AIN : PAD-2025-14

རྒྱལ་གཞུང་རྩིས་ཞིབ་དབང་འཛིན།

ཚོང་དོན་མོ་ནམ་དང་འཆོ་ཐབས་ཡར་སེང་ལས་རིམ་གྱི་ལས་འབྲེལ་རྩིས་ཞིབ་སྐྱོན་ཞུ།

Performance Audit Report on the Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP)

October 2025

DISCLAIMER NOTE

The audit was conducted in accordance with the International Standards of Supreme Audit Institutions (ISSAIs). The audit was conducted based on the audit objectives and criteria determined in the audit plan and programme prepared by the Royal Audit Authority and the findings are based on the information and data made available by the Office of Programme Management (OPM); Agriculture Research and Development Centre (ARDC), Wengkhar, Mongar; Regional Livestock Development Centre (RLDC), Khangma, Trashigang; Regional Agriculture Marketing and Cooperatives (RAMCO), Mongar, and the six eastern Dzongkhags.

This is also to certify that the auditors during the audit had neither yielded to pressure nor dispensed any favour nor resorted to any unethical means that would violate the Royal Audit Authority's Oath of Good Conduct, Ethics, and Secrecy.

རྒྱལ་གཞུང་རྩིས་ཞིབ་དབང་འཛིན།
ROYAL AUDIT AUTHORITY
Bhutan Integrity House
Reporting on Economy, Efficiency & Effectiveness in the use of Public Resources

RAA/DPCA/PAD(PA-CARLEP)/2025-2026/653 **Date: 13 October 2025**

The Secretary
Ministry of Agriculture and Livestock
Thimphu

Subject: **Performance Audit Report on the CARLEP**

Dasho,

Please find enclosed the ***Performance Audit Report on the Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP)***, covering the period from its inception until June 2024. The Royal Audit Authority (RAA) conducted this audit under the mandate of the Constitution of the Kingdom of Bhutan (2008) and the Audit Act of Bhutan (2018). The audit followed the International Standards of Supreme Audit Institutions on Performance Auditing (ISSAI 3000) and the Performance Audit Guidelines of RAA (2025).

The audit was undertaken to assess the effectiveness and sustainability of the programme in improving the livelihoods of smallholder farmers. It was guided by the following sub-objectives:

i) *To assess the effectiveness of the programme in achieving its intended outputs and targets.*

ii) *To assess the systems and mechanisms put in place to ensure the sustainability of interventions beyond the programme.*

The report was prepared based on a review of documents, data analysis, and discussions with officials from the Office of Programme Management, Agriculture Research and Development Centre, Regional Livestock Development Centre, Regional Agriculture Marketing and Cooperatives, as well as officials and beneficiaries from the six eastern Dzongkhags covered by CARLEP.

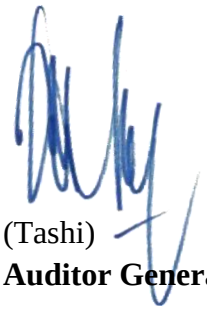
The report highlights key achievements as well as gaps in implementation and concerns on the long-term sustainability of programme outcomes. The RAA provided **13 recommendations** aimed at strengthening future agricultural programmes in Chapter 4 of the report. The findings were shared in the form of a draft report to the concerned agencies on 01 September 2025 for factual confirmations and comments.

In line with the Audit Act of Bhutan (2018) and the Audit Rules and Regulations (2020), the agencies are required to submit Management Action Plan (MAP) specifying the actions for implementing the recommendations with a definite timeframe. The RAA will follow up on the implementation of the corrective actions and recommendations based on this MAP.

Therefore, the RAA would like to request the Ministry to submit a Management Action Plan on or before **15 November 2025** (format attached under **Appendix A**). In the event of non-submission of MAP, the RAA shall invariably fix the overall supervisory accountability on the head of the audited agency in accordance with Section 55(17) of the Audit Act of Bhutan.

We take this opportunity to extend our appreciation to the officials of audited agencies for rendering support and cooperation to the audit team, which facilitated the timely completion of the audit.

Yours sincerely,



(Tashi)
Auditor General

Copy to:

1. Hon'ble Prime Minister, Royal Government of Bhutan;
2. Hon'ble Gyalpoi Zimpon, Office of the Gyalpoi Zimpon;
3. Hon'ble Speaker, National Assembly of Bhutan;
4. Hon'ble Chairperson, National Council of Bhutan;
5. Hon'ble Opposition Leader, National Assembly of Bhutan;
6. Hon'ble Chairperson, Public Accounts Committee, National Assembly of Bhutan;
7. Hon'ble Members, Public Accounts Committee, National Assembly of Bhutan;
8. Director General, Department of Livestock, MoAL, Thimphu;
9. Director, Department of Agriculture, MoAL, Thimphu;
10. Director, Department of Agriculture Marketing and Cooperatives;
11. Dzongdags, Lhuentse, Mongar, Pema Gatshel, Samdrup Jongkhar, Trashigang, and Trashi Yangtse Dzongkhags;
12. Chief Executive Officer, Food Corporation of Bhutan Limited, Phuntsholing;
13. Program Director, Office of the Program Management, CARLEP, Mongar
14. Program Director, Agriculture Research and Development Centre, Wengkhar, Mongar;
15. Regional Head, Regional Livestock Development Centre, Mongar;
16. Regional Head, Regional Agriculture Marketing and Cooperatives, Mongar;
17. Chief Planning Officer, PPD, MoAL, Thimphu.

