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KINGDOM OF BHUTAN

ANNUAL PROGRESS REPORT (2019-2020 FY)

KINGDOM OF BHUTAN

COMMERCIAL AGRICULTURE AND RESILIENT LIVELIHOODS ENHANCEMENT PROGRAMME

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CURRENCY EQUIVALENTS

Currency Unit		Ngultrum (BTN) *
USD 1.00	=	BTN 65.00

**/ 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 kilogram	=	2.204 lb
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 AND DEFINITIONS

AC	Acres
ADAO	Assistant Dzongkhag Agriculture Officer
AFD	Administration and Finance Division
AMEPP	Agriculture, Marketing and Enterprise Promotion Programme
AOS	Annual Outcome Survey
APA	Annual Performance Agreement
ARDC	Agriculture Research and Development Centre
ASAP	Adaptation for Smallholder Agriculture Programme
AWPB	Annual Work Plan and Budget
BAIL	Bhutan Agro Industries Ltd.
B2B	Business to Business
BAFRA	Bhutan Agriculture and Food Regulatory Authority
BDBL	Bhutan Development Bank Limited
BTN	Bhutan Ngultrum
CAHW	Community Animal Health Worker
CARLEP	Commercial Agriculture & Resilient Livelihood Enhancement Programme
CEO	Chief Executive Officer
CM	Component Manager
CMU	Central Machinery Unit
CSV	Climate Smart Village
DAMC	Department of Agriculture Marketing and Cooperatives (MoAF)

DAO	Dzongkhag Agriculture Officer
DE	District Engineer
DoA	Department of Agriculture (MoAF)
DoL	Department of Livestock (MoAF)
DLO	Dzongkhag Livestock Officer
DNB	Department of National Budget
DPA	Department of Public Accounts
DPO	Dzongkhag Planning Officer
DT	Dzongkhag Tshogdue
ES	Extension Supervisor
F	Female
FA	Financing Agreement
FCBL	Food Corporation of Bhutan Limited
FG	Farmers' Group
FY	Fiscal Year
GEO	Gewog Extension Officer
GNHC	Gross National Happiness Commission
GoI	Government of India
GT	Gewog Tshogdue
Ha	Hectare
HH	Household
ICT	Information, Communication Technology
IFAD	International Fund for Agricultural Development

IFPP	Integrated Food Processing Plant
IFPRI	International Food Policy Research Institute
KIL	Koufuku International Limited
KM	Knowledge Management
Km	Kilometer
L	Litre
LPG	Liquid Petroleum Gas
LUC	Land Use Certificate
M	Male
M&E	Monitoring and Evaluation
MAGIP	Market Access and Growth Intensification Project
Masl	Meter above Sea Level
MCC	Milk Collection Center
MCS	Milk Collection Sheds
MIS	Marketing Information System
MGF	Matching Grant Facility
MoAF	Ministry of Agriculture and Forests
MoEA	Ministry of Economic Affairs
MoF	Ministry of Finance
MoHCA	Ministry of Home and Cultural Affairs
MoLHR	Ministry of Labour and Human Resources
MPU	Milk Processing Unit
MT	Metric Ton

MTR	Mid-Term Review
MSP	Multi-Stakeholders' Platform
NCB	National Competitive Bidding
NEC	National Environment Commission
NGOs	Non-Governmental Organizations
NMC	National Mushroom Centre
No	Number
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
Nu	Ngultrum
O&M	Operation and Maintenance
OPM	Office of the Programme Management
PLC	Programme Letter of Credit
PPD	Policy and Planning Division (MoAF)
PPP	Public Private Partnership
PRR	Procurement Rules & Regulations
PSF	Production Support Fund
Pkts	Packets

RAMC	Regional Agriculture Machinery Centre
RAMCO	Regional Agriculture Marketing and Cooperative Office
RGoB	Royal Government of Bhutan
RIMS	Results and Impact Management System
RNR-EC	Renewable Natural Resources Extension Centre
RLDC	Regional Livestock Development Centre
RMA	Royal Monetary Authority
RUG	Road Users Group
SAP	School Agriculture Program
SLM	Sustainable Land Management
SOE	Statement of Expenditure
TA	Technical Assistant
TMR	Total Mixed Ratio
ToT	Training of Trainers
WA	Withdrawal Application
WUA	Water Users' Association

MAP OF THE PROGRAMME AREAS

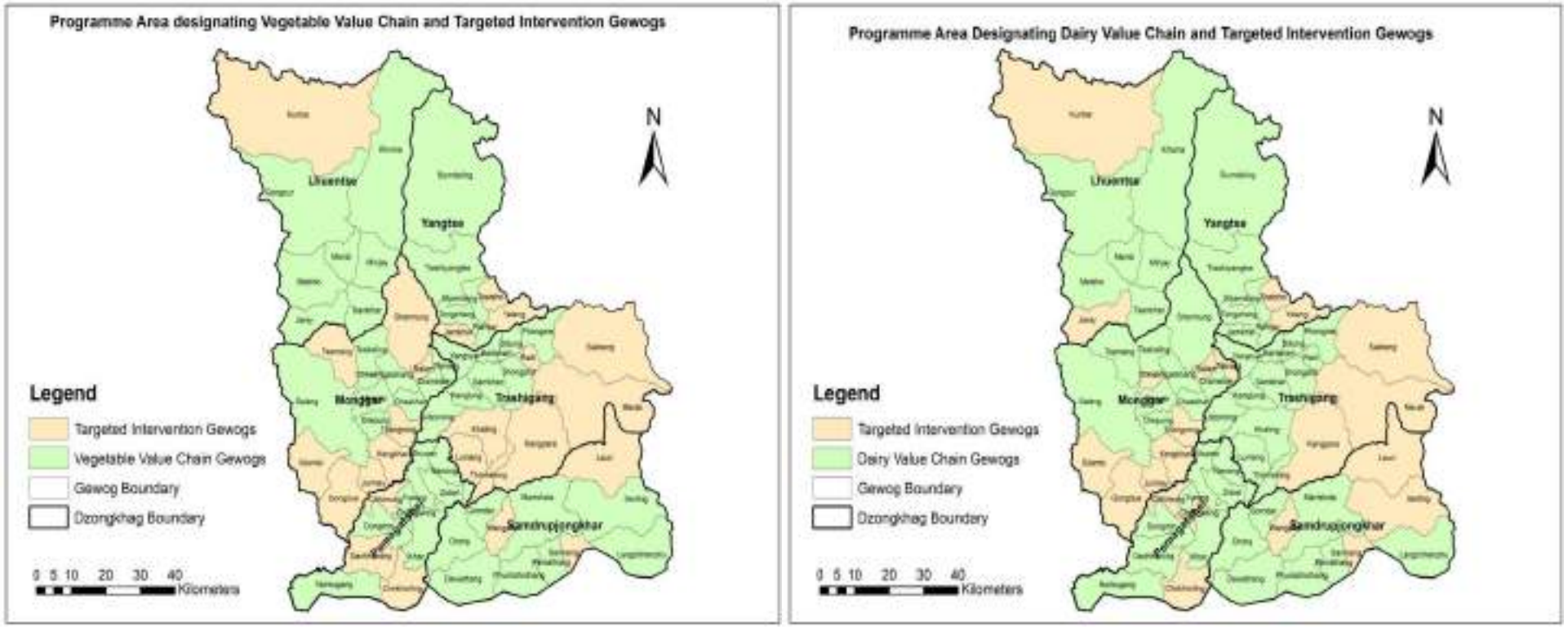

Figure 1. Map showing Programme areas

A. Programme Background

This is the fifth year Annual Progress Report for Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP). It is the eighth agriculture and rural development programme financed by the International Fund for Agricultural Development (IFAD). This is to remind that Financing negotiation for CARLEP was held in July 2015 followed by IFAD Executive Board approval in September 2015 and signing of Financing Agreement by December 2015.

The goal of the programme is to reduce poverty through 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 3 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 2025 through the additional funding of IFAD-11, the overall goal and objectives remain unchanged except some incorporations of entrepreneurship development through diverse agricultural activities.

The main implementing partners are six Dzongkhags & concerned Gewogs, Regional Agricultural Marketing and Cooperatives (RAMCO), Agriculture Research and Development Centre (ARDC) Wengkhar, Regional Livestock Development Centre (RLDC) Kanglung and KOUFUKU International (KIL) Chenery, Trashigang.

In line with the programme objective, the implementation of 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). After the MTR a sum of USD 11.2 million is approved as an additional financing with programme extension till 2025.

B. Changes in Programme Implementation Context and Design

This is the second year after the Mid Term Review (MTR). The implementation context and design are mostly amended during the MTR Mission (23rd Nov. to 7th Dec. 2018) and with design and supervision mission (1st June to 15th June 2019) has finalized the additional funding of IFAD-11. The MTR with additional resource allocation will focus and based on the 12th FYP priorities in line with Policy guidelines of the IFAD Governing Council. The implementing strategies have improved considerably compared to previous years, not only due to constructive recommendations provided during periodic fielding of IFAD missions but also due to increased experience of the implementers at District and Block level.

C. Progress and Performance by Components

Commercial Agriculture and Resilient Livelihood Enhancement Programme has adopted two prong approach as explicitly stated in the Project Design Report (PDR). The value chain approach based on vegetable and dairy and targeted interventions for building farm resilience through adoption of climate smart approaches and enhancing on-farm diversity.

COMPONENT 1: MARKET-LED SUSTAINABLE AGRICULTURAL PRODUCTION

Under this component, farmer's group-based production was primarily focused owing to the smallholder nature of the farming communities in a scattered location with low economies of scale posing challenges in product aggregation and marketing. In addition, the Programmes also supports commercial farmers/entrepreneurs to increase the production scale and complement our smallholder farmers in building resilient agricultural value chains.

Participation of Koufuko Internation Ltd. (KIL) in the dairy value chain implementation and linking of the dairy farmer groups and commercial farmers, with the KIL as processor, has established assured market for fresh milk produced by the farmers. The value-added products processed by KIL is targeted to meet the domestic demand, especially processed cheese produced under the brand name- Koufuko Cheese besides other products such as Gauda cheese, yoghurt, butter, ghee and ice cream.

The vegetable value chain is driven by linking of farmer groups to institutions such as schools, hospitals, monastic bodies besides established vegetable market platform in every Dzongkhag. The establishment of Bhutan Agro Industries Ltd. (BAIL) at Lingmethang, a branch of BAIL, Thimphu is also a potential and assured market for excess vegetables and fruits produced by the farmers in the region.

OUTPUT 1.1: INCREASED PRODUCTION RESILIENCE, DIVERSIFICATION AND INNOVATION

1.1.1 Climate smart agriculture production and marketing

Production inputs such as vegetables seeds are provided to farmers covering 1883 acres benefiting (4418 males and 6683 female) headed households.

The shortage of quality spawn is one of the main constraints hindering mushroom development in the region. Currently, the mushroom spawn is supplied from Mushroom Spawn Production Unit (MSPU), ARDSC Khangma. However, the unit has not been able to meet the growing demand for spawn in the region and thus, mushroom growers usually source spawn from across the border which is relatively expensive. Therefore, in order to address the mushroom spawn shortage and create employment for youths, Mushroom Spawn Production Unit (MSPU) under ARDSC Khangma with support from the project initiated spawn enterprise development in the region since FY2018-2019.

In FY2019-2020, a total of five spawn entrepreneurs were provided with 5 days of training on spawn production at MSPU, Khangma by including two more interested youths. There are currently 6 spawn producers spread across four Dzongkhags in the region. The youths have begun spawn production. So far only two youths have managed to produce about 2400 bottles of oyster spawn which were sold in the local market at a price of Nu. 65, generating a gross income of more than Nu. 150,000. The youths are expected to produce more than 5000 bottles of spawn in the coming season.

The high market potential crops like Quinoa, Sweet Buckwheat, hybrid maize, wheat, barley and legumes are intensified and promoted across all the project sites. Project has supported total 24.57 MT of seeds covering over 1923 acres and benefited 3032 HH (Female-1419) in the program Dzongkhags. Different types of cereal seeds supported and area of cultivation is presented in figure 2.

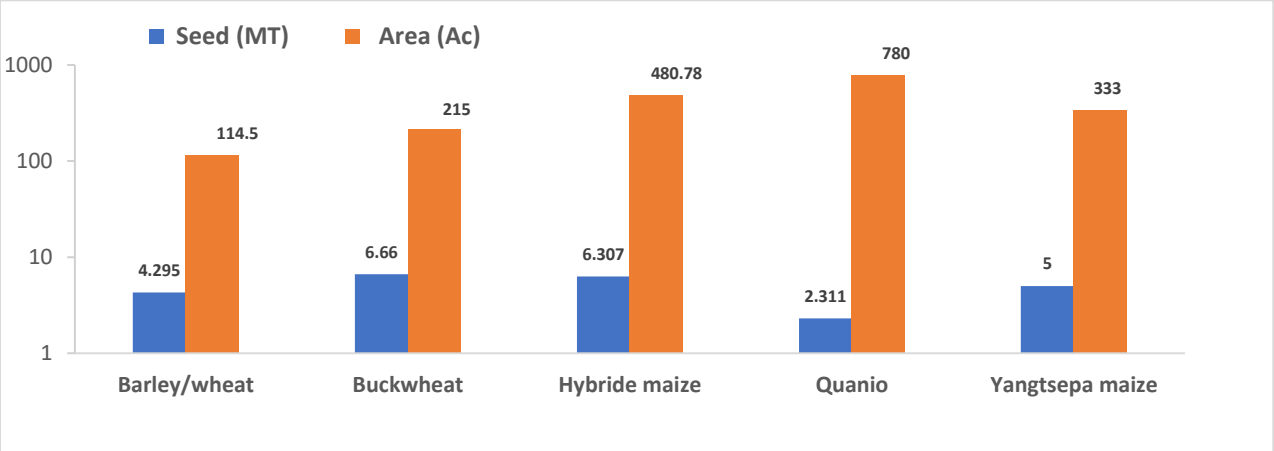

Figure 2. Cereal seeds supplied Vs. area cultivated

ARDC Wengkhar promoted spring paddy cultivation in Mongar and Samdrup Jongkhar Dzongkhags covering an area of 17 acres benefitted for 30 HH with approximate production of 20.4 MT. Similarly, 184 HH were supported with 2.88 MT of upland paddy seed cultivated in 162 acres under four Dzongkhags with total production of 218.7 MT. Figure 3 represents Dzongkhag wise upland paddy promoted and area cultivated in FY2019-2020. Thus has contributed for household food security and self-sufficiency, offering more varietal choice to farmers and reverting fallow land.

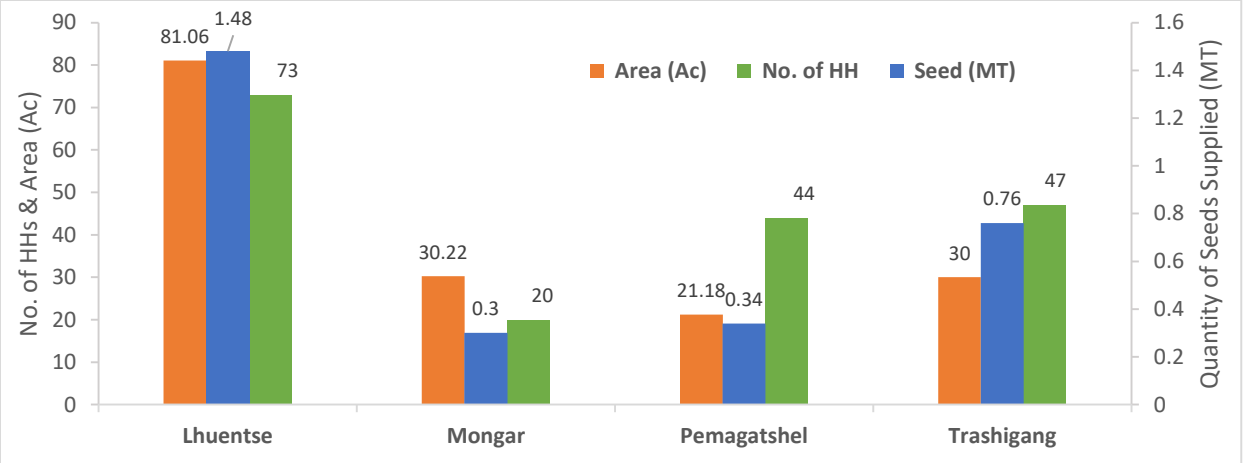

Figure 3. Dzongkhag wise upland paddy cultivated

Mushroom is one of the low volumes, high value commodities. It is also highly nutritious and rich source of minerals and vitamins. Promotion and intensification of mushroom cultivation and its technical support in the East is solely mandated to ARDSC Khangma with the establishment of Mushroom Spawn Production Unit. The unit provides services in mushroom mainly spawn and technical support to individual household, groups, villages, schools and institutions and promote the crop as an enterprise. The unit as of May, 2020 has produced 3924 bottles of oyster and 4616 bottles of shiitake spawn. The spawn has been supplied to farrmers and inoculated 15292 bags of oyster and 30438 billets of shiitake. Table 1 and 2 presents the summary information on shiitake and oyster mushroom promoted and spawn supplied in FY 2019-2020.

