cap]	0.3	0.283	0.017	94%
	dry land irrigation][cap]	1.07	0.934	0.136	87%
	dry land terracing][cap]	0.5	0.499	0.001	100%
	exhaust fan for establishment of solar dryer][cap]	0.13	0.099	0.031	76%
	kiwi seddling supply][cap]	0.61	0.566	0.044	93%
	mcc construction at rikhey and lauri][cap]	2.1	2.036	0.064	97%
	mcc construction][cap]	1.57	0.9	0.67	57%
	mulching plastic suppy][cap]	0.2	0.176	0.024	88%
	new solar fencing][cap]	0.29	0.232	0.058	80%
	paddy reaper or grass cutter fabricated][cap]	0.16	0.16	0	100%
	promotion and establishment of solar dryer][cap]	0.62	0.398	0.222	64%
	supply of pre fabricated gh][cap]	0.784	0.166	0.618	21%
	supply of chaff cutters 60 percent subsidy support][cap]	0.65	0.547	0.103	84%
	supply of diary equipments][cap]	0.5	0.388	0.112	78%
	supply of improved cattle breed 30 percent subsidy support][cap]	1.7	1.207	0.493	71%
	supply of milk chillers 500 litres capacity][cap]	0.65	0.606	0.044	93%
	supply of supper napier or pakchong slips][cap]	0.47	0.419	0.051	89%
S/JONGKHAR Total		**18.354**	**11.66**	**6.694**	**64%**
T/YANGTSE	bulk chillers and other equipment][cap]	0.3	0.153	0.147	51%
	canal system upgradation][cap]	12.862	12.423	0.44	97%
	construction of chilling centre][cap]	1	0.201	0.799	20%
	land development and slm][cap]	0.95	0.95	0	100%
	mushroom intensification (oyster)][cap]	0.15	0.15	0	100%
	pakchong and leguminous fodder intensification][cap]	0.43	0.43	0	100%
	piped irrigation network in dryland][cap]	1.04	1.04	0	100%
	sector coordination meeting][cap]	0.22	0.219	0.001	199%
	supply of chaff cutter][cap]	0.27	0.263	0.007	97%
	supply of improved cattle breed][cap]	0.95	0.834	0.116	88%
	support for fencing materials][cap]	1.1	1.081	0.019	98%
	vegetable commercialization cluster][cap]	0.82	0.817	0.003	100%
	water efficient irrigation (drips and sprinkles)][cap]	0.5	0.476	0.024	95%
	winter fodder demonstration and seed supply][cap]	0.53	0.241	0.289	46%
T/YANGTSE Total		**21.122**	**19.277**	**1.845**	**91%**

TRASHIGANG	awpb planning and review workshop][cap]	0.23	0.189	0.041	82%
	awpb planning and review workshop][cap]	0.23	0.12	0.11	52%
	construction of milk collection sheds][cap]	0.1	0.098	0.002	98%
	crop residue enrichment][cap]	0.23	0.149	0.081	65%
	electric fencing][cap]	3.029	2.42	0.609	80%
	establishment of electric fencing with hdpe pole][cap]	0.031	0.03	0.001	98%
	installation of fixed dome biogas digester 50 percent subsidy support][cap]	0.35	0.174	0.176	50%
	mcc construction at bikhar changmey udzorong and kanglung][cap]	4.75	4.55	0.2	96%
	production support for vegetable commercialization][cap]	0.4	0.399	0.001	100%
	promote onion cultivation in potential areas][cap]	0.2	0.199	0.001	100%
	promotion of passion fruit for commercialization][cap]	0.24	0.056	0.184	23%
	promotion of pineapple for commercialization][cap]	1.04	0.48	0.56	46%
	provision of drip irrigation system][cap]	1.535	1.338	0.197	87%
	purchase an supply of 300 gsm plastic fot establishment of rain water][cap]	0.17	0.06	0.11	35%
	renovation of jomori to dungpa aring irrigation channel][cap]	0.85	0.51	0.34	60%
	renovation of laburang to rangjung irrigation channel][cap]	3.99	2.837	1.153	71%
	renovation of tshelamtse to shontsham irrigation channel][cap]	1.75	1.746	0.004	100%
	supply of chaff cutter 60 percent subsidy support][cap]	0.85	0.36	0.49	42%
	supply of dairy equipment to dairy groups][cap]	0.8	0.677	0.123	85%
	supply of improved dairy cows 30 percent subsidy][cap]	1.6	0.649	0.951	41%
	supply of maize seeds for promotion of winter fodder][cap]	0.057	0.04	0.017	70%
	supply of milk pump][cap]	0.2	0.192	0.008	96%
	supply of oat seeds][cap]	0.5	0.48	0.02	96%
	supply of pakchong slips][cap]	0.4	0.378	0.022	94%
	survey design estimates for irrigation channel renovation][cap]	0.25	0.119	0.131	48%
	wetland consolidation][cap]	0.5	0.5	0	100%
TRASHIGANG Total		**24.282**	**18.75**	**5.532**	**77%**
Grand Total		**193.703**	**162.902**	**30.801**	**84%**

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