TITLE SHEET

1.	Title of the Report	:	Performance Audit Report on the Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP)
2.	AIN	:	PAD-2025-14
3.	Audited Entities	:	OPM, ARDC-Wengkhar, RLDC-Khangma, RAMCO-Mongar, Lhuentse Dzongkhag, Mongar Dzongkhag, Pema Gatshel Dzongkhag, Samdrup Jongkhar Dzongkhag, Trashigang Dzongkhag, and Trashi Yangtse Dzongkhag.
4.	Audit Period	:	From inception (2016) to June 2024
5.	Audit Schedule	:	January 2025 to June 2025
6.	Audit Team	:	1. Sangay Tenzin, Sr. Audit Officer
		:	2. Tenzin Wangchuk, Sr. Audit Officer
		:	3. Tenzin Wangmo, Asst. Audit Officer
		:	4. Phub Dem, Asst. Audit Officer
7.	Supervisor	:	Sonam Delma, Assistant Auditor General
8.	Overall Supervisor	:	Dorji Wangchuk, Joint Auditor General

ACRONYMS AND ABBREVIATIONS

AI	:	Artificial Insemination
AMD	:	Agriculture Marketing Department (of FCBL)
AMEPP	:	Agriculture Marketing and Enterprise Promotion Programme
AOS	:	Annual Outcome Survey
ARDC	:	Agriculture Research and Development Centre
AWPB	:	Annual Work Plan and Budget
BAIL	:	Bhutan Agro Industry Limited
BLSS	:	Bhutan Living Standard Survey
CAHW	:	Community-based Animal Health Worker
CAIT	:	Certified Artificial Insemination Technicians
CARLEP	:	Commercial Agriculture and Resilient Livelihoods Enhancement Programme
CGI	:	Corrugated Galvanised Iron
CSI	:	Cottage and Small Industry
CSV	:	Climate Smart Village
DAMC	:	Department of Agriculture Marketing and Cooperatives
DoA	:	Department of Agriculture
FCBL	:	Food Corporation of Bhutan Limited
FEZAP	:	First Eastern Zone Agriculture Programme
HDPE	:	High-Density Polyethylene
IFAD	:	International Fund for Agricultural Development
ISSAI	:	International Standards of Supreme Audit Institutions
KIL	:	Koufuku International Limited
KPI	:	Key Performance Indicator
LG	:	Local Government
LH	:	Lhuentse
MAGIP	:	Market Access and Growth Intensification Project
MCC	:	Milk Collection Centre
MCS	:	Milk Collection Shed
MG	:	Mongar
MoAL	:	Ministry of Agriculture and Livestock
MoF	:	Ministry of Finance
MoHA	:	Ministry of Home Affairs
MPU	:	Milk Processing Unit
MT	:	Metric Tonnes
NPSC	:	National Programme Steering Committee
NSB	:	National Statistics Bureau
NSC	:	National Seed Centre
Nu.	:	Ngultrum
OGOP	:	One-Gewog-One-Product
OPM	:	Office of Programme Management
PDR	:	Progremme Design Report
PG	:	Pema Gatshel
PIM	:	Programme Implementation Manual

RAA	:	Royal Audit Authority
RAMCO	:	Regional Agriculture Marketing and Cooperatives Office
RCSC	:	Royal Civil Service Commission
RGoB	:	Royal Government of Bhutan
RLDC	:	Regional Livestock Development Centre
RNR	:	Renewable Natural Resources
RPIC	:	Regional Programme Implementation Committee
SEZAP	:	Second Eastern Zone Agriculture Programme
SJ	:	Samdrup Jongkhar
TG	:	Trashigang
TY	:	Trashi Yangtse
USD	:	United States Dollar

CONTENT

EXECUTIVE SUMMARY

Background of the Audit

Agriculture remains central to Bhutan's rural economy, with over 60% of the population depending on it. However, the sector has long been characterised by small-scale subsistence farming, limited infrastructure and low productivity, leaving rural communities vulnerable to poverty and other socio-economic risks. To address these challenges, the CARLEP was launched in 2016 to promote commercial farming, strengthen value chains and markets, and improve the livelihoods of nearly 29,000 farmers in six eastern Dzongkhags. By June 2024, Nu. 1.508 billion had been spent on its implementation, of which Nu. 992.05 million (66%) was financed through a loan component.

Given its significance and heavy share of loan, the RAA conducted a Performance Audit of the CARLEP with the following objectives:

i) *To assess the effectiveness of the programme in achieving its intended outputs and targets.*

ii) *To assess the systems and mechanisms put in place to ensure the sustainability of interventions beyond the programme.*

The audit covered all implementing agencies and all six Dzongkhags, reviewing activities from inception through June 2024, and aimed to provide evidence to guide future agricultural policy and investment.

Audit Findings

Part 1: Achievement of Programme Targets

i) Vegetable production targets and input supports:

CARLEP aimed to achieve an annual vegetable production of above 3,600 MT from six eastern Dzongkhags by the end of the programme, organising at least 4,500 households into farming groups, with a minimum of 60% female participation.

The RAA found that CARLEP supported the establishment of 89 agricultural farmer groups comprising 1,248 households (64% female), developed over 1,500 acres of land, and supplied high-yield seeds, greenhouses, electric fencing, and post-harvest equipment. These interventions introduced new varieties of vegetables in the region and promoted modern farming techniques. However, the programme did not consistently achieve its annual production target of over 3,600 MT of vegetables, indicating that the target is less likely to be met by the end of the programme as anticipated. This shortfall was attributed to declining farmer participation, with the number of registered farmer groups falling from 89 to 79, and participating households reducing from 1,248 to 1,098. Factors contributing to this decline

included an ageing farming population, youth migration, and scattered settlements. Furthermore, inputs such as land and equipment were not always utilised efficiently, and seed self-production systems remain weak.

ii) Milk production target and input supports:

CARLEP aimed to increase milk production in the six eastern Dzongkhags by organising at least 2,600 households into dairy farming groups, with a minimum of 50% female participation.

The RAA found that CARLEP supported the establishment of 38 dairy farmer groups comprising 1,274 households (46% female), introduced 2,311 improved-breed cattle, trained 83 Artificial Insemination (AI) technicians, promoted fodder development, and upgraded more than 2,000 cattle sheds. Although milk production and quality improved, making it suitable for commercialisation, the programme lacked defined targets, making it difficult for the RAA to assess achievements. Similar to the vegetable sector, milk production was also affected by declining farmer participation, with the number of groups reducing from 38 to 31 and participating households decreasing from 1,274 to 1,109. This decline was attributed to an ageing farming population, youth migration, and scattered settlements. Other challenges included limited fodder cultivation and weak tracking of AI outcomes and productivity.

iii) Value-chain and market development:

It was envisaged that CARLEP would strengthen FCBL's capacity, which will then develop a national value chain and business plan, based on which 200 enterprises would be established. By the end of the programme, 140 enterprises and 115 marketing groups were expected to operate profitably within the value chain. Community-owned infrastructure, such as cold storage facilities, market sheds, and farm shops, was to be established to support these enterprises to remain operational beyond programme period.