Table 1. Oyster mushroom promoted and spawn supplied in six Dzongkhags

Dzongkhag	Household (No.)	Institution (No.)	Group (No.)	Spawn (bottles)	Mushroom inoculation (Bags)
Trashigang	3	2	2	624	2486
Mongar	3	4	1	1654	6296
Lhuentse	3	0	1	1220	4880
Pemagatshel	1	0	0	250	1000
Samdrupjongkhar	1	0	0	20	80
Trashiyangtse	0	1	1	156	550
Total	11	7	5	3924	15292

Table 2. Shiitake mushroom promoted and spawn supplied in six dzongkhags

Dzongkhag	Household (Nos.)	Institution (Nos.)	Groups (Nos.)	Billets (Nos.)	Spawn supplied (Nos.)
Lhuentse	6	0	1	3,685	617
Mongar	14	3	1	9,525	1,348
Pemagatshel	6	0	1	3,320	425
Samdrupjongkhar	1	0	0	800	86
Trashigang	22	1	1	8,722	1,440
Trashiyangtse	11	0	1	4,386	700
Total	60	4	5	30,438	4,616

1.1.2 Poultry for farm resilience and diversification

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 FY 2019-20, 130 number of households were supported against the 173 planned, which is 75 % achievement from the actual planned.

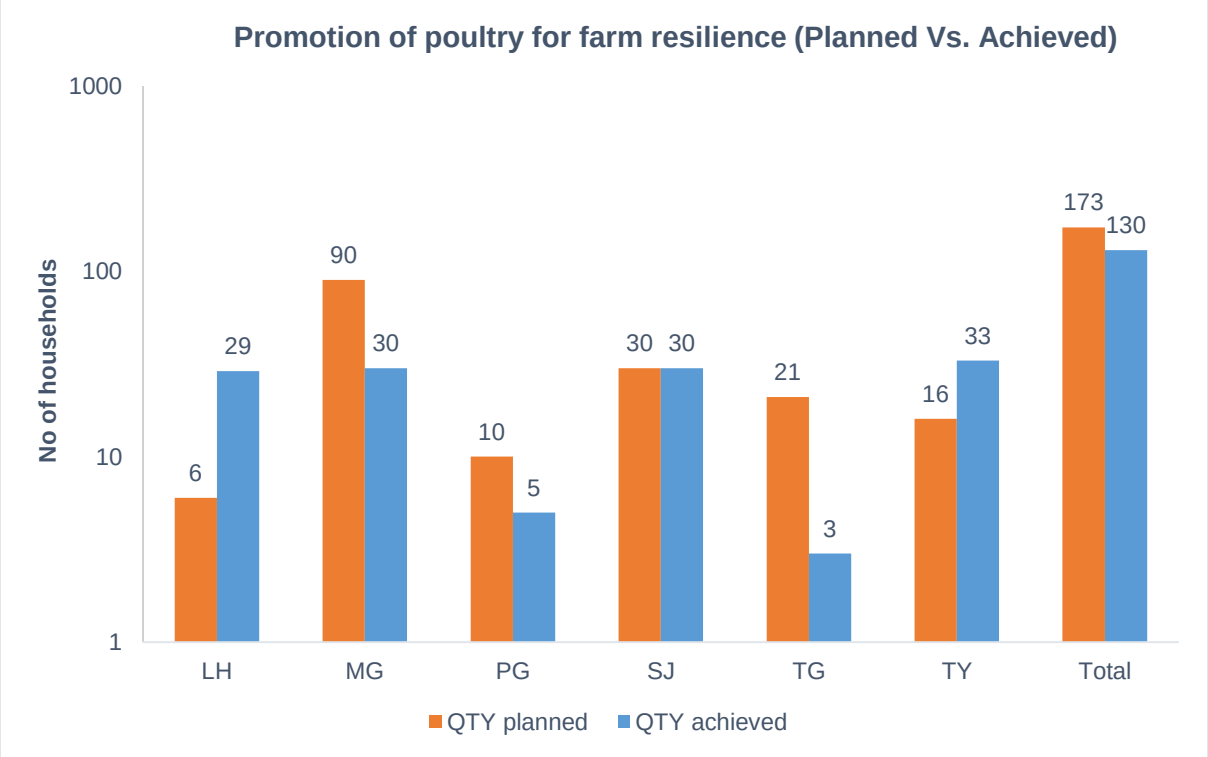

Figure 4. Promotion of poultry for farm resilience

1.1.3 Agricultural innovations through adoption of climate smart village

Permaculture concept is being implemented through adoption of climate smart villages. With the inclusion of six new Climate Smart Village (CSV) in 2019-2020, there are total of 12 pilot villages in the region, with two villages in each Dzongkhag, covering 319 rural households (Male-168, Female-51) in the region. Of the many Climate Smart Agriculture (CSA) interventions designed to be implemented in 2019-2020 in the pilot villages, homestead nutrition garden development through focused village approach and cereal crop diversification were implemented.

Designed to promote multi-tier cropping system and diversify crop production for food and nutrition security, homestead nutrition garden comprising of integrated cultivation of fruits and vegetables was promoted in 11 of the 12 Climate Smart Villages (CSVs) with the supply of 4,943 grafted fruit plants and 1,358 packets of assorted vegetable seeds (Table 3) The nutrition garden development program benefitted 159 households (Male-101, female-58) transforming more than 38 acres of land into a multi-tier, integrated nutrition garden. The fruit plants promoted in the nutrition garden includes Avocado, Mango, Dragon fruit, Pear, Persimmon, Peach, Plum, Walnut, Passion fruit, Pineapple and Litchi while the vegetable comprises of Beans, Chilli, Lady's finger and Bitter gourd. Table 3 shows the details of inputs provided and acreage under homestead nutrition garden in respective pilot villages. Philuma village under Samdrupjongkhar Dzongkhag will take up homestead nutrition garden in the following year.

Table 3. Inputs supported and area covered under homestead nutrition garden in CSVs sites

Dzongkhag	CSV location	Male	Female	Mixed Fruit plants (Nos.)	Vegetable seeds (Pkts)	Area (Acre)
Lhuentse	Jatshabi	1	1	45	58	0.43
	Serphu	2	11	497	90	3.22
Mongar	Ngarpentang	20	8	789	195	9.3
	Yangbari	5	7	306	60	1.89
Pemagatshel	Woongborang	4	2	647	80	1.61
	Bongman	11	3	440	76	4.62
Samdrup Jongkhar	Pangthang	16	3	497	168	3.91
	Philuma	-	-	-	156	-
Trashigang	Threphu	12	6	408	208	3.17
	Chengri-Sayul	7	7	458	72	2.3
Trashiyangtse	Dukti	15	4	471	70	5.21
	Bainangkhar	9	5	385	125	3.02
Total		101	58	4943	1358	38.68

1.1.4 Biogas installation

As part of an overall strategy of promoting climate smart farming system, construction of family-sized (4 m^3) biogas was facilitated through subsidy support in the form of biogas appliances equivalent to 50 % of the unit cost. Community adoption of biogas ensued after imparting "hands on training on biogas construction" for Masons and supervisors at Ramjar gewog in Trashi Yangtse Dzongkhag.

The Dzongkhag wise physical achievements in this reporting period is as indicated in Figure 5 below.

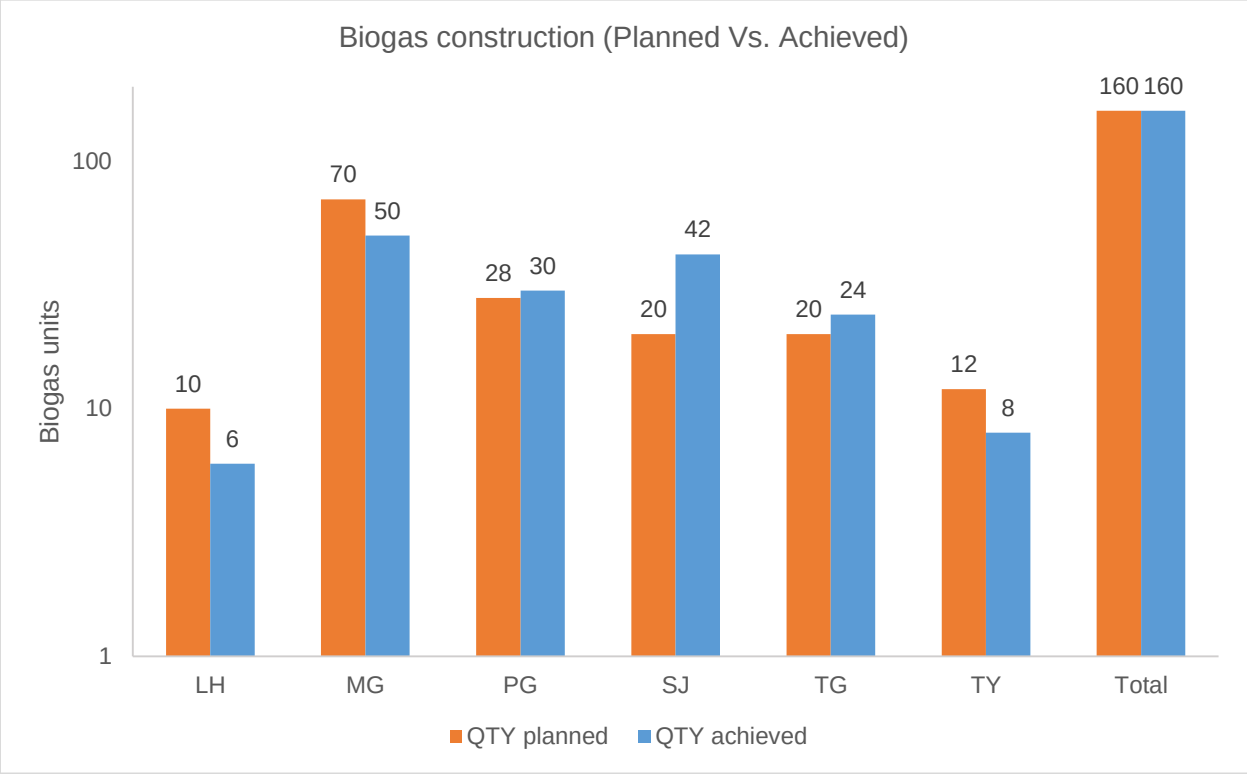

Figure 5. Dzongkhag wise biogas installed

1.1.5 Increased outreach and extension services

In line with the Lead Farmer Model Guideline, the 4th batch of Lead Farmer participants have so far completed two modules of training - first module of training (Awareness program) held during November 2019 and second module of training (Crop establishment and management practices) have been conducted. A total of 27 Lead farmers (Male-17, Female-10) attended the course and they are supported in the establishment of a model in 11.17 acres of land with the support of 1730 seedling. They were also supported with 2.16 Kg of assorted vegetable seeds for home nutrition garden establishment within the model orchard. However, the third and fourth modules could not be conducted due to the on-going COVID19 pandemic.

Similarly, Lhuentse, Mongar, Samdrupjongkhar and Pemagatshel Dzongkhags have also taken up expansion of Lead Farmers for enhance extension service delivery in the Gewogs. A total of 139 farmers (Male-85, Female-54) have been trained and supported with inputs such as fruit plants, assorted vegetable seeds for home nutrition garden and other irrigation equipment and established demonstration orchard.

Samdrupjongkhar Initiatives (SJI) has trained five new Lead Farmers from Dewathang, Orong and Gomdar using the Lead Farmers trained by ARDC Wengkhar as resource person. These Lead Farmer participants, nominated by senior Lead Farmers, attended farmer-to-farmer training program and hands on training on organic agriculture practices organized by SJI.
The SJI also promoted onion production by reverting fallow land which has been left fallow for last 18 years. The onion production program was initiated by 13-member youth groups (Male-10, Female-3) led by a Lead Farmer. The group managed to harvest 0.4 MT of bulb onion which was sold in the local market and earned Nu. 24,000/- (Nu. 60 per Kg). Further, with increasing demand for organic fertilizers, SJI supported three Lead Farmers from Dewathang and Orong (Male-2, Female-1) with compost shed construction and cow urine harvesting units. So far, the Lead Farmer in Dewathang (Rikhey village) has sold 5 MT of compost (Nu. 5 per Kg) and 500 Litres of cow urine (Nu. 5 per Litre) generating a gross income of about Nu. 27,500/-.

SJI has also promoted homestead nutrition garden for 24 households in Dewathang and Orong with 608 avocado plants and assorted vegetables covering an area of about 2 acres. They also promoted multi-use greenhouse. As part of response measure to COVID-19 pandemic, SJI also promoted commercial organic farming on 1.5 acres fallow land, which benefitted 6 youths and 2 single mothers in Dewathang. In order to step up their initiative to recycle waste, SJI also promoted fencing of farm land (1.5 acres) using PET bottles.

OUTPUT 1.2: VEGETABLE PRODUCTION INTENSIFICATION AND EXPANSION

1.2.1 Inputs for vegetable production

Dzongkhags and ARDC supported production inputs such as protected Agriculture (pre-fabricated greenhouse 20x5 m) along with drips and sprinklers. The protected agriculture is implemented in focused vegetable commercial areas across six Dzongkhags linked to schools and hospital feeding program. A total of 242 greenhouse sets along with drips sets are supported for 476 farmers (Male-217, Female-259) including farmers' groups and individuals taking up vegetables as an enterprise (Figure 6). The crops in the Protected cultivation are based on the recommendation of ARDC for prioritized crops for off-season production with a major focusing on chili and tomato cultivation. Protected cultivation technology has been supported through a cost-sharing modality where the beneficiary contributed 20% of the total cost.

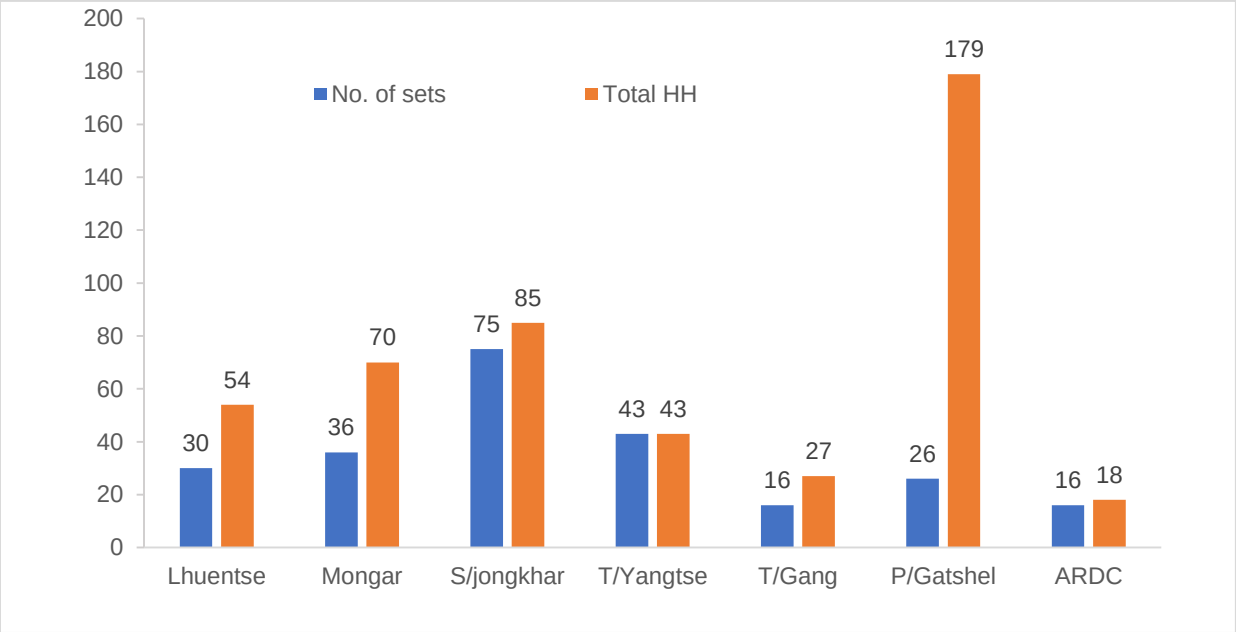

Figure 6. No. of pre-fabricated greenhouse supported Vs. household benefited

Total 940.34 Kg of assorted vegetable seeds have been supported and cultivated in 1843.8 acres which is 1468 acres more compared to financial year 2018-2019. Households coverage also increased drastically from 6065 HH in FY2018-2019 to 11101 HH in the current financial year. Seeds has been supported for commercial production as one-time support and thereafter beneficiary purchased for following season cultivation. Figure 7 represent the area increases trend during the FY 2019-2020 compared to FY2018-2019.

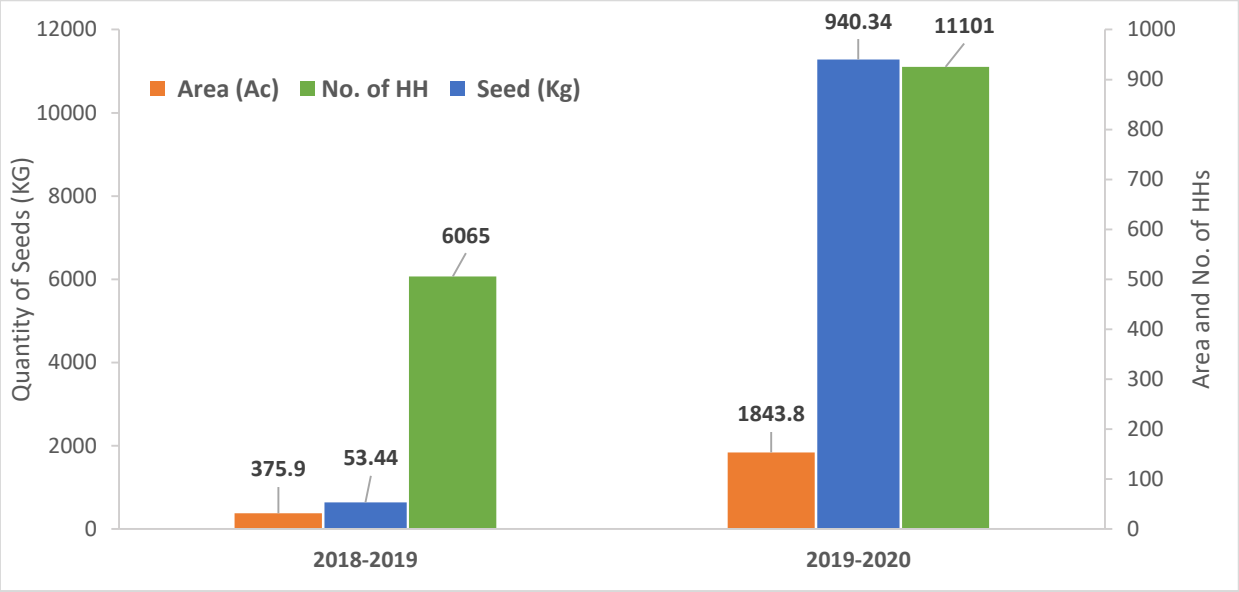

Figure 7. Comparison of production area and input supported for 2 years

A total of 4220 sets of sprinklers and drip irrigation sets are supported across all six Dzongkhags focusing on those areas where the implementation of vegetable cultivation has been prioritized among other crops. The support was focused on Land Use Certificate (LUC) youth, vegetable group and individual farmers who are into commercial farming. Sprinklers are mostly promoted in those areas where vegetable cultivation is done in an open field to make use of available water efficiently. It has benefited 1539 HH covering approximately 142 acres of land. Other supports rendered to the same beneficiary include mulching plastic, watering cans and flexible pip.