The RAA found that the planned national value chain and business plan were never prepared, and FCBL withdrew from its lead role midway through implementation. Enterprise development activities were carried out by Dzongkhags in response to ad hoc demands, resulting in the establishment of around 33 enterprises against the target of 200. Although six agro-processing units, about fourteen milk processing units, and several mushroom, poultry, and beekeeping enterprises were supported under the programme, besides linking them with schools and institutions, most struggled to sustain operations and establish effective linkages with schools and institutions. Furthermore, market infrastructure facilities provided under the programme lacked a coherent strategy. Cold storage facilities established by FCBL were underutilised despite having opportunity to integrate into the value chain strategies, and farm shops were closed after operating at a loss.

Thus, while agricultural production improved, transforming farming practices from subsistence to a commercially oriented system remains a long-term endeavour.

iv) Capacity building support:

More than 17,000 farmers and staff received training, including overseas exposure visits. However, there is little evidence of impact assessments, and the intended role of lead farmers in extending training has largely lapsed.

v) Monitoring and data:

Monitoring of progress at both the field and programme levels was weak and focused mainly on the implementation of activities and their completion, rather than on targets and outcomes. There was inadequate monitoring of broader goals, reflecting weak risk management within the OPM. Staff shortages, inconsistent records, and inaccurate data further undermined progress reporting and also made it difficult for the RAA to assess results with reliability.

Part 2: Sustainability of the Programme

The PIM (2016) envisioned establishing strong farmer groups, securing assured markets, and developing supportive agricultural policies and systems to ensure that the outputs developed under the programme would continue delivering results beyond its closure. In practice, these mechanisms remain largely unfulfilled, primarily due to unaddressed external factors and incomplete implementation of key initiatives. Farmer groups face demographic pressures, markets remain uncertain, and policy support has been limited. Without further measures, the benefits achieved are likely to diminish once the programme concludes.

Recommendations

The RAA proposed 13 recommendations: 12 to the MoAL and one to the OPM. Key proposals include strengthening and clustering farmer groups, developing strategies to retain agricultural labour and sustain cultivated land, improving market linkages, building local technical support and maintenance systems, fully staffing gewog RNR extension offices, and enhancing monitoring mechanisms and data quality in future.

Conclusion

CARLEP brought significant progress in agricultural infrastructure, production, and livelihoods in the eastern Dzongkhags. However, the sustainability of its benefits is constrained by declining capacity of farmer groups, weak markets, and demographic challenges. Future interventions should continue to empower farmer groups, develop market-oriented value chains, and strengthen institutional capacity, guided by thirteen targeted audit recommendations.

CHAPTER 1: ABOUT THE AUDIT

1.1. Rationale for the Performance Audit of CARLEP

The RAA conducted the performance audit of CARLEP considering the following materiality factors:

i) Significance of agriculture in the rural economy

Agriculture remains the cornerstone of Bhutan's rural economy, providing both sustenance and employment for over 60% of the population. Despite its central role, the sector has long been characterised by small-scale subsistence farming, with production primarily focused on meeting immediate household needs rather than engaging with commercial markets. This has contributed to low productivity, limited income generation, and increased vulnerability to external shocks such as climate change, market volatility, and rising input costs.

In the six eastern Dzongkhags, notable progress in the RNR sectors can be attributed to a series of initiatives supported by the International Fund for Agricultural Development (IFAD), beginning with FEZAP and SEZAP. CARLEP, the recent intervention, was designed to bring a strategic shift towards commercial, market-oriented agriculture, aimed at improving the livelihoods of 28,975 smallholder farmers. In this light, it is both timely and important to assess the programme's success in catalysing agricultural transformation and promoting sustainable rural development, and draw lessons for the future through this performance audit.

ii) Significance of the investment amount

The agriculture sector has consistently been one of the largest recipients of government expenses during the successive FYPs, underscoring its pivotal role in the country's socio-economic development. Since its inception, substantial domestic and international financial resources have been invested in the sector with the objectives of strengthening rural livelihoods, ensuring national food security, and reducing poverty. Among these initiatives, CARLEP stands out as a major investment of recent years, with a total capital outlay of approximately Nu. 2 billion, a combination of domestic financing, grants and a concessional loan from IFAD (with the Debt to Non-Debt Fund ratio of nearly 2:1).

As of June 2024, the utilisation status of the committed CARLEP funds is presented in **Table 1.1**, with further expenditures expected to be added until the completion of the programme in December 2025. The substantial financial outlay underscores the need for a performance audit to evaluate the programme's return on investment and ensure value for money.

Table 1.1: ***Details of money invested by the end of June 2024 (Nu. in Million)***

SPENDING AGENCY	SOURCE OF FUND							TOTAL EXPENDITURE
	DEBT	NON-DEBT						
	IFAD Loan	International Grants			Domestic Contribution			
		IFAD Grant	ASAP Grant	Total Grant	RGoB	Beneficiary's Expenditure in the form of Cost Sharing	Total Domestic Contribution	
	(A)			(B)			(C)	(A+B+C)
OPM	51.45	65.51	33.17	98.67	19.97	1.68	21.64	171.76
ARDC	88.94	3.05	78.12	81.16	-	5.13	5.13	175.24
RLDC	43.50	4.01	26.49	30.51		0.83	0.83	74.84
RAMCO	55.31	5.18	13.87	19.05	-	0.26	0.26	74.62
FCBL	10.79	-	5.54	5.54		-	-	16.33
Lhuentse	106.98	1.12	19.59	20.71	0.13	18.96	19.09	146.78
Mongar	145.11	1.70	28.55	30.25	-	22.61	22.61	197.97
Pema Gatshel	138.67	1.00	27.89	28.89	-	15.55	15.55	183.12
Samdrup Jongkhar	121.62	1.89	27.77	29.66		13.72	13.72	165.00
Trashigang	117.27	1.10	23.05	24.15	-	8.59	8.59	150.01
Trashi Yangtse	112.41	1.22	29.90	31.11	-	8.95	8.95	152.47
Total	**992.05**	**85.77**	**313.94**	**399.71**	**20.09**	**96.29**	**116.38**	**1,508.14**
Debt Vs. Non-Debt	**992.05**	**516.09**						**1,508.14**
	66%	**34%**						**100%**
Debt to Non-Debt Ratio	**1.92 : 1**							

Source: *Compiled by RAA based on financial progress data furnished by OPM, Mongar*

iii) Concern over repetitive issues in financial audit reports

Over the past eight years of implementation of CARLEP, the RAA has carried out annual financial audits and reported several repetitive instances of lapses such as overpayments, wastages, unfinished infrastructure projects, and inadequate monitoring. While many of these issues were resolved through RAA's continuous follow-up system, the programme remains exposed to broader systemic risks that cannot be addressed through routine financial audits. A performance audit is therefore essential to provide an independent assessment of the programme's overall effectiveness, identify systemic weaknesses, and offer actionable recommendations to improve future agricultural interventions in the country.

iv) Need for sustaining programme outcomes beyond the implementing period

A critical concern in CARLEP's implementation is the sustainability of its benefits beyond the programme's duration as the country will be repaying nearly 66% of the total investment with interest. Thus, ensuring value for money requires that the benefits generated be sustained into the future. Long-term impact relies on creating robust policies and institutional mechanisms capable of sustaining the benefits created under the programme. This includes strengthening local capacities, ensuring the continued provision of technical support, and securing funding for the ongoing maintenance and expansion of infrastructure.

Therefore, a performance audit is essential to evaluate the sustainability of the CARLEP programme in relation to institutional frameworks, infrastructure development, and capacity-building efforts, and to determine whether the benefits will endure in the long run.

1.2. Expected contribution to audit impact

The performance audit of CARLEP has assessed whether programme resources were used prudently, whether intended improvements in rural livelihoods, infrastructure, and farmers' engagement in agricultural and livestock enterprises have been realised, and whether systemic weaknesses and risks have been addressed. Based on the findings and recommendations, the audit is expected to contribute towards the following impact:

i) Institutional capacity and governance in the agriculture sector strengthened

The audit identified opportunities to enhance institutional capacity, technical support, and training, as well as the management of farmers' groups and cooperatives. Implementing these measures is expected to sustain CARLEP's benefits and ensure that institutional arrangements effectively support the long-term objectives of the programme.

ii) Value chains and enterprises are sustained

The audit reviewed value chain initiatives and commercial activities supported under CARLEP. Through this assessment, measures were identified to maintain income gains for farmers. These measures are expected to prevent livelihoods from reverting to pre-programme levels and to promote resilient, market-oriented farming practices.

iii) Future interventions and policy decisions guided

The audit will provide insights to the Ministry and implementing agencies to improve accountability, optimise resources, and shape future interventions. By addressing systemic weaknesses, supporting inclusive value chains, and promoting equitable rural development, the audit aims to help agencies deliver lasting and measurable benefits to communities across Bhutan.

1.3. RAA's mandate to audit the CARLEP

The RAA conducted the Performance Audit of CARLEP drawing the authority from Article 25.1 of the Constitution of the Kingdom of Bhutan (2008), which mandates the RAA to audit and report on the economy, efficiency, and effectiveness of public resource utilisation.

Section 69 of the Audit Act of Bhutan 2018 further authorises the RAA to conduct performance audits. The scope of performance audits is broadly defined under Section 70 of the Act, which states that *"performance audit includes, but is not limited to, examining and reporting on the economy, efficiency, and effectiveness of public operations on selected schemes, themes, or topics as deemed necessary by the Authority."*

While the RAA's authority to audit foreign-assisted, donor-assisted, or special projects of the Royal Government is established under Section 90(2) of the Audit Act, the PIM (2016) specifically designates the RAA as the auditor for the CARLEP. Although the Manual explicitly mandates the RAA to audit annual financial statements of the programme, this role, when read alongside Article 25 of the Constitution and Section 69 of the Audit Act, provides a sufficient legal mandate to conduct the Performance Audit on the programme.

1.4. Auditing Standards and Ethical Requirements

The audit was conducted in accordance with the International Standards of Supreme Audit Institutions on performance auditing (ISSAI 3000). These standards require that a performance audit be conducted independently and objectively, assessing whether public resources are used economically, efficiently, and effectively, based on clear criteria and supported by sufficient and appropriate evidence. To adhere to these standards, the RAA has followed the audit procedures as outlined in the RAA's *Performance Audit Guidelines (2025 Revision)*.

The auditors, throughout the audit, remained independent of the MoAL, OPM and all the implementing agencies, and have fulfilled their responsibilities in accordance with the requirements outlined in the RAA's *Oath of Good Conduct, Ethics, and Secrecy of Auditors*.

The RAA believe that the audit evidence obtained is sufficient and appropriate to support the findings and provide a basis for the recommendations.

1.5. Audit Objectives

The audit was conducted with the main objective of assessing the effectiveness and sustainability of the programme in improving the livelihoods of smallholder farmers. This was guided by the following two sub-objectives:

i) *To assess the effectiveness of the programme in achieving its intended outputs and targets.*

ii) *To assess the systems and mechanisms put in place to ensure the sustainability of interventions beyond the programme.*

1.6. Audit Scope

What? The audit assessed the effectiveness and sustainability of the CARLEP in enhancing the livelihoods of smallholder farmers by examining its implementation and long-term impact. It evaluated whether the programme has achieved its intended results, including the successful execution of planned activities and attainment of targeted outputs as measured by its KPIs. Additionally, the audit reviewed the systems and mechanisms in place to ensure that programme interventions continue to benefit farmers beyond its duration, focusing on institutional frameworks, financial sustainability, and

capacity-building efforts. This comprehensive assessment provided insights into the programme's overall success and identified areas for improvement.

Who and Where?

1. Ministry of Agriculture and Livestock, including:
   - Office of the Programme Management, Mongar
   - Agriculture Research and Development Centre, Mongar
   - Regional Agriculture Marketing and Cooperatives Office, Mongar
   - Regional Livestock Development Centre, Trashigang
2. Mongar Dzongkhag
3. Lhuentse Dzongkhag
4. Trashigang Dzongkhag
5. Trashi Yangtse Dzongkhag
6. Pema Gatshel Dzongkhag
7. Samdrup Jongkhar Dzongkhag
8. Food Corporation of Bhutan Limited, Regional Office, Samdrup Jongkhar
9. Koufuku International Limited, Trashigang
10. Bhutan Agro Industry Limited, Lingmithang Plan, Mongar
11. National Seed Centre, Trashi Yangtse

When?

The Audit was conducted by the RAA between 10 March 2025 and 06 May 2025. It covered the key activities implemented by the aforementioned implementing agencies since the inception of the programme (2016) till June 2024.