1.2.2 Farmers' capacity development

Most of the implementing agencies could not implement capacity development programs because of the mass gathering restriction imposed by the Government to prevent the spread of the Corona virus. However, some implementing agencies were able to conduct farmers' training at the beginning of the financial year, before the COVID 19 measures were regulated. Figure 8 shows the capacity development conducted by each implementing agencies on different areas. Implementing agency such as Samdrupjongkhar has trained farmers on nursery management technology focused on nursery seed sowing, transplanting and management. A total of 500 farmers (M-219, F-281) under Pemathang, Phuntshothang, Langchenphu, Serthi and Wangphu gewog under Samdrupjongkhar Dzongkhag are trained.

Similarly, Trashigang, Lhuentse and Samdrupjongkhar Dzongkhag also conducted capacity development for farmers and LUC members on vegetable cultivation techniques. A total of 685 farmers (M-293, F-392) attended the training.

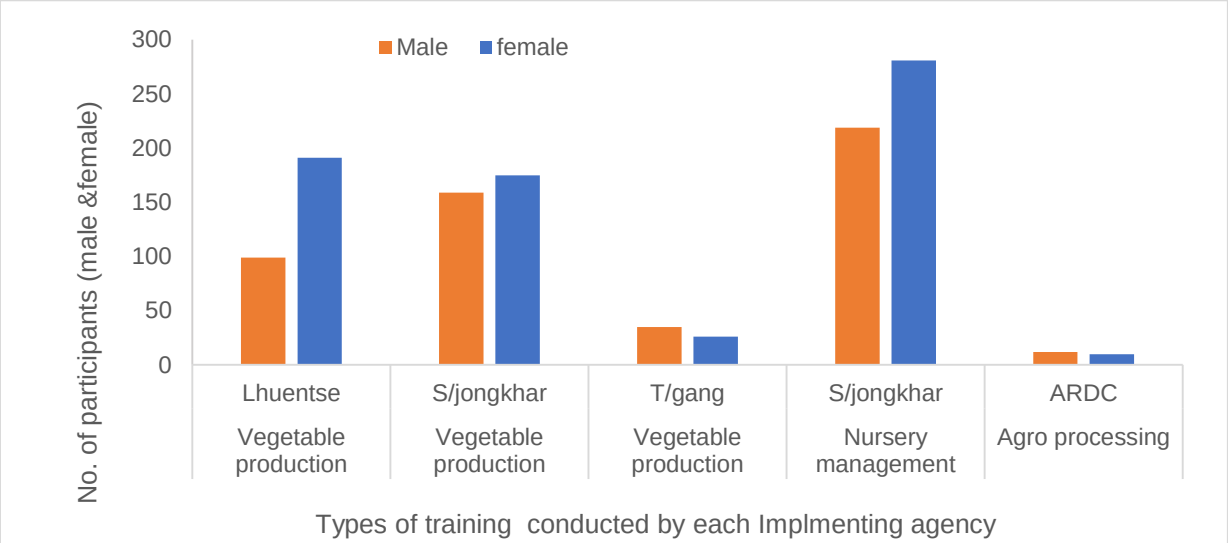

Figure 8. Dzongkhag wise capacity development on different modules

Likewise, ARDC Wengkhar in collaboration with Integrated Food Processing Plant (IFPP), Lingmethang and Gewog Agriculture Extension officer provided on-site hands-on practice and training to 22 farmers in two gewogs under Mongar. A three-day training was conducted for a women group consisting of 10 members in Tsakaling and a vegetable production group consisting of 12 members in Sherimuhung. The training focused on the processing and value addition techniques i.e. preparation of candies from locally available fruits and vegetables such as Assam apple (*Docynia indica*), local peach, pear and pumpkin which has a low market value. The groups were also trained on handling and maintenance of an electric dryer, packaging and labelling of the products.

1.2.3 Support to Centers -ARDC, NSC

Many different factors can affect agricultural production. To maintain the sustainability of agricultural production despite the limited land for farming, and challenges imposed by climate change, there is a need for alternative technologies for farming. The project supported training on hydroponics for some of the researchers in the centers at Chiang Rai Province in Thailand. Henceforth, the Research and Development Center, Wengkhar initiated and developed a model on hydroponic as a part of the post-training program (Figure 5). The model constitutes a greenhouse-based structure in which two hydroponic techniques - Deep Flow Technique (DFT) and Nutrient Flow Technique (NFT) are established. The basic parts of the system consist of a growing chamber to grow crops, reservoir tank for a nutrient solution with pumps to pump nutrient solution from reservoir tank to growth chamber. Nutrient supply and humidity changes are automated using a sensor-based system. The complete set was established with a total cost of Nu. 1.01 Million with funds from CARLEP/IFAD and the European Union-Rural Development and Climate Change Response Program MoAF (EU-RDCCRP).

The production trial of lettuce conducted in 2019-2020 FY showed convincing results. ARDC Wengkhar will conduct a production trial of tomato and strawberry in the coming season after which the center will offer this technology as an option for any interested youth commercial farms in peri-urban areas.

Figure 9. Hydroponic vegetable cultivation trial

National Seed Center (NSC) is one of the important Institutions that support in supplying agriculture production inputs in the country. NSC, Trashiyangtse is located in the east and cater to eastern Bhutan. To strengthen the capacity of the center on seed processing and packaging, the project supported the center through ARDC Wengkhar for procurement of equipment and materials such as digital weighing balance, moisture meter and double-deck plastic. However, some equipment could not be procured due to the current pandemic disease and will be purchased in FY2020-2021.

Besides the promotion of climate-smart agriculture practices in CSV in the Dzongkhags, ARDC Wengkhar initiated the establishment of a permaculture block at Wengkhar to promote organic farming. Renovation of oil distillery unit to extract biopesticides and initiate on-station research on the preparation of biopesticides from locally available plants have been initiated. These activities will be piloted in climate smart villages from the financial year 2020-2021 onward.

OUTPUT 1.3: DAIRY PRODUCTION INTENSIFIED AND EXPANDED

1.3.1 Capacity development of dairy farmer's groups

The success of the dairy farming is entirely dependent on competency of the farmers in terms of sound herd management acquired through proper feeding practices, disease prevention and control, hygienic milking practices and desired breeding. Therefore, the Program continues to build capacity of the dairy farmers both at group and individual level to continually guide them in sustainable dairy management and production.

The Figure below shows the number of farmers trained on different modules with total planned and actual achieved. From the 1930 number of farmers targeted for training, 2226 farmers were actually trained with the achievement of 115 % (Figure 10).

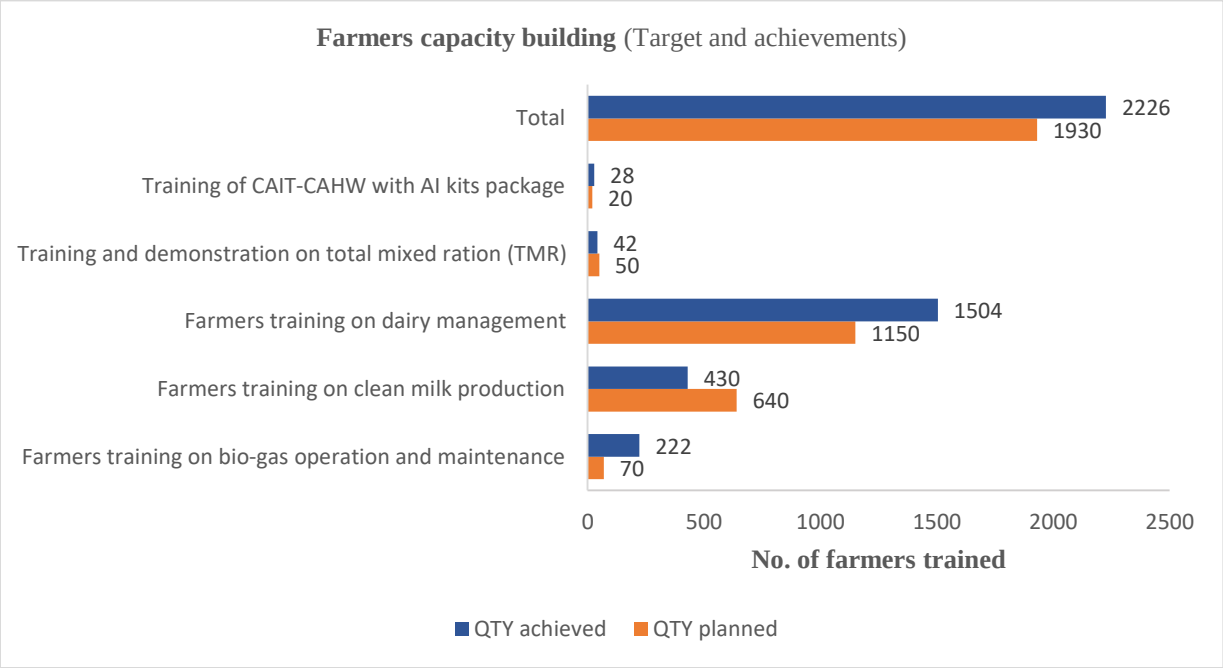

Figure 10. Farmers capacity building conducted on different modules

RLDC also trains Community Artificial Insemination Technicians (CAIT) annually in order to enhance service delivery and improves outreach. During FY2019-20, 28 number of CAIT was provided with training/refresher training for two weeks. Those trained CAIT's are spread across six Dzongkhags performing mobile AI and benefiting dairy farmers while at the same time earning income through the collection of service fees as and when the services are provided. For example, CAIT at Norbugang under Pemagatshel Dzongkhag inseminate 15-20 cows every month on average, with a conception rate of almost 50 % which is rated as satisfactory (*Case story of a CAIT at Norbugang into Business annexed*).

1.3.2 Feed and fodder production

The following figure shows fodder intensification program in the Programme Dzongkhags.

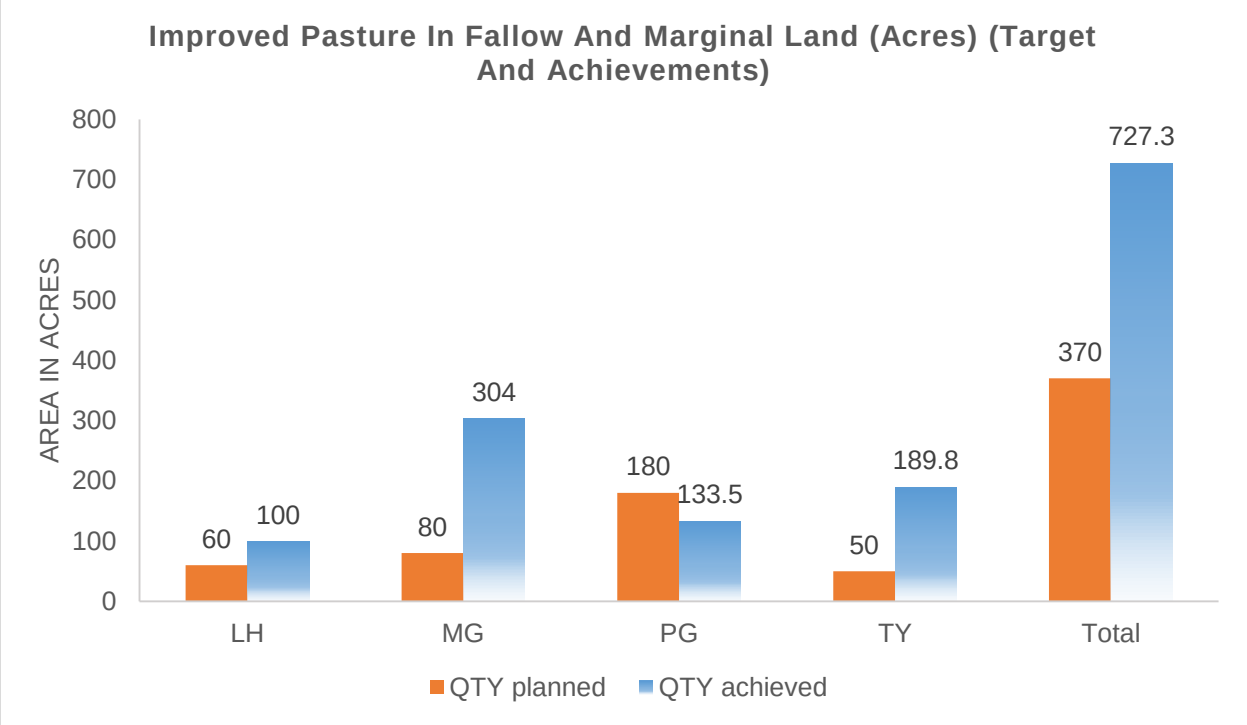

Figure 11. Dzongkhag wise improved pasture development

Improved pasture can be categorized into Temperate pasture and Sub-tropical pasture. Grass mixtures composed of Italian rye grass, Tall fescue and white clover is being supplied in the former while Ruzi and molasses are supplied in the later. A total of 727.3 acres of improved pasture were developed from the plan target of 370 acres. The achievements far exceeded the target by almost 96 % as shown in the above Figure 11. This implies that fodder plays a crucial role in dairy farming.

Another type of fodder widely promoted is the fodder slips (Gautemala, Napier, Packchong). Its robustness and biomass, besides important nutrient content, is well received by the farmers and therefore it serves as one of the major sources of fodder in the region. Almost 73 % (30.6 Acres) of fodder slips propagation was achieved from the total planned (42 acres) as shown in Figure 12.

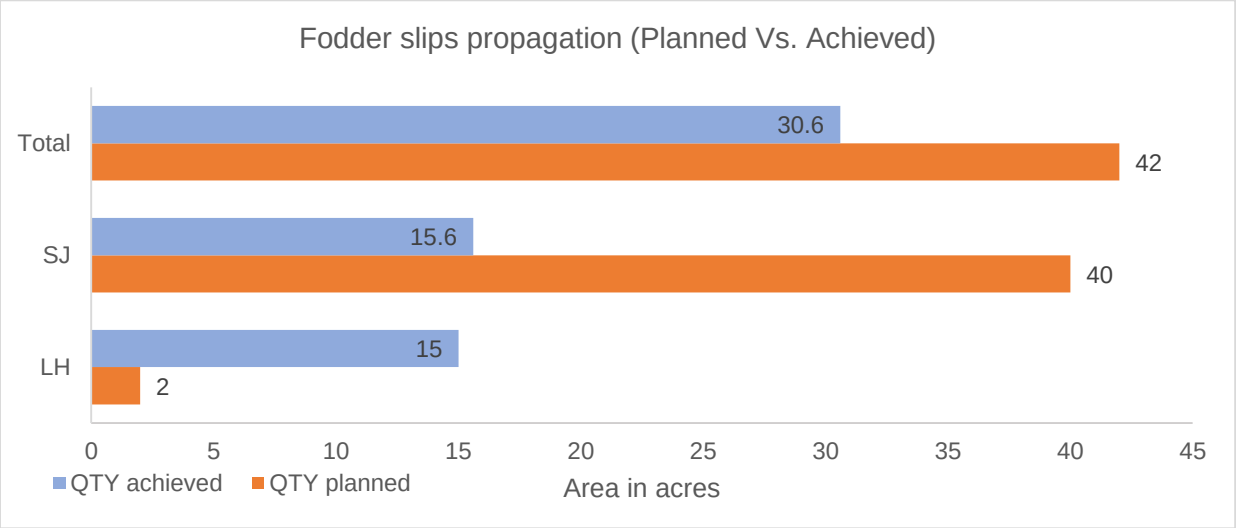

Figure 12. Fodder slips propagation

Winter is the season when our farmers experience severe fodder scarcity to the extent of milk yield declining to as low as 50 % compared to other seasons (Summer). One of the CARLEP interventions is to ensure sustained fodder supply base irrespective of seasons and maintaining optimum milk yield so that milk supply base is maintained at the optimum at all times. To realize this, CARLEP has been supporting the farmers, through the Dzongkhags, in enhancing winter fodder by promoting winter oat in fallow land besides other interventions such as crop residue enrichment, hay making and silage making. Figure 13 shows winter fodder promotion achieved against the planned target. The achievement far exceeded the target by almost 341 % because of the increased demand of oat seeds by the beneficiaries.