1.7. Audit Approach

The audit was performed using a combination of the Result-Oriented and the System-Oriented approaches to facilitate a robust and well-rounded assessment. A result-oriented approach examines whether a programme or activity has achieved its intended outputs and outcomes effectively and efficiently. A system-oriented approach examines the processes and controls in place to ensure they support proper functioning and reliable results.

The result-oriented approach was applied in this audit to address the first sub-objective, while the system-oriented approach was employed to address the second sub-objective.

1.8. Data Collection Methods

The RAA applied the following methods to gather and analyse data and information, and draw conclusions thereof:

i) Documents review

The RAA examined relevant policies, programme documents, implementation reports, financial records, monitoring and evaluation reports, and other official documents to assess the design, implementation, and outcomes of CARLEP.

ii) Data analysis

The RAA analysed quantitative and qualitative data, including financial data, programme performance indicators, interview notes, and beneficiary records, to identify trends, gaps, and discrepancies in programme implementation and results.

iii) Physical inspection

The RAA conducted site visits to selected project locations in all six eastern Dzongkhags to verify the existence, functionality, and quality of infrastructure, facilities, and agricultural inputs provided under the CARLEP, as well as assessing their utilisation and maintenance.

iv) Interview, focus group discussion and experts' opinions

The RAA engaged with the key stakeholders, including programme implementers, beneficiaries, government officials, extension workers, and sector experts, to gain insights into programme effectiveness, challenges, and sustainability issues. Structured and semi-structured interviews, as well as focus group discussions, were used to triangulate findings from documentary reviews and data analysis.

CHAPTER 2: INTRODUCTION

2.1. Bhutan's Agricultural Landscape and the Need for CARLEP

Bhutan, a small Himalayan nation known for its commitment to Gross National Happiness, has long maintained a delicate balance between economic development and environmental conservation. With more than 60% of its population dependent on agriculture, the sector remains the backbone of rural livelihoods. However, challenging geographical location, small population size, limited arable land, and reliance on traditional farming methods have constrained agricultural productivity, leaving many rural communities vulnerable to poverty and other socio-economic risks. As the country modernises, the agricultural sector faces growing pressures, including climate change, rural-to-urban migration, and increasing food imports. These challenges have underscored the need for a structured, market-driven approach to agricultural development, leading to the establishment of the Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP).

CARLEP was conceptualised to transition Bhutan's agriculture from a subsistence-based model to a more commercial and resilient system. Traditionally, Bhutanese farmers produced crops and livestock for household consumption, with limited market engagement. This lack of commercialisation, coupled with weak infrastructure, fragmented land holdings, and limited mechanisation, resulted in low productivity and income instability. In recent years, food imports have surged, particularly for rice, vegetables, and dairy that could otherwise be produced domestically. This reliance on imports poses risk to national food security and economic stability, highlighting the need for an agricultural programme that strengthens local production, enhances value chains, and improves market integration.

One of the key drivers behind CARLEP is the challenge of rural poverty and youth unemployment. Younger Bhutanese are increasingly migrating to urban areas in search of better economic opportunities, leaving behind an ageing farming population. If agriculture continues to be perceived as a low-income, labour-intensive sector with little financial security, this trend could accelerate, further undermining food production. CARLEP aims to revitalise rural farming by introducing commercial incentives, supporting agribusiness ventures, and integrating farmers into profitable value chains. By doing so, it seeks to make agriculture a more attractive and viable livelihood, especially for women and youth.

2.2. Goal and Objectives of the CARLEP

The CARLEP is strategically designed to foster the sustainability of smallholder agriculture while addressing the twin challenges of poverty reduction and climate change resilience. The programme's goal is to **"*sustainably increase smallholder producers' incomes and reduce poverty through the commercialisation of production by programme households*."** This overarching goal aligns with Bhutan's national poverty reduction strategy, which emphasises increasing household incomes and improving the socio-economic conditions of rural

communities. By targeting smallholder farmers, the programme seeks to achieve greater income stability through enhanced agricultural productivity and market integration.

The development objective of CARLEP is articulated as increasing returns to smallholder farmers through climate-resilient production of crops and livestock, embedded within nationally organised value chains and marketing systems. It also aims to increase the production of vegetables, rice/maize, and milk in programme areas. These targets are ambitious and focused on tangible outputs that can directly contribute to increased agricultural productivity. However, critically, the focus on increasing production may overlook the challenges surrounding post-production, such as storage, transportation, and market access, which can undermine the sustainability of increased yields. Furthermore, while scaling up vegetable and dairy value chains across Bhutan, particularly in the six eastern Dzongkhags, may contribute to national economic integration, the risks of market over-saturation and price volatility should be considered, as smallholder farmers are vulnerable to fluctuations in global and national market trends.

2.3. Target Area and Beneficiaries

The programme targeted selected Gewogs in six eastern Dzongkhags: Lhuentse, Mongar, Pema Gatshel, Samdrup Jongkhar, Trashigang, and Trashi Yangtse (**Figure 2.1**) with high production and marketing potential in the selected value chains. It was targeted to benefit **28,975** smallholder households, of which **7,115** households would have directly benefitted from vegetable and dairy value chains by the end of the programme.

Figure 2.1: Target areas

Source: *Adopted from PIM (2016)*

2.4. Programme Components and Logical Framework

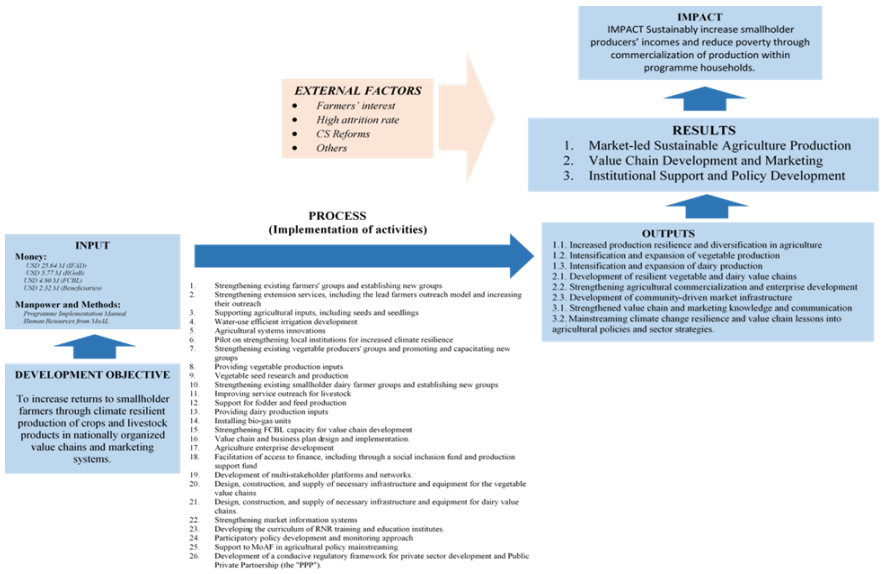
To achieve its objectives, the programme consists of four key components:

i) Market-led sustainable agricultural production
ii) Value chain development and marketing
iii) Institutional support and policy development
iv) Programme management

These components are interconnected and were implemented in close coordination, with a phased approach throughout the programme's duration. The design was aligned with Bhutan's administrative structure, where agricultural and livestock production activities were managed by the Department of Agriculture (DoA), the Department of Livestock (DoL), Dzongkhags, and Gewogs. Processing, marketing, and enterprise development were overseen by the Food Corporation of Bhutan Limited (FCBL), the Department of Agriculture Marketing and Cooperatives (DAMC), Dzongkhags, and Gewogs. FCBL was responsible for the overall design and development of the value chain, integrating both production and marketing components.

A detailed programme logical framework and the interconnections among the programme components, outputs, and activities are visualised in **Figure 2.2**.

Figure 2.2: Visualisation of the Programme Logical Framework



Source: *Developed by the RAA based on the Programme Logframe provided in PIM (2016)*

As seen from **Figure 2.2**, ***Component 1*** of the CARLEP programme, with a budget of **USD 17.34 million**, aims to promote market-led sustainable agricultural production for rural households. It focuses on increasing production resilience, diversifying agriculture, and expanding vegetable and dairy production. Key activities include promoting integrated farming, enhancing extension services, providing agricultural inputs like seeds and irrigation systems, and supporting agricultural innovations. Additionally, the programme seeks to strengthen local institutions for climate resilience and improve the capacities of farmers through training, group development, and access to financial resources. These efforts aim to boost agricultural productivity and foster sustainable livelihoods in Bhutan's rural areas.

Component 2 focuses on establishing organised value chains and marketing systems to enhance smallholder incomes through vegetable and dairy products. The programme supports the creation of farmer groups for effective marketing, facilitated by FCBL and DAMC. FCBL is the lead in value chain development and infrastructure support, collaborating with

Dzongkhag RNR sectors. This component aims to strengthen FCBL's capacity for value chain management, design business plans for vegetable and dairy value chains, and promote climate resilience. Activities include capacity building, facilitating market access, providing financial support, and promoting private sector participation for sustainable marketing and agricultural growth.

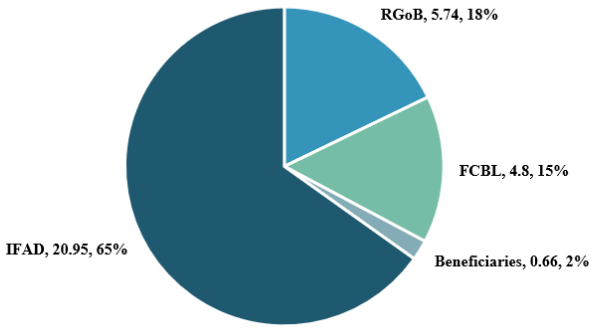
Component 3 focuses on institutional support and policy development with USD 0.526 million aiming to strengthen agricultural institutions and policies for improved, resilient agricultural and marketing practices. This component promotes collaboration among stakeholders, including farmers, researchers, and policy-makers, to enhance climate-resilient farming and value chain development. Activities include knowledge sharing, building market information systems, and curriculum development at agricultural training institutes. Additionally, it supports participatory policy development and mainstreaming climate resilience lessons into agricultural policies. The component also focuses on creating a conducive regulatory framework for private sector engagement and public-private partnerships, enhancing agricultural production and marketing systems.

Component 4 of the programme focuses on MoAL's responsibility for providing core staff and key functions such as gender mainstreaming, monitoring, evaluation, and knowledge management. Monitoring functions include conducting surveys, assessments, and coordinating with IFAD's supervision missions. Lessons learned from previous projects, such as AMEPP and MAGIP, are integrated, emphasising poverty targeting, gender-sensitive value chain development, and marketing system improvement. The programme aligns with Bhutan's 11th Five-Year Plan, focusing on poverty alleviation and social development. It also supports IFAD's strategies for rural development, private sector engagement, and climate resilience, with an emphasis on smallholder farmer empowerment.

2.5. Programme Duration and Funding

The programme was initially scheduled for seven years from 2015 to 2022. However, with the approval of additional financing in the form of a loan and grant, the programme period has been extended until the end of December 2025. The total project cost amounted to **USD 40.37 million**, financed by IFAD, RGOB, FCBL and beneficiaries as shown in **Figure 2.3**.

Figure 2.3: ***Source of funding (Nu. in Million)***



Source: *Developed by RAA based on PIM (2016)*

The initial allocation of the programme fund among the components is shown in **Table 2.1**.

Table 2.1: ***Summary of the programme budget appropriations as per the design report***

Components	IFAD Loan 1	IFAD Loan 2	IFAD Grant	ASAP Grant	RGoB	FCBL	Ben.	Total	%
Market-led Agricultural production	4.81	4.27	0.40	3.03	4.20	-	0.66	**17.36**	**55**
Value chain development and marketing	3.15	1.66	0.17	1.73	0.60	4.28	-	**11.59**	**37**
Institutional Support and Policy Development	0.14	0.65	0.03	0.27	0.01		-	**0.53**	**2**
Project management, Coordination and M&E	0.17	-	0.47	-	0.93	0.52	-	**2.09**	**6**
Total	**8.27**	**6.58**	**1.07**	**5.03**	**5.74**	**4.80**	**0.66**	**31.57***	**100**