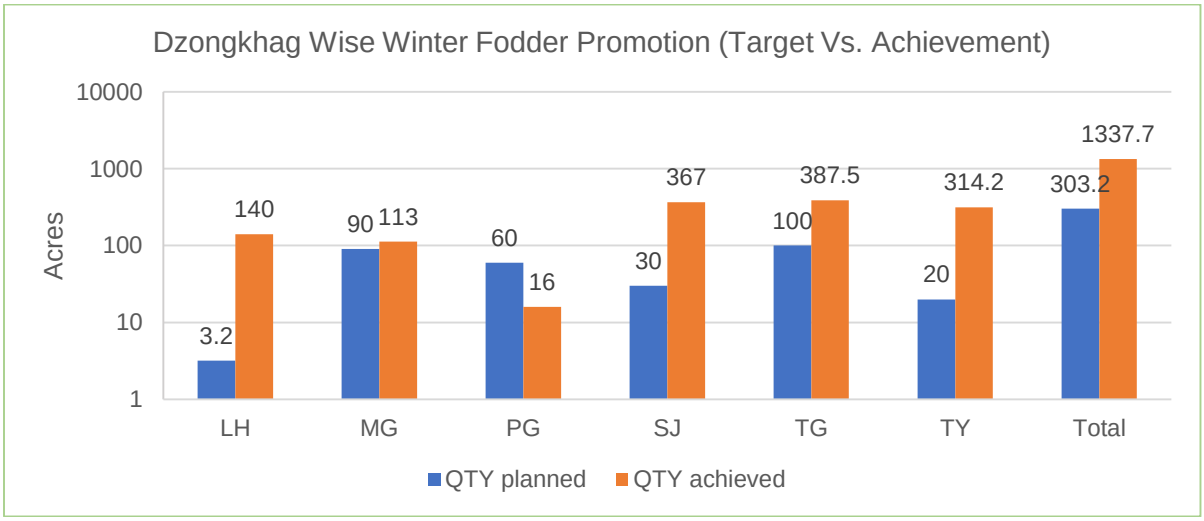

Figure 13. Dzongkhag wise winter fodder promotion

1.3.3 Provision of dairy production inputs

Subsidiary support to dairy production inputs (cattle sheds, improved cows, chaff cutter, dairy equipment, cold chain facilities) have significantly propelled the dairy sector growth in the region making smallholder farmers to effectively participate in the dairy value chain model. For example, project interventions over the years has contributed a lot in terms of formalizing milk market, milk quality improvement, youth and women employment creation in the Programme Dzongkhags.

1.3.3.1 Subsidiary support to cattle sheds construction

The 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 FY2019-20, a total of 568 cow sheds were constructed with subsidy support from CARLEP against the target of 340. In overall, the physical achievement stands at 67 % more than the actual planned as shown in figure 14 below.

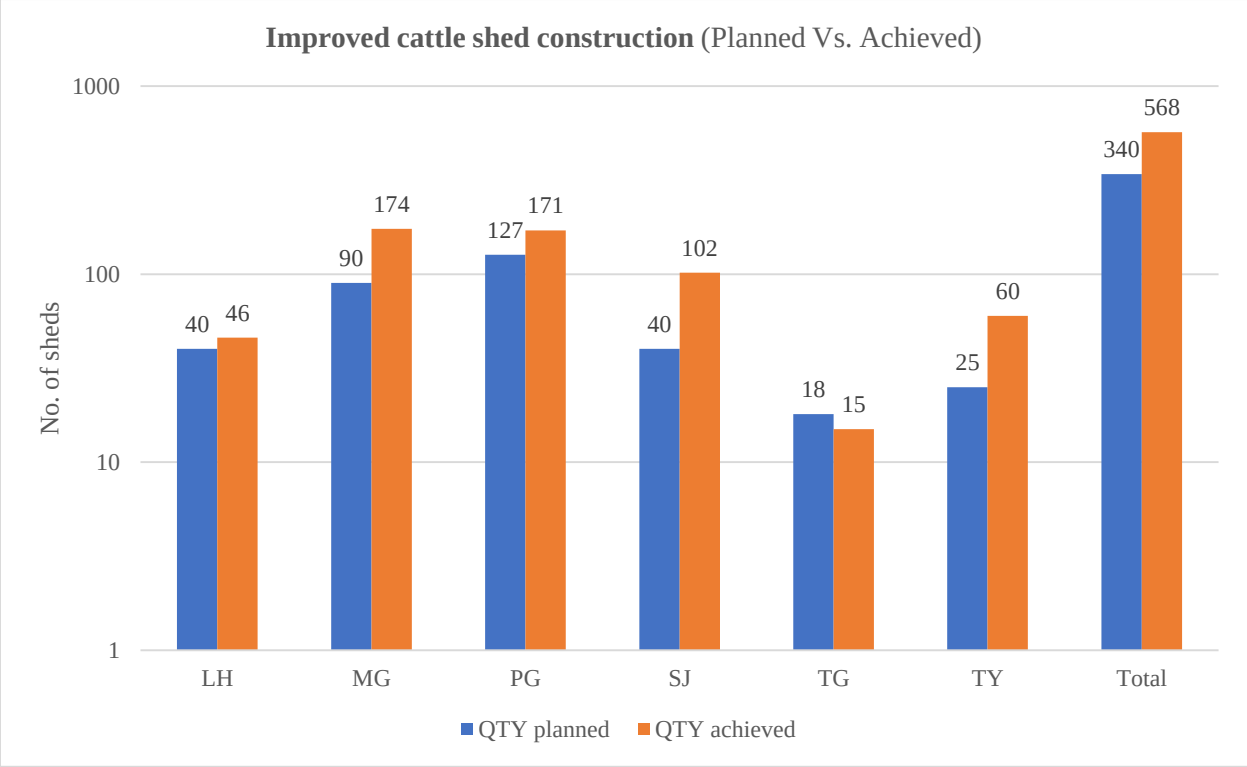

Figure 14. Improved cattle shed constructed

1.3.3.2 Subsidiary support to purchase of improved dairy cows

Increasing the milk supply base is made possible through subsidised support to purchase of quality dairy cows and improving the genetics through breed upgradation. During FY2019-20, the CARLEP has facilitated subsidized purchase of 409 improved dairy cows against the 200 cows planned. The achievement stands at almost 105 % higher than the actual planned (Figure 15). The reason for higher achievement is attributed to reallocation of funds in response to COVID-19 pandemic, requiring to enhance dairy production contributing towards national food security.

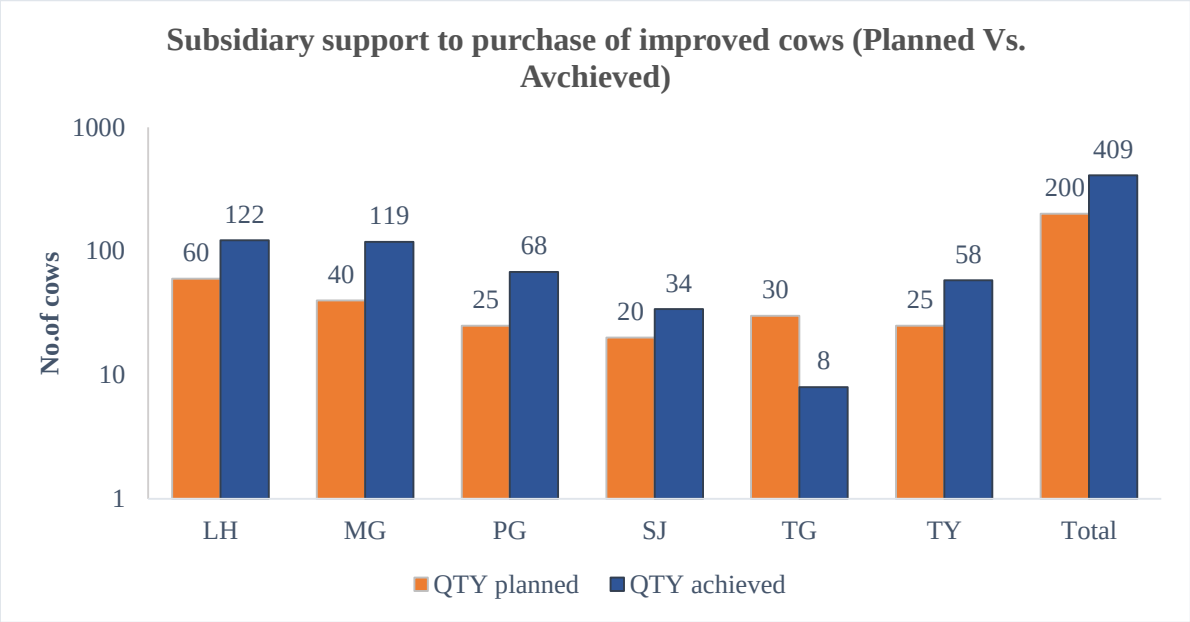

Figure 15. Subsidy support to improved cows purchase

This intervention over the years has resulted to enhanced milk production broadly contributing to building resilient dairy value chain in the region. The Dzongkhag wise milk production trend is as shown in the figure below.

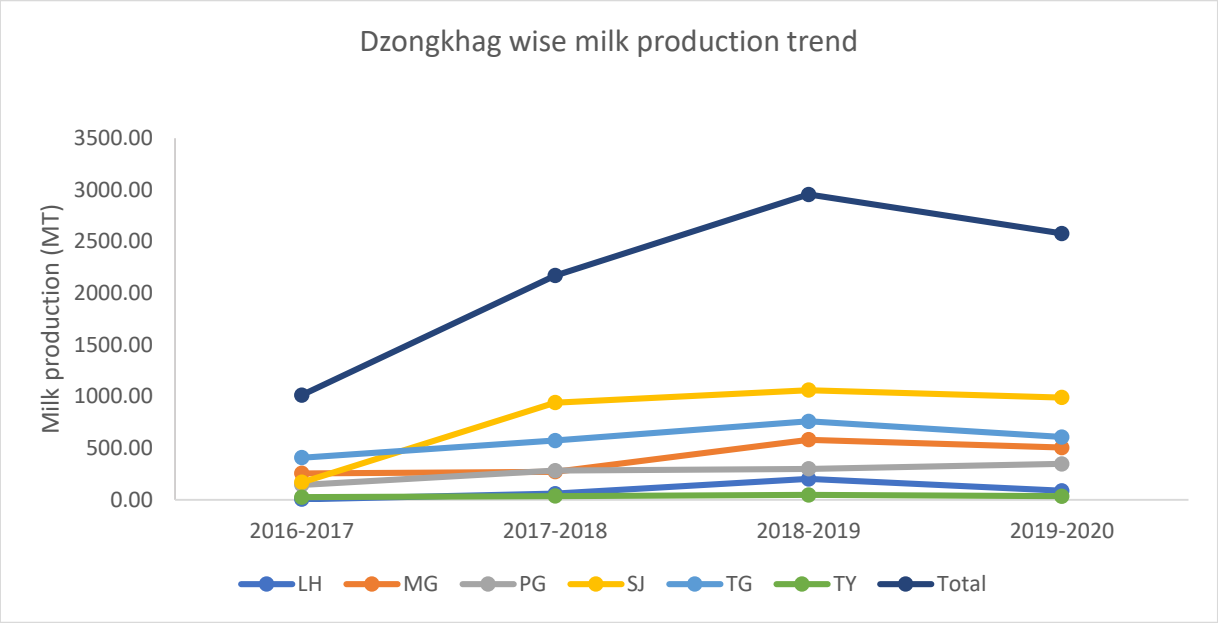

Figure 16. Dzongkhag wise milk production trend from Dxairy Farmers Group

Moreover, the milk supplied by the farmer groups of Trashigang Dzongkhag is in an increasing trend as shown in the figure below. For example, there was an increase in milk collected by the KOUFUKO Dairy Plant from 296.43 MT in 2017 to 429.57 MT in 2018 but observed slight decline in 2019 by 36.21 MT as shown in Figure 17 below.

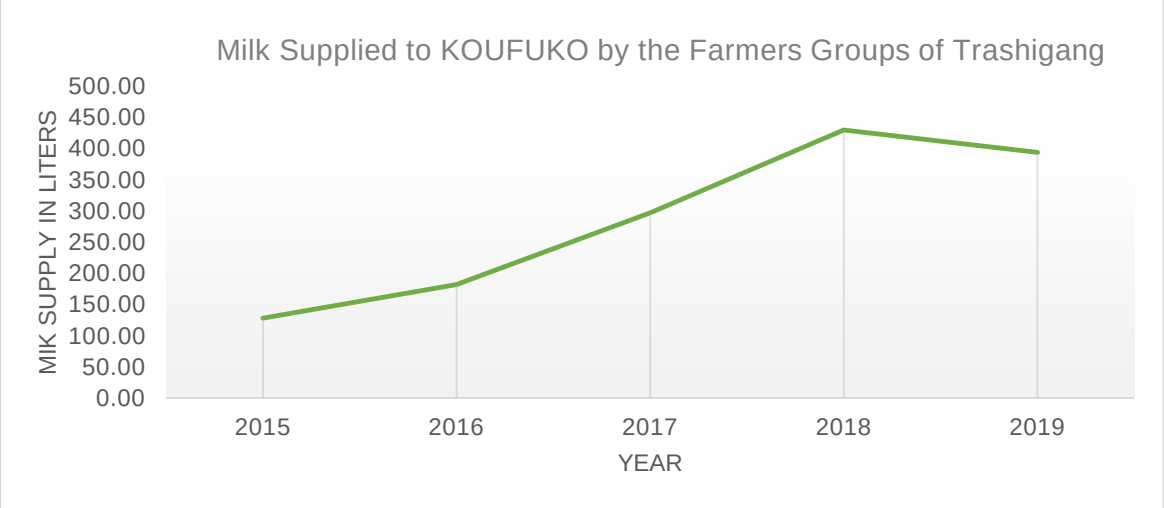

Figure 17. Milk supply trend to Koufuko Dairy Plant

1.3.3.3 Subsidiary support to purchase of chaff cutter

During this reporting period, CARLEP has facilitated subsidized purchase of 391 number of chaff cutters against the target of 295 numbers. The physical achievement stands at almost 133 % for the six Programme Dzongkhags as shown in figure 18. Through this

support, dairy farmers were greatly benefited in terms of drudgery reduction in chopping fodder, improved palatability and digestibility, encouraged farmers to conserve fodder in the form of hay and silage.

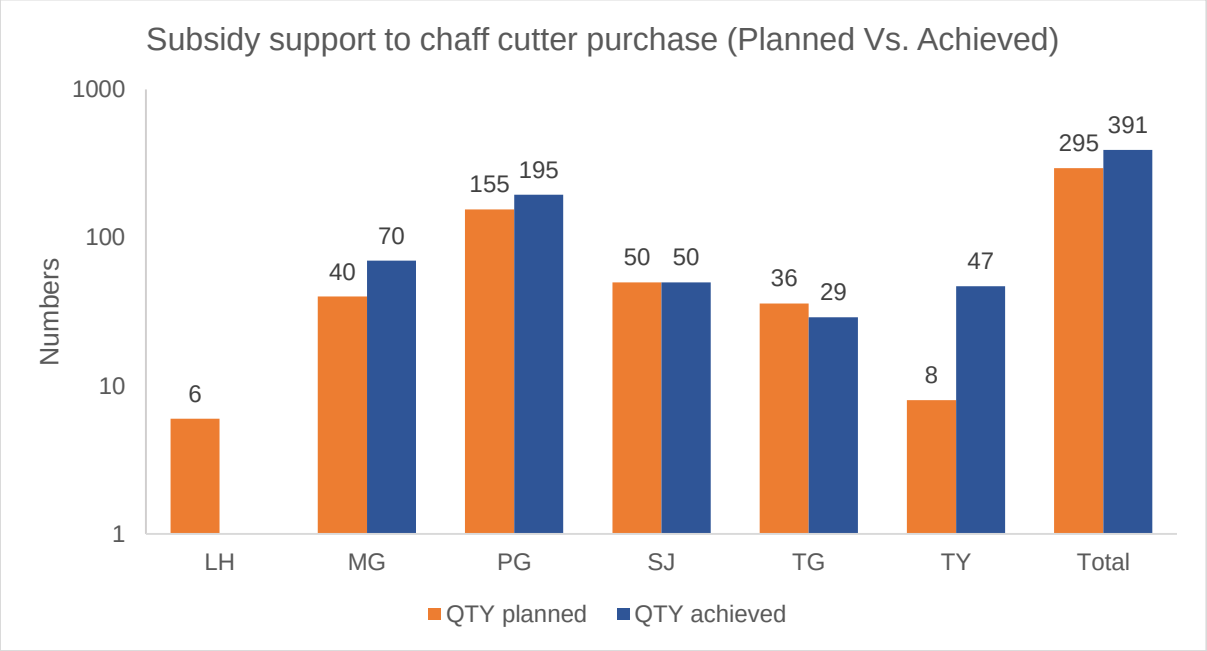

Figure 18. Subsidy support to chaff cutter purchase

1.3.3.4 Dairy breed intensification

Oestrus synchronization was carried out as a campaign and those responsive cows were inseminated with sex sorted semen. Similarly, sex sorted semen was explicitly used in the CHBPP areas as per the CHBPP guidelines of the DoL. Since the CHBPP expansion involves training and awareness of farmers, this activity was partially implemented because of COVID-19 pandemic restricting mass gathering. In areas inaccessible to AI, breeding bulls were supplied to maintain the improved Jersey bloodline.

Table 4. Agency wise breed intensification activities conducted

Agency	Sub-activity	Indicators	QTY planned	QTY achieved
LH	Establishment of CAIT in LUC s and farmers group	No. of people trained	5	10
	Initiate estrus synchronization programme through use of sex sorted semen (Semen straw & hormones)	Unit of semen	285	200
	Purchase of LN2 cans for AI service expansion to intensify breeding program	Equipment set	3	2
	Supply of breeding bulls to remote communities for breed improvement	No. of bulls	11	5

PG	Initiate estrus synchronization programme through use of sex sorted semen (Semen straw, CRB insert 395)	Unit of semen	300	1282
	Purchase of AI kits (LN2 cans for semen straw storage and transportation) for breed intensification through sex sorted semen	Equipment set	3	5
	Support and establish AI centers	No. of AI Centers established	5	10
RLDC	AI service expansion & CAIT establishment	Unit of semen	2000	2000
	Dairy cattle breed improvement intensification through CHBPP expansions	No. of cattle	1000	0
	Dairy cattle breed improvement intensification through targeted estrus synchronization	No. of cattle	1000	0
SJ	Supply of breeding bulls	No. of bulls	5	9
	Use of sex sorted semen for breed improvement	Unit of semen	400	370

1.3.3.5 Dairy equipment

The support to dairy equipment is to ensure improved efficiency in milk collection, processing and marketing of the products and also to minimize loss through wastage and spoilage. For example, bulk milk coolers have encouraged our dairy farmers to produce more as the milk spoilage is reduced significantly. The table below shows the type of dairy equipment supported to dairy groups and farmers.

Table 5. Dairy equipment support

Agency	Milk cans	Bulk chillers	Cool box, digital weighing balance and packing paper	Milk analyzer	Cream separater and butter churner	Yoghurt set (yoghurt packing machine, laser packing equipment)
LH					1	2
MG	150			2	9	2
PG	65	4		2		4
SJ		6			1	
TG			2		2	
TY	30					
Total	**245**	**10**	**2**	**4**	**13**	**8**

OUTPUT: 1.4 PRODUCTION RELATED INFRASTRUCTURE

1.4.1 Irrigation renovation

Table 6 indicates the detailed spillover activity carried out during FY2019-2020. A total of four spill over irrigation renovation was implemented, one each under Samdrupjongkhar and Mongar and two schemes under Trashigang Dzongkhags. The total command area covered under four schemes is 286 acres, however, around 30 % of the total land was left fallow due to water shortage. With the completion of scheme renovation, farmers started reverting additional 84.01 acres (30%) of wetland for paddy cultivation and off-season vegetable after paddy harvest which is expected to benefit 217 HH.

Table 6. Spill over irrigation renovation implemented in 2019-2020 in the Dzongkhags

Agency	No. of schemes	Command area(Ac)	Fallow (Ac)	Scheme length (Km)	Total HH	Male	Female
Mongar	1	70	10	4	75	30	45
T/Gang	2	156	74.01	4.26	124	53	71
S/Jongkhar	1	60	0	7.5	18	15	3
Total	**4**	**286**	**84.01**	**15.76**	**217**	**98**	**119**

Similarly, the table 7 indicates two new schemes renovation was taken up during FY 2019-2020. One each under Trashigang and Trashiyangtse Dzongkhgs with scheme length of 5 Km and 1.8 Km with command area of 95 acres and 150 acres respectively. New schemes have benefited total of 120 HH. With the renovation of irrigation schemes, farmers will benefit from undisrupted seasonal paddy cultivation as well as from the off-season chili and vegetable cultivation. Starting 2020 cropping season, more farmers will step forward to revive their fallow land which was left uncultivated due to insufficient irrigation water. A total of 28 acres fallow land will be revived for paddy cultivation and other cereal intensification thereby increase food production in the households.

Table 7. New irrigation renovation implemented in 2019-2020 in the Dzongkahg

Agency	No. of scheme	Command area(Ac)	Fallow (Ac)	Scheme length (Km)	Total HH	Male	Female
T/yangtse	1	95	8	5	75	40	35
Trashigang	1	150	20	1.8	45	25	20
Total	2	245	28	6.8	120	65	55

Dzongkhags have also implemented dryland irrigation focusing mainly on vegetable production where commercialization is limited by insufficient water. It also aimed to serve

for multipurpose use such as household consumption, dairy, poultry and other horticulture activities. Besides, it will also enable improved home sanitation and the establishment of backyard agricultural activities for food self-sufficiency for marginal farmers. During the financial year 2019-2020, a total of 15 schemes have been completed benefitting 782 HH (Female-355) across six eastern Dzongkhags.

Farm Demonstration of rainwater harvesting is also initiated in Langchenphu Gewog under Samdupjongkhar Dzongkhag and Zobel, Shumar and Chimung under Pemagatshel Dzongkhag. A total of 14 demonstration models has been set up which will benefit 21 HH to collect the rainwater for irrigating backyard garden as well as for livestock purposes during a water shortage.

1.4.2 Electric Fencing

Wildlife depredation of crops and livestock is a major challenge in rural areas hindering agricultural production. As a result, large area of agricultural land is left fallow. As a call to this menace, MoAF has come up with eco-friendly electric fencing to prevent wildlife incursions in agricultural field and contribute towards realizing national food self-sufficiency and security. Therefore, the eastern region of Bhutan is currently leading on adoption of electric fencing with fund support from CARLEP. The graph below shows the length of electric fencing constructed during this reporting period.

A total of 335.08 Km electric fencing has been installed which covers 2172.27 acres of cultivated land for 1968 HH. The interventions have been taken up through cost sharing modality where the procurement of GI wire, HDPE pipe, solar panel, charge controller and nails are supported from the project, and fencing poles and manual labor contribution from the beneficiaries. CARLEP has implemented the electric fencing form FY 2019-2020 and the impact assessment is yet to be conducted. However, it is reported that there has been a drastic reduction of the crop loss with the electric fencing put in place as per the feedback received from the beneficiaries and extension officers. Although the crops damage by wild animals such as wild boar and deer has been drastically reduced, the depredation of monkeys and porcupine could not be solved.

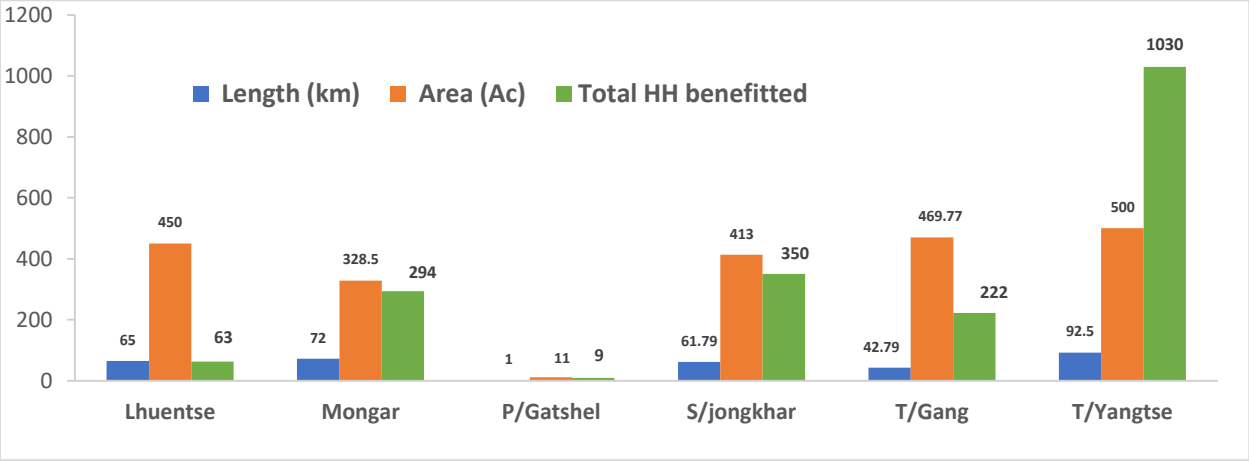

Figure 19. Dzongkhag wise electric fencing installed

1.4.3 Land Development

The terrain of the land in six eastern Dzongkhags are characterized by steep slopes and surface stones making farm mechanization difficult. Similarly, wetlands are also characterized by narrow terraces and unfeasible for deploying machine. In line with 12th FYP, CARLEP has prioritized land development as one major interventions for cereal intensification and vegetable commercialization. Land development has been implemented based on three categories such as dryland terracing, wetland consolidation and fallow land reversion (Table 8). A total of 455.27 acres of land has been developed (wetland and dryland) in this fiscal year, of which 150.66 acres of fallow land is reverted for cultivation and benefits 487 HH across six eastern Dzongkhags. Likewise, each Dzongkhags has initiated different soil improvement activities through cultivation of leguminous crops, plantation of grass slips for terrace stabilization and other crops as a post land development program.

Table 8. Land development under six Dzongkhags in FY2019-2020

Agency	Wetland consolidation				Dryland terracing				Fallow land reversion			
	Area (Ac)	**Total HH**	**M**	**F**	**Area (Ac)**	**Total HH**	**M**	**F**	**Area (Ac)**	**Total HH**	**M**	**F**
LH	88.18	90	42	48	31.41	32	20	12	0	0	0	0
MG	21.97	31	19	11	55.36	45	23	22	0	0	0	0
SJ	10.07	12	8	4	28.52	20	12	8	6	3	3	0
TY	45	40	25	15	14.5	6	3	3	0	0	0	0
TG	0	0	0	0	0	0	0	0	45.5	99	67	32
PG	0	0	0	0	10	7	3	4	99.16	102	83	19
Total	**165.22**	**173**	**94**	**78**	**139.79**	**110**	**61**	**49**	**150.66**	**204**	**153**	**51**

Land development through terracing has immensely benefitted the farmers under Samdrupjongkhar Dzongkhag due to the feasibility of farm mechanization. The farmers

reported having reduced work drudgery and saved time. The time saved has been either used in performing other works or spending time with their families.

1.4.4 Post-harvest equipment

Post-harvest equipment mainly corn shellers were supported by ARDC Wengkhar to different Dzongkhags. It has been provided to the maize intensification areas where community-based maize seed production is established and functional. It was also provided to the CSV sites to enable the smallholder farmers to reduce drudgery as well as save time.

Table 9. Corn Sheller supported in different Dzongkhags

Villages	Dzongkhag/Gewog	Household	Corn sheller machine (Sets)
Serphu	Lhuentse/Khoma	15	7
Yangbari	Mongar/Balam	13	7
Bongman	Pemagatshel/Khar	20	10
Philuma-Phu	Samdrupjongkhar/Orong	52	28
Chengri-Sayul	Trashigang/Lumang	10	5
Bainangkhar	Trashiyangtse/Tomijangsa	35	18
	Total	145	75

Samdrupjongkhar Dzongkhag also supported Bhutan Green Products, a private enterprise focusing on value addition of naturally grown spices especially ginger for both domestic supply and export. The company also provides a platform for the ginger growers under the Samdrup Jongkhar Dzongkhag to earn income through the assured market. The ginger growers and the company has already entered into the buyback agreement with technical support from Dzongkhag and Gewog administration for sustainable buyback and marketing. It will benefit the farmers of Orong, Dewathang and Langchenphu. Further, it will also benefit ginger growers from the nearby Dzongkhag, thereby encouraging more farmers for ginger cultivation. An agreement has been signed between the Dzongkhag administration and the company to create an economic opportunity for the ginger growers and ensure regular buyback.

1.4.5 Support to Youth in farming under Land Use Certificate (LUC)

The youth as a nation builder plays a very important role in the economic development of the country. Therefore, much attention has been given for the sustainable development of individual and the youth in a society of Bhutan. As youths come from various regions and background, they need to be properly guided and technically assisted to start up agricultural enterprises.

Land use certificate (LUC) is a part of His Majesty's People's Project aimed at addressing youth unemployment through commercial farming and enhancing economic productivity in rural areas. Through the program, the youths are being supported with housing, land development, irrigation facilities, greenhouse installation, capacity building training, exposure trip, and all necessary tools and equipment. To date, there are 64 youths (51 males and 13 female) under 12 LUCs in the eastern Bhutan. The cumulative income generated by the LUC was Nu 1.265 million in six months based on the two sites report.

1.4.6 Strengthening existing farmers group and establishment of new groups

The farmer's groups and cooperative development is one of the important programs of Regional Agricultural Marketing and Cooperatives Office. The farmer's groups and cooperatives are entities which can address the problem of low scale production and build social cohesion in the community. In the east, where commercialization is challenging, the formation and development of farmers groups and cooperatives is the only approach to achieve the economies of scale for marketing.

In this fiscal year, three dairy cooperatives were upgraded into cooperatives and nine farmer's groups were registered. The registrations were carried out after identification and revision of the By-laws, business plan and management plan. A total of 3 cooperatives and 9 farmers' groups were registered in FY 2019-2020. The following table shows the details of cooperatives and farmers groups registered during FY 2019-2020.

Table 10. Details of registered farmer groups and cooperatives

Sl. No	Name of the Cooperative	Dzongkhag	Gewog	Member		
				M	**F**	**Total**
1	Tashi Tagay Nyamley Tshogdey	Trashigang	Samkhar	38	30	68
2	Tashi Tsheringma Nyamley Tshogdey	Trashigang	Samkhar	13	34	47
3	Druk Chigthuen Nyamley Tshogdey	Trashigang	Yangneer	14	19	33
4	Puensum Tsesey Detshen	Trashigang	Khaling	1	11	12
5	Dungkarcholing Gongpa Gonor Gongphel Detshen	Mongar	Chaskhar	10	27	37
6	Yatong Gonor Gongphel Detshen	Mongar	Chaskhar	14	24	38
7	Sanam Thuendrel Zhetshog Detshen	Mongar	Tshakaling	2	4	6
8	Thamdrang LUC- youth in farming	Mongar	Silambi	6	0	6

9	Rekhey Rangzhin Sanam Detshen	S/Jongkhar	Dewathang	13	15	28
10	Deptsang Tshesay Detshen	S/Jongkhar	Serthi	18	12	30
11	Denphu Sanam Lajung Detshen	S/Jongkhar	Serthi	13	17	30
12	Wooling Rangzhin Sanam Detshen	S/Jongkhar	Orong	47	17	64
Total				**189**	**210**	**399**

With the increasing cardamom production in the east, the need to push forward cardamom farming as a profitable venture was felt important. CARLEP initiated and organized exchange visit cum farmers to farmers training on post-harvest management and marketing aspects of cardamom from 6th to 14th October 2019 at Dagana. A total of 12 farmers and 6 extension agents participated in the exchange visit. The main purpose of the visit was to equip individuals with adequate knowledge of cardamom farming and generate income from the sale to enhance the livelihoods.

COMPONENT 2: VALUE CHAIN DEVELOPMENT AND MARKETING

OUTPUT 2.1: VALUE CHAIN DEVELOPED, STRENGTHENING AND EXPANSION

2.1.1 Multi-stakeholder facilitation process (Value Chain Enhancement Meeting)

The multi-stakeholder platform brings together all actors and supporters for value chain development. It enables the stakeholders to create ownership of the program and develop plans to further improve the value chain.

RAMCO has conducted two MSP i.e. Lhuntse and Trashiyangtse Dzongkhag on School and Hospital Feeding Program. The participants of the multi-stakeholder platform include value chain actors (Farmers Groups, Traders, Schools, Input suppliers) and value chain supporters (Dzongkhag Agriculture Sector, Dzongkhag Livestock Sector, Dzongkhag Education Sector, BLDCL, FMCL, FCBL, BAFRA & RAMCO).

The MSP was conducted mainly to create ownership, collective action to address issues towards creating efficient marketing and production system and to create Business to Business (B2B) linkages. During the MSP the value chain actors and supporters updated the current status of value chains with reporting of their progress and achievements. More importantly, the platform allowed them to raise issues and develop ways forward. The platform has also helped farmers to interact with traders/schools and develop a plan for linkages.

As an outcome of this platform, the schools and FGs were identified for linking and drawing contractual agreements for the supply of RNR produces for the academic year 2020.

As a follow-up on MSP, 66 schools have been linked with 156 agriculture FGs and 38 livestock FGs benefiting 3385 households to supply RNR products for the academic year 2020. The school linking was carried out mainly to provide an assured and sustainable market to FGs and provide fresh and nutritious vegetables to schools. During the linking program, the price for different types of vegetables was discussed and agreed between the schools and the farmer’s groups followed by the signing of a contractual agreement.

The RNR products and milk marketing in Samdrup Jongkhar were streamlined with the establishment of a B-Coop shop at Samdrup Jongkhar. The B-Coop shop which is managed by a board instituted among farmers’ groups and cooperatives has shown a remarkable achievement over the last one year. A total of seven dairy groups and two dairy cooperatives have earned Nu. 25.492 million from the sale of milk to B-Coop. From July 2019 to date, the B-Coop shop has sold 637.29 MT of milk collected from the farmer’s groups at Nu.40 per litre. The B-Coop shop sells milk across the border at Nu.43-45 per liter.

The farmers' group linkage to B-Coop has directly benefited 564 members of dairy farmers' groups and cooperatives to generate income. The B-Coop shop has been instrumental for the efficient marketing of milk in the Dzongkhag. Apart from income from the sale of milk, four groups who are the management board of the B-Coop shop have earned a profit of Nu. 1.1 million in one year from the sale of dairy products like butter, cheese, yogurt and agricultural products like sweet buckwheat flour, lentils, rajma beans, and maize grits. Likewise, the milk transporters are paid monthly salary ranging from Nu.7000 to 9000 by the groups and the earning from it is saved in the group account.

OUTPUT 2.3: DEVELOPMENT OF COMMUNITY DRIVEN MARKET INFRASTRUCTURE

2.3.1 Dairy value chain infrastructures

Given the scattered nature of settlements in the region, milk collection and aggregation has always been a challenge to the dairy farmers. The result of unorganized milk collection and marketing hindered dairy value chain development. Over the years, milk collection and aggregation has improved by a manifold with CRALEP support in value chain infrastructures such as milk collection sheds, milk collection/chilling centers, milk processing units and linking farmers with the processors. The figure below shows the type of dairy infrastructures supported by CARLEP during 2019-20FY.