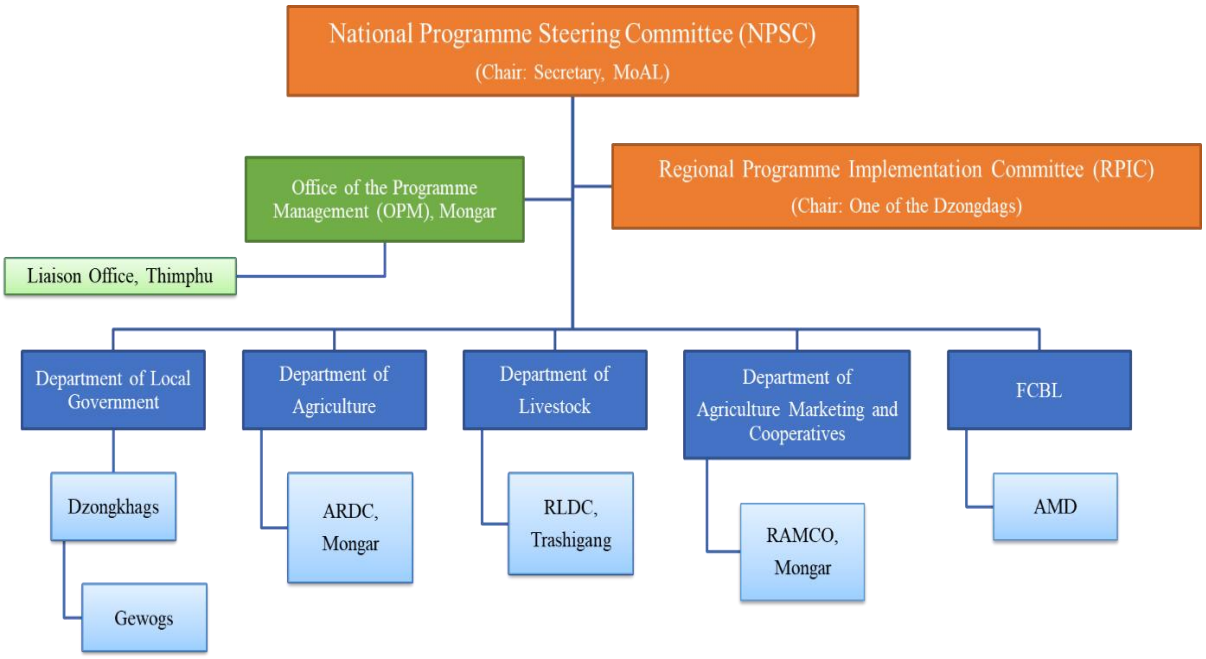
***Source**: Reproduced from the official website of CARLEP. https://carlep.gov.bt/about-us/overview/*

***Note:** In 2022, IFAD has released additional fund of USD 10 million and extended the programme to 2025. The total fund added up to USD 40.37 million.*

2.6. Implementing Agencies

The overall programme implementation is being coordinated by the Office of Programme Management (OPM) based at Wengkhar, Mongar, supported and guided by the National Programme Steering Committee (NPSC) at the national level and the Regional Programme Implementation Committee (RPIC) at the regional level. **Figure 2.4** represents the governance and implementation structure for the programme.

Figure 2.4: ***Programme Management and Coordination Structure***



***Source:** Adopted from PIM (2016)*

The key agencies involved in implementing the programme and their responsibilities are described below:

i) The Ministry of Agriculture and Livestock (MoAL)

The MoAL, serves as the lead programme agency, offering policy guidance, setting policy priorities, and facilitating programme implementation. MoAL is tasked to provide the necessary technical staff and arrange for technical support through its line departments and field agencies. To ensure stability in the OPM, MoAL, in collaboration with the Ministry of Finance (MoF) and the Royal Civil Service Commission (RCSC), is required to ensure that appointed staff, particularly those assigned to the OPM, remain until the programme is completed.

ii) National Programme Steering Committee (NPSC)

The NPSC is a committee instituted to review the programme's progress, issue policy directives to ensure smooth implementation, provide guidance on programme management, and resolve issues that cannot be resolved by the RPIC. The committee is chaired by the Secretary of MoAL and includes the heads of the line departments for Agriculture, Livestock, Agricultural Marketing & Cooperatives, Public Accounts (MoF), MoHA, as well as the Chief Executive Officer of FCBL. The Programme Director of the OPM serves as the Member Secretary of the NPSC.

iii) Regional Programme Implementation Committee (RPIC)

The committee consists of Dzongdags, Dzongkhag Tshogdu Chairpersons, Dzongkhag Agriculture Officers, Dzongkhag Livestock Officers, Dzongkhag Planning Officers, Accounts Officers, Programme Directors from ARDC Wengkhar and RLDC Khangma, and OPM staff. The RPIC is chaired by one of the Dzongdags on rotation basis, depending on the location of the meeting. The Programme Director of OPM also serves as the member secretary of the RPIC.

The primary responsibilities of the RPIC were to:

i) Align and approve the Annual Work Plan and Budget (AWPB) of the implementing agencies, including the annual procurement plan, and
ii) Address and resolve any issues related to programme implementation. The RPIC is required to meet once a year.

iv) The Office of Programme Management (OPM)

The OPM leads the implementation of CARLEP, supported by agencies under the line departments such as DoA, DoL, DAMC, and FCBL. It is responsible for overall coordination, including planning, progress monitoring, and reporting. The OPM manages fund allocation and disbursement to implementing agencies, as well as generates and disseminates knowledge to RGoB, IFAD, and other relevant stakeholders.

v) Dzongkhags and Gewogs

The Dzongkhags and Gewog extension centres operating in the six eastern Dzongkhags are responsible for identifying programme interventions in consultation with the Gewog Tshogde, Gup, Gewog Administrative Officer, and Tshogpas, with support from the Dzongkhag Agriculture and Planning Officers. They also take the lead in implementing Dzongkhag and Gewog-based activities, with technical assistance from service agencies of the line departments, including central programme agencies and commodity programmes.

vi) Agriculture Research and Development Centre (ARDC), Wengkhar, Mongar

The ARDC is responsible for supporting the implementation of the agriculture production component by providing technical assistance in cereal crops and horticulture. It is expected to promote permaculture innovations and adopt the lead farmer approach to enhance agricultural extension and outreach services. ARDC is required to focus on boosting production and commercialisation, particularly emphasising off-season cultivation and integrating fruits, vegetables, and cereal crops into farming systems.