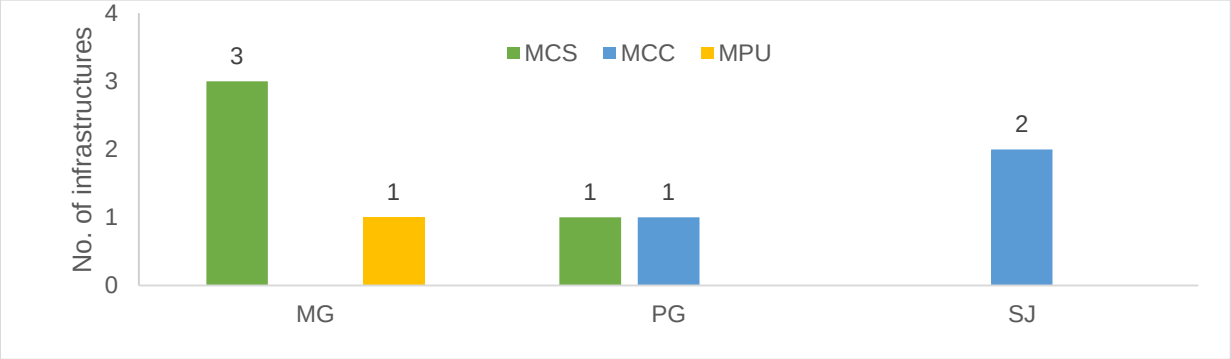

Figure 20. Support to dairy value chain infrastructures

The development of market infrastructures remains an important element under marketing. It provides a platform for buyers and sellers to meet and have transactions at a designated place and thus enabling better trade of RNR products.

In this fiscal year, one major market facilities were developed as an immediate action to address growing space congestion. The long awaited and needed large market facility at Trashigang was constructed to the adjacent of the old large market facility. The infrastructure is currently operational and is being used by farmers from Ramjar, Jamkhar, Yalang and Tongshang Gewogs under Trashiyangtse Dzongkhag and farmers from Chaskhar, Drametse and Narang Gewogs under Mongar Dzongkhag to sell their farm produces.

COMPONENT 3: INSTITUTIONAL SUPPORT AND POLICY DEVELOPMENT

OUTPUT 3.1: STRENGTHENED VALUE CHAIN AND MARKETING KNOWLEDGE AND COMMUNICATION

The main vision of the Department of Agriculture and Marketing Cooperatives is to be responsive marketing and cooperative institution, supporting profitable and people-centered marketing of RNR products, for both domestic and international markets contributing to sustainable socio-economic development. Besides, the Department aims to promote marketing of RNR products through promoting efficient and effective marketing systems, facilitating institutional linkages and strengthening farmer's groups and cooperatives.

3.1.1 Improving Market information system

Providing current or Up-to-date market information provides basis for decisions such as product development or improvement, pricing, packaging, distribution, and enables producers to negotiate with traders, and explore market choices for their produce and plan for productions.

To improve market information sharing among stakeholders, weekly market prices of major RNR commodities are collected from six major markets in the region. The market prices are regularly updated on AMIS by the collector and monitored to ensure prices are regularly updated.

RAMCO has established price board information at Mongar weekend market place to provide reliable price information to the customers. It also creates awareness to the general public on commodity and price. In the view of COVID-19, several awareness programme was displayed through this information board.

C.1 Activities & Outputs: Key achievement highlights

The overall programme outreach in this reporting period is 63.244% (18625 HHs with target 28975) based on the log frame indicator (Without double counting of households).

The main achievements of the activities and outputs during the FY 2019-2020 are as highlighted:

a) Around 25 MT of cereal seeds are distributed covering around 1924 acres of land expected to produce 2884 MT this coming year.
b) A sum of BTN 13.194 Million ($ 0.202 million) is pumped for the irrigation renovation including the two new renovation and four schemes of spill over 2018-2019. It covers 401 acres of land benefiting 457 households.
c) 15 dryland irrigation schemes constructed benefiting 782 households (427 males and 355 females). The area covers 551 acres.

d) Vegetables cultivation covers 1844 acres with inputs supply of 940 kgs of seeds, a total receiving household are around 11100 in which 6683 households are the female beneficiaries.
e) 13 mushroom enterprise established inclusive of shiitake (60hhs) and oyster (11hhs) farming, in which 71 households with 30438 billets and 15292 bags are ready for the production.
f) 6 climate Smart Village (CSV) are initiated and supported this fiscal year, and a total of 12 CSV under CARLEP being facilitated in the project area.
g) 27 lead farmers are trained at ARDC and 139 under lead farmer expansion programme through Dzongkhag initiative.
h) 456 acres of land brought under land development programme benefiting 487 households.
i) 1968 households beneficiated through electric fencing activity; an area of 335 km being fenced for wild animal protection.
j) 242 sets of protected agriculture equipment (Greenhouse) supplied to 462 households for commercial farming for high-value crops.
k) 409 improved cattle procured and distributed to the farmers
l) 568 cattle shed constructed
m) 727.3 acres of land bought under perennial fodder cultivation, 30.6 acres fodder slips plantation and 1337.7 acres under winter cultivation to improve animal nutrition.
n) 391 Chaff cutter/chopping machine supplied to dairy farmers
o) AI refresher training conducted for 9 CAITs and 19 AITs for 14 days at Thangrong gewog, Mongar
p) 160 units of family-sized biogas installed
q) 130 poor and vulnerable households supported with poultry for building farm resilience
r) 14 number of breeding bulls supplied
s) 3852 doses of sex-sorted semen supplied to CHBPP areas
t) 245 number of milk cans supplied aimed at clean milk production
u) 10 number of milk chillers supplied to improve milk quality
v) 13 sets of MPU equipment (Butter churner and cream separator) supported to farmer groups
w) 2226 farmers trained on dairy management, clean milk production, feed and fodder and biogas plant operation and maintenance
x) Constructed 4 milk collection sheds (MCS), 3 Milk Collection Centers (MCC) and 1 MPU

C.1.2 Progress towards Component Outcome (s)

The following are some of the CARLEP Outcome indicators to be measured in the mid-term and end line of the project phase.

- Community-based Resilient Agricultural Production has sustainably increased
- Adoption of inputs/tech/practices

- Increased smallholder income from crop and livestock Value Chains
- Rural enterprise with increase profits
- Strengthened Agricultural Institutions and policies for Improved and Resilient Agricultural Marketing practices
- Adoption of climate-resilient practices
- Significant reduction of time collecting fuel and water
- Reduced water shortages

Some of the indicators as covered in the Annual Outcome Survey (AOS) and reported are:

1. The result showed that 59% of households headed by males compared to 41% by the female.
2. Average monthly income of the HHs in the region is Nu.8844 (N=400, Max=79333, Min=0), with a marginal increase by 0.4% as compared to 2017.
3. Households in the treatment group (M=Nu. 8974/month) were earning more than the households in the control group (M= Nu. 8715/month).
4. The dairy is the highest ranked prime source of income for the farmers in the region.
5. Approximately, 52% of HHs were food self-sufficient in the region.
6. 98% of HHs engage in vegetable cultivation in the treatment group as compared to 92% in the control group.
7. The mean vegetables production per HHs has increased in 2018 as compared to 2017, expect for chili.
8. The survey found that the region produces 15,098 MT of vegetables in a year.
9. 54% of the total HHs (N=400) sold the vegetables, while 41% grew vegetables only for self-consumption and 5% didn't grow vegetables at all.
10. Approximately 61% of the HHs in the treatment group (N=200) and 48% of HHs in control group (N=200) produced and sold vegetables in the markets.
11. 85% of the HHs in treatment group (N=200) own cattle as compared to 72% in control group.
12. Average milk yield of improved cattle breed in the region is 5.1 liters per cow per day in summer and 3.7 liters in winter.
13. Milk yield has increased for both treatment and control group as compared to 2017.
14. Mean annual household milk production in treatment group is 2252 liters and 1392 liters for HHs in control group.
15. Approximately 66% of HHs in treatment group have adopted at least one new technology in dairy development as compared to 70% in control group.
16. 30% of dairy farmers in treatment group have improved cattle shed as compared to 35% in control group.
17. 15% of the smallholder dairy farmers (N=312 HHs) in the region are using biogas.
18. 20% of HHs (N=125) in treatment group and 28.7% of HHs (N=101) in control group have marketed vegetables in group.
19. 20% of the HHs sells the farm produce to regular trader with an increased by 4%.

C.1.3. Convergence and partnership

Besides CARLEP, there are other projects such as a Global Climate Change Alliance through European Union (EU-GCCA), Government of India (GoI) supported projects, Highland Research and Development, Gewog and Dzongkhag development grants (RGoB), etc. operating in the same programme Dzongkhags. It is therefore important to synchronize or harmonize the annual work plan and budget (AWPB) among the projects and programmes to avoid duplication and to take advantage of synergy and complementing effects. In the first year, some of the managers from various projects were invited during the AWPB preparation to harmonize the work plan. During the supervision mission, a stake-holders workshop was organized among the development partners to thresh out the common issues, and share their vision and strategic plan and approaches. Recently, high officials from FAO have visited Office of the Programme Management and shared the overall strategic plan of CARLEP.

C. 1.4. Grant activities

The two grants – IFAD grant and ASAP trust grant mainly supported the training, farmers group formation, supply of inputs such as seeds, seedlings, water harvesting technologies, permaculture, nursery raising, biogas installations, organizing meetings and workshop, and lead farmers training. IFAD grants are mostly supported with soft wire enhancement of entrepreneurs through private partner promotion (PPP) model. In a way, grants activities are much achievable than the loan counterpart fund. With the grant assistant, some of the staff availed the ex-country training to enhance the individual capacity. However. Some could not avail the training due to the current pandemic.

C.1.5. Constraints/bottlenecks affecting Component Progress and actions taken

The geographical location of the far flung nature of village settlement has the utmost constraint and bottleneck affecting the overall development in the region. Some of the factors challenging the villagers are: water shortage due to erratic rainfall and developmental activities affecting the network of water channels, wildlife depredation, and post harvest losses due to pests and disease among others. Therefore, CARLEP supported efficient irrigation facilities, protected agriculture technologies, irrigation renovation, and electric fencing installation. Besides, the beneficieries are also provided capacity building training to address challenges faced.

Similarly, limited access to suitable agricultural land is one of the challenges faced by the agriculture sector. The challenges are further aggravated with the factors such as empty households, and rural-urban migration resulting in fallowing of land. In this fiscal year, some of the youth have returned to the village and have started commercial farming in the Government lease land and private fallow land for sustainable living.

D. Progress towards programme purpose & goal

The programme aims to facilitate the transformation of subsistence-based agriculture into a sustainable value chain market-driven productive sector by promoting climate-smart approaches in agriculture and strengthening the local or community capacity. The programme is gearing towards the goal and objective of CARLEP. The production of milk has increased and certainly increased the income from the dairy sector. The targeted interventions through the provision of input supports have helped crop diversification and enhanced income generation and enhancing farm resilience. The conservation of local crop varieties or native animal breeds will also contribute towards resilience building. The establishment of climate smart villages through the participatory approach, a way towards strengthening local capacity to adapt towards climate change impact. These interventions will directly contribute to increased rural income and thus reduce rural poverty.

The commercialization of vegetable production and the establishment of dairy cooperatives is expected to contribute towards the development of sustainable value chains in both the vegetable and livestock commodities. This is evident from enhanced vegetable and milk production in the programme areas. To sustain the value chain, investments are being made in infrastructure development as well as strengthening the capacities of the farmers' groups and other actors in the value chain. The support in post-harvest technology and product diversification both in vegetables and dairy will help in the establishment of a sustainable value chain.

E. Programme Sustainability

The programme sustainability is the pioneering issue concerned in every donor-funded, it governs from the highest governing body to the grass-root implementing agencies with the transparency in an individual`s mind of thought. Hence, the programme sustainability is one of the priorities under CARLEP. Likewise, the programme is making careful considerations to sustain the programme impacts and benefits. The involvement of communities in irrigation infrastructure management through the establishment of Water-Users' Association (WUA) is aimed at sustaining the benefits. The cost-sharing mechanism in providing input support is one of the strategies. The beneficiary contribution of 20% is being implemented for the supply of post-harvest equipment under the vegetable value chain. The farmers contribute 30% of the cost for the purchase of crossbred cattle. Similarly, the beneficiaries contribute labor force and locally available raw materials for construction of dairy sheds while programme supports the purchase of other raw materials such as cement, nails and corrugated iron (CGI) sheets for roofing. The cost sharing mechanism is being implemented to instill a sense of ownership among the beneficiaries and motivate farmers in continuing the activities beyond the project period. Therefore, the programme management will continue to emphasize on programme sustainability through sensitization programs.

Further, the involvement of Public-Private-Partnership (PPP) is being solemnly pursued especially for infrastructure with higher investments. In the dairy value chain, the

establishment of milk processing units on the PPP model has been initiated. The linking of dairy groups from Trashigang Dzongkhag to Kufouku International Limited (Japan assisted programme) has assured the milk market to the farmers. The programme will closely work with the company to sustain the dairy value chain. Similarly, the involvement of NGO like the Samdrup Jongkhar Initiative will ensure the sustainability of impacts and benefits of climate change adaptation measures and resilient farming practices through adoption and expansion of farmer-farmer extension methodology.

Nonetheless, the crucial factor in the sustainability of the impact and benefits of the programme is access to the market and the price of the produce. Thus, the establishment of a well-organized and systematic marketing channel is key to the sustainability of the programme impacts.

F. Programme Management

Office of the Programme Management has conducted coordination activities such as preparation of Annual Work Plan and Budget as usual. A regular meeting and discussion with the Dzongkhags, Regional institutions sector heads (Agriculture, Livestock, Planning Officers, Budget and Account Officers) has been conducted. Regular monitoring is carried out through field visits, phonic conversations, e-mails, and other means of communication.

F.1. Financial Management

The total financial achievement during FY 2018-19 was 76% with an increase of 12% compared to last year's progress achievement of 64%. This increase has been contributed through the training of the financial officers in the districts at various levels of training. CARLEP accounts are sent to the Philippines for financial management training and several rounds of financial related in-country training and workshops are held to improve the financial management system under the CARLEP. The detailed achievement report is attached in the annexure.

Table 4. Consolidated financial progress for FY 2019-2020

Agency wise financial progress report for CARLEP (2019-2020)FY				
AGENCY	APPROVED BUDGET	TOTAL EXPENDITURE	Beneficiary Contribution	Achievements (%)
ARDC	46,288,000	34,504,558	1,708,813	75%
LHUENTSE	31,012,000	25,887,376	10,162,183	83%
MONGAR	34,409,000	34,168,740	17,026,255	99%
OPM	71,639,000	35,547,310	-	50%
PEMA GATSHEL	39,932,000	32,997,275	14,430,595	83%
RAMCO	29,430,000	9,856,540	92,230	33%
RLDC	16,415,000	7,446,425	116,787	45%
SAMDRUP JONGKHAR	30,591,000	28,297,760	9,946,910	93%
TRASHIGANG	38,885,000	29,100,400	3,289,680	75%
TRASHIYANGTSE	27,625,000	21,596,975	11,456,865	78%
Grand Total	366,226,000	259,403,359	68,230,317	71%

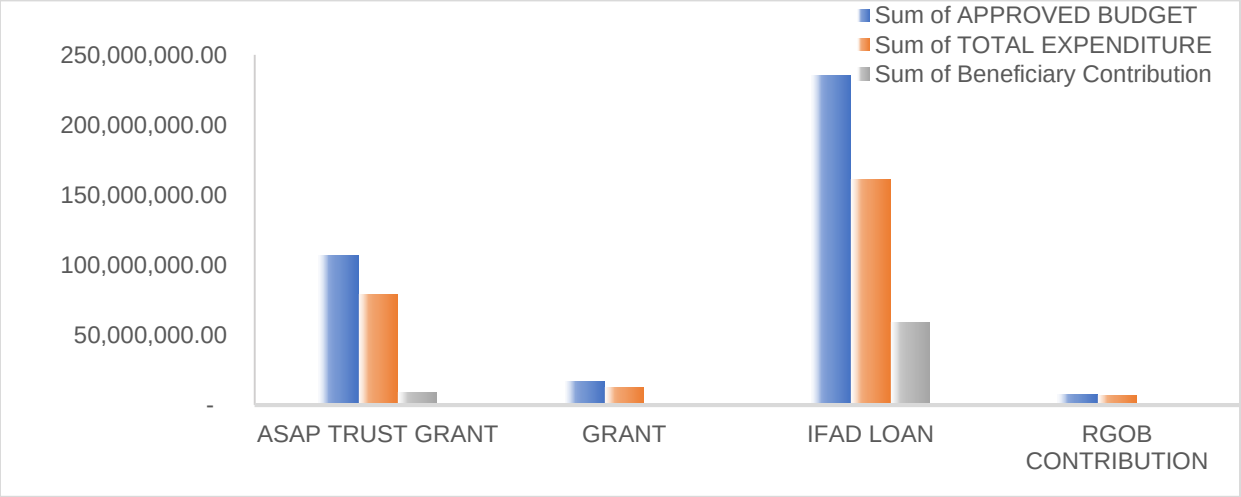

Figure 21. Expenditure based on the approved budget

Table 5. Summary of expenditure by funding sources

Type of fund	APPROVED BUDGET	TOTAL EXPENDITURE	Beneficiary Contribution
ASAP TRUST GRANT	106,504,000.00	79,038,617.70	9,055,337.40
GRANT	16,759,000.00	12,741,039.19	
IFAD LOAN	235,424,000.00	160,574,947.09	59,174,979.82
RGOB CONTRIBUTION	7,539,000.00	7,048,755.00	
Grand Total	366,226,000.00	259,403,358.98	68,230,317.22

F.2. Procurement

The procurement plan is based on the IFAD guideline and implemented as per the plan. In every Annual Work Plan Budget (AWPB) meetings, all the reverent officers are made aware of the procurement guidelines and asked to make a procurement plan based on the work plan. The sanction is based on the procurement plan and gets the funds released in the OPM. In general, all the implementing agencies are not complacent with procurement procedures of the Government as well as IFAD's.

F.3. M&E, Communications, and Knowledge Management

Knowledge Management(KM) is considered as an integral part of CARLEP. KM is about facilitating the processes by which knowledge is created, shared and used in changing people's attitudes, behaviors 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 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.

CARLEP has done substantial work related to knowledge management and dissemination including compilation of stories, articles, brochures, pamphlets and audio-visual documentation and are shared through various channels i.e. IFADASIA Facebook, CARLEP Facebook, youtube and the official web page to dessiminate knowledge to wider audiences. In FY 2019-20, the programme has published third editions of the "Stories of

Change" publication covering stories under thematic areas of the project (Stories of change publication annexed).
To date, CARLEP has produced 7 audio-visual documentations, of which 2 video documentary has been produced during the implementation period FY 2019-20 as mentioned below.

- **Lead farmers documentary**: To create awareness on the lead farmer training and encourage more farmers to become lead farmer in farmer-to-farmer extension approach, demonstration and awareness for promotion of fruits, vegetables and cereal crops etc.

- **Kufouku International Limited** - A Link in the Dairy Value Chain in the East, paradigm shift in dairy farming from home processing of local butter and cheese to direct group marketing of fresh milk. The increase in the economic returns of the smallholder dairy farmers, thereby, enhancing their livelihoods.

To generate knowledge products, CARLEP has been organizing the annual writeshop to enhance the writing skills and techniques for proper documentation. However, the writeshop for this fiscal year could not be conducted due to the mass gathering restriction in the light of COVID-19.

F.4. Gender

Gender mainstreaming and social inclusion are critical entry points in the holistic implementation of CARLEP activities. It is one of the major thematic areas of CARLEP in which the women and the marginalized section of the people are equally considered in the developmental activities' partners. Concurrently, gender mainstreaming is considered as the cross-cutting issue, whereby, every activity executed under CARLEP targets for equal participation and equally benefits both men and women.

The distinct needs, constraints, and decision making roles of gender in farming are addressed such that both men and women are able to equally participate, contribute and benefit from the programme interventions . The project explores and facilitates promotion of need-based gender friendly technologies and equipment, such as chaff cutter, corn sheller, and quinoa de-husking. CARLEP also supports the formation of women's groups to ensure active participation of women in project-related activities, decision-making bodies and committees. In this fiscal year, CARLEP in collaboration with the National Commission for Women and Children(NCWC) planned a leadership training exclusively targeted to women farmers including youth aiming to empower and strengthen the competencies of potential female members of the FGs and Cooperatives/enterprises with leadership skills to take up leadership roles. The training was also aimed at providing women with information and tools to gain insights into the gender situation in Bhutan. However, the training could not be conducted due to the restriction on mass gathering in the light of COVID-19 pandemic.

Of the total beneficiaries of 36399 HHs, 17430 are female households' beneficiaries. It indicates 48% are female and only 52% are male.

G. Summary of Lessons Learned

Preparation of the Annual Work Plan and Budgeting is an essential part of the project phase. The programme Management stresses more on the preparation of the Annual Work Plan and Budgeting and provides proper guidelines to the implementors. However, there is a need for improvement in planning to get the realistic time frame, where it is critically important for the release of the fund and monitoring.

Multi-Stakeholders Platform (MSP) is found to be an important tool to address and strengthen the value chain. RAMCO is mandated for upscaling and expansion of the programme but all other stakeholders have to be proactive to improve the system at greater possible. RAMCO have done mostly in relation to school linking programme but same principle has to be applied for the larger market for mass benefits.

H. Conclusions and Recommendations for follow-up

The overall physical outreach is satisfactory with 64.27% whereas financial achievement is 71% based on the expenditure. Henceforth it is recommended following the value chain concept with MPS and B2B linkage. The focused approach will continue for commercialization for vegetable and dairy improvement in the programme area.

The planning phase has been improved that all the implementing agencies are authorized to prepare a work plan based on the farmer`s need, concerning the environment aspects, implementation capacity in line with vegetable and dairy value chain.

All the Gewog extension staff will be trained on the M&E system and reporting will be channelized. This will bring the CARLEP activities more transparency and complacent while implementing the activities in the field.

I. Conclusion

In general, all the implementing agencies reported that more than 80% of physical progress has been achieved and some are on-going in the field. The budget under some of the activities which are foreseen to underachieve due to the outbreak of COVID-19 has been surrendered.

Annexure 1. Progress Report Matrix (2019-20)

Output	Activity	Indicator	Unit	Annual Target	Achievement	Expenditure (BTN million)	Appraisal target	Cumulative achievement	Achieve-ment %	Financer
1.1.A	**Climate Smart Agriculture Production and Management**									
1.1.A	Upgrading of existing farmer groups (Agriculture)	No. of farmers Groups upgraded	No.	50	4	0.566	300	49	16	ASAP
1.1.A	Upgrading of existing farmer groups (Livestock)	No. of farmers Groups upgraded	No.	41	2	0.24	150	19	13	ASAP
1.1.A	Training of extension agents	No. of EAs trained	No.	30	30	0.532	420	51	12	ASAP
1.1.A	Production inputs for farm resilience and diversification, Vegetable seed (Agriculture)	Area under farm resilience and diversification	Acre	635	1841	12.852	7414	3101	42	LOAN
1.1.A	Production inputs for farm resilience and diversification (Livestock - Poultry)	No of native poultry units promoted	No.	168	130	2.844	300	358	119	LOAN
1.1.A	Production inputs for farm resilience and diversification (Livestock - Piggery)	No. of native piggery units promoted	No.	0	0		150	30	20	LOAN
1.1.A	Promotion of SLM techniques	Area under SLM	Acre	75	0	0	200	77	39	LOAN
1.1.A	Land development (dryland terracing)	Area under land development	Acre	293	368	20.172	300	496.506	166	LOAN
1.1.A	Land development (wetland consolidation)	Area under land development	Acre	62	98	2.298	300	98.29	33	LOAN
1.1.A	Land development (fallow land reversion)	Area under land development	Acre	50	144		300	144	48	LOAN
1.1.A	Local germplasm collection, conservation and promotion	No. of lines	No.	0	0		100	78	78	LOAN
1.1.A	Crop diversification(Cereals, oil seeds, pulses)	Area under diversification	Acre	762	2219	4.241	3000	3017	101	LOAN
1.1.A	Mushroom intensification	No. of mushroom entrepreneurs established	No.	17	13	2.945	150	13	9	LOAN
1.1.B	**Innovation through Permaculture & Biogas**									
1.1.B	Farm level rainwater harvesting infrastructure	No. of infrastructure established	No.	8	14	0.894	162	16	10	LOAN
1.1.B	Tree crop seedlings	Area covered	Acre	75	0		300	104	35	ASAP
1.1.B	Inputs for permaculture (agriculture)	Sets of tools supplied	set	6	7	3.738	36	11	31	ASAP
1.1.B	Inputs for permaculture (livestock)	No. of units supported	No.	0	0		36	14	39	ASAP
1.1.B	Bee Keeping	No. of household supported	No.	50	31	0.145	600	38	6	ASAP
1.1.B	Nursery set up (Agriculture)	No. of nurseries set up	No.	8	0		50	24	48	ASAP
1.1.B	Nursery set up (Livestock)	No. of nurseries set up	No.	8	5		6	5	83	ASAP
1.1.B	Staff training on permaculture	No. of training	No.	0	0		2	1	50	ASAP

Output	Activity	Indicator	Unit	Annual Target	Achievement	Expenditure (BTN million)	Appraisal target	Cumulative achievement	Achieve-ment %	Financer
1.1.B	Farmers training on permaculture	No. of farmers trained	No.	50	21	0.162	250	197	79	ASAP
1.1.B	Permaculture materials & translation	No. of materials published	set	6	0		25	4	16	ASAP
1.1.B	Biogas digester	No. of biogas digester promoted	No.	252	160	3.967	1412	245	17	ASAP
1.1.B	TA biogas	No. of TA recruited	No.	0	0		1	0	0	ASAP
1.1.B	Capacity building on biogas technology /a	No. of training	No.	1	1	0.654	76	1	1	ASAP
1.1.B	Electric fencing	Length of the fencing	km	350	335	10.883	90	335	372	LOAN
1.1.B	Promotion of solar dryers	No.of dyer	No.		0		36	1	3	ASAP
1.1.B	Support to LUCs	lumpsum	No.	5	12	0.345	36	12	33	ASAP
1.1.C	**Innovation through ICTs**									
1.1.C	Hand-held tablets, software and soil test kits	No. of ICT tools introduced	No.	0	20	0.65	100	32	32	GRANT
1.1.C	Training on tablet-based soil monitoring technology	No. of training conducted	No.	0	0		4	0	0	GRANT
1.1.C	Training on report writing documentation and information sharing	No. of training conducted	No.	0	0		5	3	60	GRANT
1.1.C	Pilot e-reporting system	No. of e-reporting system	No.	0	0		1	1	100	GRANT
1.1.C	Information management dissemination	No. of publication		0	0		50	0	0	GRANT
1.1.D	**Increase Outreach of Extension Services**									
1.1.D	Training of trainers (ToT) (Agriculture)	No. of ToT conducted	No.	2	0		14	3	21	ASAP
1.1.D	Training of trainers (ToT) (Livestock)	No. of ToT conducted	No.	2	11	0.6	14	2	14	ASAP
1.1.D	Training of lead farmers	No. of lead farmers trained	No.	40	30	1.422	240	128	53	LOAN
1.1.D	Development of training material and field manuals	No. of training materials developed	No.	4	0		13	7	54	ASAP
1.1.D	Expansion of lead farmers	No. of lead farmers trained	No.	45	139	2.999	1300	560	43	ASAP
1.1.D	Farmer field festivals/field day	No. of Farmers field festivals convened	No.	0	0		63	32	51	ASAP
1.1.D	Workshops (planning, review, evaluation)	No. of Workshops conducted	No.	10	9	0.598	20	17	85	ASAP
1.1.D	Documentation and systematization	Documents produced	No.	0	0		3	2	67	ASAP
1.1.D	Protected gear kits for extensions	No. of Kits supplied	No.	0	0		100	0	0	ASAP
1.1.D.2	**Demonstration inputs & equipment for lead farmers**									
1.1.D.2	Production inputs Protected agriculture	Number of production inputs supplied	No.		4220	5.988	130	4247	3267	LOAN

Output	Activity	Indicator	Unit	Annual Target	Achievement	Expenditure (BTN million)	Appraisal target	Cumulative achievement	Achieve-ment %	Financer
1.1.D.2	Poly-tunnels	No. of poly-tunnels set up	No.	72	1		35	105	300	LOAN
1.1.D.2	Protected greenhouse with structures set	No. of poly-tunnels set up	No.		242	9.824	60	242	403	LOAN
1.1.E	**Resilient & Water Use Efficient Irrigation Development**									
1.1.E	District engineers and extension agents (design and construction)	No. of DEs and EAs trained on climate resilient irrigation	No.	20	1	0.532	100	20	20	ASAP
1.1.E	Water Users Associations (O&M)	No. of WUAs trained on Climate resilient irrigation	event	5	0		33	29	88	GRANT
1.1.E	Preparation of manual for upgrading irrigation engineering norms	Manual for upgrading Irrigation Engineering norms prepared	No.	0	0		1	0	0	ASAP
1.1.E	**Irrigation Infrastructure**									
1.1.E	Feasibility studies	No. of Feasibility studies conducted	No.	1	0		2	2	100	LOAN
1.1.E	Renovation of irrigation infrastructure	Irrigation Infrastructure renovated (Area coverage)	Acre	750	401	13.194	3052	2704	89	LOAN
1.1.E	Pilot irrigation schemes	No. of Pilots irrigation schemes developed	No.	1	1	0	26	2	8	LOAN
1.1.E	Quality control and supervision	No. of quality control and supervision conducted	No.	0	0		12	0	0	LOAN
1.1.E	Water efficient irrigation and promotion of efficient technologies /dryland irrigation	No. of improved irrigation system	No.	9	15	20.656	60	33	55	LOAN
1.1.E	Pump irrigation network up to field edge	No. of pump irrigation	No.	2	2	3.6	20	2	10	LOAN
1.1.F	**Strengthening of Local Institutions on Smallholder's Climate Resilience**									
1.1.F	Development of business model and sustainability plan for service and O&M	No. of business model and sustainability plan developed	No.	0	0		3	0	0	ASAP
1.1.F	Upgrading of farm roads to climate resilient standards	No. or length of farm roads upgraded to climate resilient standards	KM	0	0		32	0	0	LOAN
1.1.G	**Technical Assistance (C1)**									
1.1.G	Recruitment of National TA done	No. of TA recruited	No.	0	0		6	0	0	ASAP
1.2.A	Training & extension material developed	No. of training & extension materials developed	No.	4	0		20	8	40	ASAP
1.2.B	**Capacity Development of Vegetable Production Groups**									
1.2.B	Awareness and mobilisation carried out (Agriculture)	No. of awareness & mobilization conducted	No.	7	0		104	56	54	ASAP
1.2.B	**Training on Production Techniques & Post-harvest Management**									

Output	Activity	Indicator	Unit	Annual Target	Achievement	Expenditure (BTN million)	Appraisal target	Cumulative achievement	Achieve-ment %	Financer
1.2.B	Training on vegetable production techniques	No. of farmers training conducted	No.	24	13	0.491	390	93	24	ASAP
1.2.B	Retraining on vegetable production techniques	No. of farmers training conducted	No.	0	0		790	8	1	RGOB
1.2.B	Training on post-harvest management	No. of farmers trained on post-harvest management	No.	2	25	0.171	390	300	77	ASAP
1.2.B	Retraining on post-harvest management	No. of farmers retrained on post-harvest management	No.	0	0		790	5	1	RGOB
1.2.B	Exchange visits for farmers	No. of exchange visits	No.	1	3	1.761	18	12	67	ASAP
1.2.C	**Vegetable Seed Research & Production**									
1.2.C	Training and certification of vegetable seed growers	No. of vegetable seed growers trained on seed certification	No.	0	10	0.3	130	27	21	ASAP
1.2.C	Equipment and input support vegetable seed growers	No. of Equipment supplied to veg. seed growers	No.	0	0		130	17	13	LOAN
1.2.C	Retraining of vegetable seed growers	No. of veg. seed growers retrained	No.	0	0		195	6	3	RGOB
1.2.C	Seed processing units vegetable seed farm NSC	No. of seed processing units supported	No.	1	0		2	1	50	LOAN
1.2.C	Glasshouse construction vegetable seed farms NSC	No. of glasshouse constructed	No.	0	0		2	1	50	LOAN
1.2.D	**Provision of Vegetable Production Inputs**									
1.2.D	Provision of stress tolerant vegetable seeds	Quantity of vegetable seeds supplied	Acre	380	0		3000	688	23	LOAN
1.2.D	Small post-harvest equipment	No. of small post-harvest equipment promoted	No.	20	0		730	44	6	LOAN
1.3.A	**Development of training & extension materials**									
1.3.A	Training & Extension materials developed (Livestock)	No. training & extension materials developed on dairy production	No.	0	0		78	1	1	GRANT
1.3.A	AI service expansion & CAIT establishment breed intensification through sex sorted semened	unit of semen	Semen	2000	3652	1.783		3652		
1.3.A	Training on AI	No. of people trained	No.	1000	703	0.6		703		
1.3.A	**Capacity Development of Dairy Production Groups**									
1.3.A	Awareness & Mobilization Carried Out (Livestock)	No. of Dairy groups sensitized and mobilized	No.	1	0		95	27	28	ASAP
1.3.A	Training on livestock husbandry	No. of dairy groups or individuals trained on livestock husbandry	No.	24	31	1.567	150	84	56	ASAP

Output	Activity	Indicator	Unit	Annual Target	Achievement	Expenditure (BTN million)	Appraisal target	Cumulative achievement	Achieve-ment %	Financer
1.3.A	Retraining on livestock husbandry	No. of dairy groups or individuals retrained on livestock husbandry	No.	0	0		420	9	2	RGOB
1.3.A	Training on clean milk production	No. of dairy groups or individuals trained on clean milk production	No.	18	27	0.475	150	74	49	ASAP
1.3.A	Retraining on clean milk production	No. of dairy groups or individuals retrained on clean milk production	No.	0	0		420	28	7	RGOB
1.3.A	Training on farm record keeping	No. of dairy groups or individuals trained on farm record keeping	No.	0	0		65	74	114	ASAP
1.3.A	Retraining on farm record keeping	No. of dairy groups or individuals retrained on farm record keeping	No.	0	0		420	18	4	RGOB
1.3.C	**Improved Services Outreach through CAHWs & Lead Farmers**									
1.3.C	CAHW model development and packaging	No. of CAHW model developed	No.	1	0		2	1	50	ASAP
1.3.C	Training of trainers (ToT)	No. of ToT conducted on CAHW & lead farmers	No.	1	0		2	1	50	ASAP
1.3.C	Training of CAHWs	No. of CAHWs trained	No.	1	1	0.6	105	82	78	ASAP
1.3.C	Retraining of CAHWs	No. of CAHWs retrained	No.	0	0		80	0	0	RGOB
1.3.C	Kits for AI practitioner	No. of Kits supplied	No.	0	0		80	32	40	LOAN
1.3.C	Transport facilities for CAHWs	No. of CAHWs supported with transport facilities	No.	1	0		75	0	0	LOAN
1.3.C	AI service expansion & CAIT establishment breed intensification through sex sorted semened	No. of CAIT established	No.	20	10	0.383	5100	10	0	LOAN
1.3.C	Breed intensification through community breeding bull services	No.of bulls supplied	No.	15	9	0.349	75	9	12	LOAN
1.3.C	Breed intensification through CHBPP	No. of breed intensification	semen	1000	200	2.978	2295	200	9	ASAP
1.3.D	**Support to Fodder & Feed Production**									
1.3.D	Perennial fodder in fallow and marginal land	Area of fallow & marginal land under perennial fodder	Acre	160	707	3.728	1633	1934.3	118	ASAP
1.3.D	Winter fodder crop demonstration and seed supply	Area under Winter fodder	Acre	568	2588	5.099	1885	3308.7	176	ASAP
1.3.D	Promote fodder slips (Napier/Gautemala, Pakchong)	Area under fodder slips	Acre	0	31	1.064	0	30.6		ASAP
1.3.D	Promote fodder trees	Area under fodder trees	Acre	0	117	0.256	0	116.66		ASAP
1.3.D	Training of feed producers	No. of feed producers trained	No.	6	0		200	60	30	ASAP

Output	Activity	Indicator	Unit	Annual Target	Achievement	Expenditure (BTN million)	Appraisal target	Cumulative achievement	Achieve-ment %	Financer
1.3.D	Chopping machine (for dairy groups)	No. of chopping machines supplied	No.	316	391	8.192	947	415	44	LOAN
1.3.D	Training on use of crop residues and feed/fodder	No. of training conducted	No.	20	42	0.14	40	50	125	ASAP
1.3.D	Collection of indegenous fodder germplasm	No. of germplasm	No.	25	48	0.468	45	48	107	ASAP
1.3.D	Planting native species fodder	Area under antive podder spp.	Acre		0		150	0	0	ASAP
1.3.D	TMR facilities for youth	No. of unit	No.		0		5	0	0	LOAN
1.3.E	**Provision of Dairy Production Inputs**									
1.3.E	Milk transportatio Cans	No. of Milk cans supplied	No.	150	173	0.845	2000	789	39	LOAN
1.3.E	Cross-breed cattle	No. of cross-breed cattle supported	head	210	409	10.533	2600	967	37	LOAN
1.3.E	Shed construction	No. of sheds constructed	No.	314	568	13.431	2000	1351	68	LOAN
1.3.E	Equipment dairy production groups	No. of equipment supplied to dairy producer groups	No.	44	44	6.223	147	44	30	LOAN
2.1.A	**Strengthening of FCBL for Value Chain Development**									
2.1.A	Capacity development activities	No. of staff trained on value chain development	No.	127	0		450	7	2	ASAP
2.1.B	**Vegetable value-chain design and business plan**									
2.1.B	Vegetable value chain plans prepared	Vegetable value-chain design & business plan in place	Plan	1	0		3	1	33	LOAN
2.1.C	**Dairy value-chain design and business plan**									
2.1.C	Dairy value chain business plans prepared	Dairy value-chain design & business plan in place	Plan	1	0		3	1	33	ASAP
2.1.D	**Value Chain Development, Strengthening and Expansion**									
2.1.D	Multi Stakeholders facilitation process	No. of stakeholders engaged or consulted	No.	5	6	1.5	50	10	20	LOAN
2.1.E	**Technical Assistance (C2)**									
2.1.E	National/External TA	No. of National/External TA recruited	No.	0	0		6	0	0	ASAP
2.2.B	**Support to Marketing Groups**									
2.2.B	Awareness on marketing groups	No. of Marketing groups sensitized	No.	28	37	0.5	200	110	55	RGOB
2.2.B	Strengthening of existing marketing and cooperative capacity development packages	No. of marketing & cooperative capacity development packages strengthened	No.	35	3	0.806	3	3	100	RGOB

Output	Activity	Indicator	Unit	Annual Target	Achievement	Expenditure (BTN million)	Appraisal target	Cumulative achievement	Achieve-ment %	Financer
2.2.C	**Training on Marketing Groups**									
2.2.C	Formation of vegetable marketing groups	No. of vegetable marketing groups formed	No.	2	0		230	26	11	ASAP
2.2.C	Formation of dairy marketing groups	No. of dairy marketing groups formed	No.	0	0		150	20	13	LOAN
2.2.C	Training in marketing & value-chain	No. of groups or individual farmers trained on marketing & value-chain	No.	45	1	0.765	450	46	10	ASAP
2.2.C	Training in packaging & handling	No. of groups or individual farmers trained on packaging & handling	No.	12	0		415	38	9	LOAN
2.2.D	**Support to Entrepreneurs**									
2.2.D	Development of training packages for agriculture entrepreneurs	No. of training packages developed for agriculture entrepreneurs	No.	14	0		2	1	50	ASAP
2.2.D	Entrepreneur identification and engagement process	No. of entrepreneurs identified and engaged	No.	0	0		1	0	0	LOAN
2.2.D	Enterprsie developed	No. of enterprsie developed	No.	6	3	1.374	14	3	21	LOAN
2.2.E	**Other Trainings to Groups, Cooperatives & Entrepreneurs**									
2.2.E	Training provided to other groups and entrepreneurs	No. of groups, coops & entrepreneurs trained	No.	4	0		50	34	68	ASAP
2.2.F	**Multi-stakeholder Platforms & Network development**									
2.2.F	Multi-stakeholder platforms and networks developed	No. of platforms & networking established	No.	5	1	1.5	5	2	40	LOAN
2.3.A	**Planning & Design**									
2.3.A	Business plan-based planning of market infrastructure	No. of market infrastructure developed based on business plan	No.	2	0		3	1	33	LOAN
2.3.A	Development of business plans for 3 windows shops	No. of Developments windows shops convened	No.	0	0		2	1	50	ASAP
2.3.B	**Vegetable Value-chain, Post-harvest & Market Infrastructure & Equipment**									
2.3.B	Value-chain equipment	No. of value-chain equipment promoted	No.	20	4	0.093	12	7	58	LOAN
2.3.B	Value-chain infrastructure	No. of value-chain infrastructure put in place	No.	3	2	3.875	8	3	38	LOAN
2.3.B	Support to KIL	lumpsum					5	1	20	LOAN

Output	Activity	Indicator	Unit	Annual Target	Achievement	Expenditure (BTN million)	Appraisal target	Cumulative achievement	Achieve-ment %	Financer
2.3.C	**Dairy Value-chain Post-harvest & Market Infrastructure & Equipment**									
2.3.C	Construction of milk collection Center (MCC) with processing facilities	No. of MCC constructed	No.	18	5	2.237	44	47	107	LOAN
2.3.C	Construction of milk collection shed (MCS)	No. of MCS constructed	No.	3	1	0.591	180	24	13	LOAN
2.3.C	Milk processing unit (MPU)	No. of milk processing unit established	No.	1	1	3.5	24	12	50	LOAN
2.3.C	Milk chilling van	No. of milk chilling van provided	No.	0	0		4	1	25	LOAN
3.1.A	**Strengthening of the DAMC Market Information System**									
3.1.A	Strengthening of the DAMC market information system	DAMC MIS strengthened	No.	0	0		2	0	0	ASAP
3.1.A	Equipment related to Market Information System upgrade	No. of equipment supplied for MIS upgradation	No.	0	0		4	3	75	LOAN
3.1.B	**Curriculum development of RNR Training and Education institutes**									
3.1.B	Curricula for RNR Training & Education Institutes Developed	No. of curriculum developed	No.	0	0		2	0	0	LOAN
3.2.A	**Participatory policy development and monitoring approach**									
3.2.A	Participatory Policy Development Approaches Developed	No. of participatory policy development process or approach initiated	No.	0	0		2	0	0	ASAP
3.2.B	**Mainstreaming climate resilience and value chain development lessons in agricultural policies**									
3.2.B	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	No.	0	0		3	0	0	ASAP
3.2.C	**Development of a regulatory framework for PPP**									
3.2.C	Regulatory Frameworks for PPP	A regulatory framework for PPP developed	No.	0	0		2	0	0	GRANT
3.2.D	**Technical Assistance (C3)**									
3.2.D	National/International TA	No. of Nationals/International TA recruited	No.	1	0		4	0	0	ASAP
3.2.D	Support budget RNR training and education institutes	Amount supported	No.	0	0		3	0	0	ASAP
3.2.D	Support budget climate resilience mainstreaming	Amount supported	No.	0	0		4	0	0	ASAP

Output	Activity	Indicator	Unit	Annual Target	Achievement	Expenditure (BTN million)	Appraisal target	Cumulative achievement	Achieve-ment %	Financer
3.2.D	Support budget PPP regulatory framework	Amount supported	No.	0	0		3	0	0	GRANT
4.1.A	**Project Management Unit**									
4.1.A	Vehicles	No. of vehicles purchased	No.	2	2	4.506	11	3	27	GRANT
4.1.A	Laptops	No. of laptops purchased	No.	20	15	2	37	25	68	GRANT
4.1.A	Printer	No. of printers purchased	No.	0	0		15	10	67	GRANT
4.1.A	Scanner	No. of scanners purchased	No.	0	0		4	1	25	GRANT
4.1.A	Photocopier heavy duty	No. of heavy duty photocopier purchased	No.	0	0		3	1	33	GRANT
4.1.A	Office equipment	Stes of office equipment purchased	Set	0	0		28	5	18	GRANT
4.1.B	**Capacity Building**									
4.1.B	Training on gender	No. of staff trained on gender	No.	1	0		3	1	33	ASAP
4.1.B	Training on knowledge management	No. of staff trained on KM	No.	1	1	0.044	4	2	50	ASAP
4.1.B	Training on monitoring and evaluation	No. of staff trained on M&E	No.	1	1	0.65	5	1	20	ASAP
4.1.B	Training on financial management	No. of staff trained on FM	No.	2	1	1.5	12	3	25	ASAP
4.1.B	Training and workshop for OPM staff	No. of training	Event				12	0	0	ASAP
4.1.C	**Coordination**									
4.1.C	Coordination meetings with dzongkhags	No. of Dzongkhags coordination meeting held	No.	6	6	0.996	20	15	75	ASAP
4.1.D	**Food Corporation of Bhutan**									
4.1.D	Materials and Equipment Procured for FCBL	No. of Materials and equipment procured by FCBL	No.	0	0		6	2	33	ASAP
4.1.E	**Monitoring & Evaluation**									
4.1.E	Baseline and impact studies	No. of baseline & impact studies conducted	No.	0	0		1	1	100	LOAN
4.1.E	Programme Supervision Mission	No. Of Mission	No.	1	1	0.41	17	4	24	LOAN
4.1.E	Annual outcome surveys	No. of AOS conducted	No.	1	0		7	2	29	LOAN
4.1.E	Other surveys/studies	No. of survey/studies conducted	No.	1	1	1.491	9	1	11	LOAN
4.1.E	Mid-term review	Mid-term review conducted	Mission	0	0		1	1	100	GRANT
4.1.E	Project completion report	PCR prepared	Report	0	0		2	0	0	GRANT
4.1.E	MIS	No. of MIS	No.		0		4	0	0	GRANT
4.1.E	Software development for M&E		No.		0		2	0	0	GRANT

Output	Activity	Indicator	Unit	Annual Target	Achievement	Expenditure (BTN million)	Appraisal target	Cumulative achievement	Achieve-ment %	Financer
4.1.E	Study tours and learning visits (Both in-country and overseas)				4	9.33	9	7	78	ASAP
4.1.F	**Knowledge Management**									
4.1.F	Printing and publications	No. of quality KM products published	No.	1	3	0.204	12	11	92	GRANT
4.1.F	Setting up IMS (CARLEP Webpage)	Web page established	No.	0	0		1	1	100	GRANT
4.1.F	Workshops and meetings	No. of workshops & meetings conducted	No.	1	1	4.309	11	5	45	ASAP
4.2.A	**OPM, Mongar**									
4.2.A	National Program Director	No. of months Paid	Months	12	0		126	48	38	RGOB
4.2.A	Finance Manager	No. of months Paid	Months	12	0		126	48	38	RGOB
4.2.A	Accountant	No. of months Paid	Months	12	0		126	48	38	RGOB
4.2.A	M&E and Gender Manager	No. of months Paid	Months	12	0		126	48	38	RGOB
4.2.A	Project Support Officer	No. of months Paid	Months	12	0		126	48	38	RGOB
4.2.A	KM Officer	No. of months Paid	Months	12	0		126	48	38	RGOB
4.2.A	Component Manager (Agriculture Production)	No. of months Paid	Months	12	0		126	48	38	RGOB
4.2.A	Component Manager (Livestock Production)	No. of months Paid	Months	12	0		126	48	38	RGOB
4.2.A	Driver (x2)	No. of months Paid	Months		0		252	0	0	RGOB
4.2.B	**Liaison Office, Thimphu**									
4.2.B	IFAD Focal Officer, PPD	No. of months Paid	Months		0		126	0	0	RGOB
4.2.B	IFAD Focal Officer, AFD	No. of months Paid	Months		0		126	0	0	RGOB
4.2.C	**Operating Cost, Project Management Unit**									
4.2.C	Vehicle operation and Maintenance	No of Vehicles	LPS	5	0			0		RGOB
4.2.C	Maintenance of Building	Lump sum	LPS		0			0		RGOB
4.2.C	Maintenance of Equipment	Lump sum	LPS		0			0		RGOB
4.2.C	Utilities - telephone, internet, electricity, water, sewerage, fax, post, etc.	Lump sum	LPS		0			0		RGOB
4.2.C	Office supplies	Lump sum	LPS	11	1	0.129		1		RGOB
4.2.C	Travel and Meetings	Lump sum	LPS	2	0			0		RGOB

Annexure 2: A **Case Story of Pema Wangda Venturing Into CAIT-CAHW under Norbugang Gewog, Pemagatshel**

Reproductive efficiency of the dairy herd plays an important role in the economic success of the dairy farm. One of the progress made in reproductive technologies by the department of livestock is artificial insemination (AI) for the improvement of the genetic potential of animals for increasing productivity and improving the performance of the herd. The AI process, technology and conception rates have been improved tremendously within the last decade. The country now has 106 AI outreach centers covering all 20 the Dzongkhags.

With the rapid growth of livestock sectors in the country, there is a high demand for veterinary services. However, limited man force stationed at various areas falls short to reach out to every household. Likewise, rugged terrains and inadequate AI technicians are some of the factors affecting service outreach in remote areas. Therefore, the need for Community Artificial Insemination Technicians (CAIT) and Community Animal Health Worker (CAHW) service delivery was felt important. In 2010, the Department of Livestock initiated CAIT and has been continuously rendering supports to train CAIT from different dzongkhags. The department has trained more than 100 CAIT and is deployed in various parts of the country to extend the veterinary services.

In eastern Bhutan, CAIT-CAHW is being trained annually by the Regional Livestock and Development Center Kanglung, Trashigang in collaboration with relevant agencies with fund support from CARLEP-IFAD to cater breeding service and improve outreach. In FY 2019-20, a total of 28 CAIT has been trained and are actively performing mobile AI and generating a good income from the service delivered to the dairy farmers. Besides, the farmers are also benefited from the services as they are now able to bred herds via AI with semen collected from a good bull and generate income through the sale of live animals and dairy products.

Pema Wangda, 42, is one of the two CAIT-CAHW from Norbugang gewog, Pemagatshel who has received the training during the seventh batch of CAIT-CAWH training organized by the RLDC Kanglung. Since the training, Pema has been actively reaching out to the dairy farmers and has been assisting the gewog livestock officer for the services.

Prior to becoming the CAIT-CAHW, Pema worked as a driver to agencies and later become a dairy farmer. After attending the training, Pema become CAIT-CAHW and benefitted most of the dairy farmers in his community.

“In the past, the AI was performed by the Livestock officers, therefore, most of the dairy farmers could not avail timely

services. Therefore, I saw an opportunity of earning through CAIT-CAHW and attended the training", says Pema.

Today, Pema is one of the trusted CAIT in the region for his quality and timely services at reasonable fees. Despite the transportation challenges, Pema is determined to provide door-to-door services for the farmers at Nu.800 per cow, and depending on the distances, the fees vary from Nu. 1000 per cow to dairy farmers residing 8km away from his station to Nu. 1500 per cow residing in more than 12 Km away.

Pema currently provides his service to Gashari, Tselingzor, Ngongshingborang and Norbugang under his gewog, and sometimes he service reaches out beyond the region such as Mongar and Trashigang. To date, he has performed more than 300 AI and three sex-sorted inseminations. He inseminates 15-20 cows every month on average, with a conception rate of almost 50 %. Pema earns an income of Nu. 3000 to 4000 per month on average from his AI services.

Despite the challenges faced, Pema currently lives his wish to benefit dairy farmers and will continue to reach his services to the dairy farmers. Besides CAIT-CAHW, Pema is also a member of Norbugang Zambala Om Detshen. Together with his group, he works hard to increase dairy productions to achieve self food-sufficiency and substitute dairy imports within the dzongkhag and beyond.

Currently, Pema is contented with his work and he makes sure his clients are also satisfied with his service.

"If AI fails to conceive cow for the first time, I perform AI for the second time in the same cow without fees to maintain the trust among the dairy farmers who hires me ", says Pema. Although the success of the conception rates outweighs the failure rate, Pema feels that he can excel in these skills and expand his outreach to many regions.

Annexure 3: OPM staff list

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