With support from the programme, ARDC is expected to develop, test, and promote climate-resilient agricultural technologies for both cereal and horticultural crops. The centre will enhance farmers' technical skills through hands-on practice and support the establishment of commodity-based villages in the region. Additionally, ARDC is also required to contribute to knowledge management by creating mechanisms for knowledge sharing, producing knowledge products, and preparing activity reports and updates through its communication sector.

Collaboration with central service agencies such as the National Plant Protection Centre, National Soil Services Centre, National Post-Harvest Centre, National Mushroom Centre, National Organic Program, Agriculture Machinery Centre, and National Seed Centre (NSC) will be essential for ARDC to obtain specialised technical assistance in their respective areas. Through these initiatives, ARDC will play a key role in advancing agricultural development, promoting sustainable farming practices, and improving the technical capacity of farmers across six regions.

vii) Regional Livestock Development Centre (RLDC), Khangma, Trashigang

The RLDC is responsible for supporting the livestock production component by providing technical assistance in dairy production technology. RLDC is expected to lead the implementation of the Lead Farmers model for livestock, offering farmers-to-farmers extension services, alongside the Community-based Animal Health Worker (CAHW) model. The centre is also responsible for managing and operating these extension models, aiming to scale them up nationwide and ensure their sustainability, which will ultimately benefit the livestock and dairy farmers, promoting self-sustaining roles for CAHWs throughout the programme's duration.

Within its regional mandate, RLDC should provide technical support and backstopping to Dzongkhags for livestock development activities, while ensuring effective monitoring of field activities. Additionally, the centre is expected to contribute to the programme's knowledge management by sharing good practices related to livestock and dairy activities.

Moreover, RLDC is required to collaborate with other regional agencies, including the Regional Pig and Poultry Farm, the Regional Nublang Breeding Farm, the Regional Mithun Breeding Farm, and the Regional Centre for Aquaculture, to mobilise the necessary production inputs. These collaborative efforts are essential to ensure the success of the livestock and dairy development initiatives.

viii) Regional Agriculture Marketing and Cooperatives Office (RAMCO), Mongar

The component manager for value chain and marketing at OPM, deputed from RAMCO, is responsible for conducting market research and facilitating the sharing of information. This role involves identifying potential sites for farm shops, setting up new farm shop structures, and identifying active groups to connect with schools and institutions. The component manager is also required to focus on strengthening existing community production and marketing groups, as well as fostering the development of new ones and enhancing their capacity.

Given the rising youth unemployment issues in the country, RAMCO is also expected to work on promoting entrepreneurial development and engaging youth in the commercialisation of farming. This will include encouraging cost-sharing through the establishment of proper linkages with credit schemes and agencies.

ix) Food Corporation of Bhutan Limited (FCBL)

The Food Corporation of Bhutan Limited (FCBL) is the main lead to develop the agricultural value chain by establishing marketing systems at programme sites, including storage facilities and farm shops that provide farm inputs and essential groceries. FCBL is also responsible for managing a buy-back mechanism, allowing farmers to repay in kind during harvest. It is tasked to handle the collection, processing, packaging, and marketing of produce at market rates, ensuring fair compensation with support from government schemes like the Minimum Support Price. FCBL is required to initiate contract farming arrangements and transition to an online commodity exchange platform, modernising the agricultural marketing system, boosting productivity, and stabilising farmers' incomes.

CHAPTER 3: AUDIT FINDINGS

Bhutan observed significant agricultural and livestock development over the years in the six eastern Dzongkhags as a result of numerous interventions and support from the government and development partners such as IFAD. The RAA reviewed this progress through its examination of the CARLEP.

This chapter presents the material findings from the RAA's examination of the CARLEP programme, highlighting both observed achievements and persistent challenges. It identifies gaps in achieving intended results and draws evidence-based lessons to inform future strategies for sustaining programme outcomes. The chapter is structured to focus on the most significant findings, ensuring clarity and relevance for decision-makers.

The findings are presented in two parts. Part-A outlines the key interventions carried out under CARLEP and the issues and challenges linked to their results, providing an overall view of the programme's effectiveness. Part-B describes the RAA's observations on the sustainability strategies set out in the PIM (2016). By presenting the findings in this structured and evidence-focused manner, the chapter supports informed planning and policy decisions while maintaining transparency, accountability, and compliance with recognised performance auditing standards.

PART-A: Achievement of Programme Targets

CARLEP was primarily introduced with the overall goal ***to "sustainably increase smallholder producers' incomes and reduce poverty through the commercialization of production by programme households"*** which was planned to achieve by supporting smallholder farmers to pursue climate-resilient production of vegetables and livestock products, embedded within nationally organised value chains and marketing systems. The programme was targeted to enable a minimum of 23,000 farming households to cope with the impacts of climate change, and benefit 5000 households with at least a 25% increase in household assets and income, as compared to baseline and reduce child malnutrition by 15% from baseline.

3.1. Vegetable Production Target and Input Utilisation

As per the PIM (2016), the CARLEP envisioned to achieve an annual vegetable production of at least 3,600 MT by the end of the programme period from the six eastern Dzongkhags. In order to achieve this, a minimum of 4,500 households will be organised into vegetable farming groups, with at least 60% female participation, and various infrastructure investments were prioritised to be made, such as land development, greenhouses, electric fencing, and irrigation facilities, along with the provision of improved quality seeds and seedlings.

Following the assessment of the achievement of the vegetable production target, the RAA made the following observations:

3.1.1. Vegetable Production Target

The RAA noted that CARLEP had been successful in introducing new and improved vegetable varieties, marking a significant milestone in enhancing food and nutrition security in the region while also creating opportunities for farmers to earn better market prices, particularly for off-season and climate-resilient crops.

For instance:

i) As reported in the Stories of Change (2020), the programme introduced short-duration radish (35 days) and heat-tolerant cauliflower varieties (*Pragati-40, White XC*) at ARDC Wengkhar and ARDC Lingmethang. These varieties are well-suited for off-season cultivation, enabling farmers to grow them during hotter periods and thereby increase production and income.

ii) As reported in the Annual Progress Report (2022-2023), a new onion variety (*Wengkhar Gop*) was introduced, with ARDC continuing efforts to improve its yield and adaptability.

iii) As reported in the Stories of Change (2022), quinoa cultivation was expanded across eastern dzongkhags, increasing from 64 acres in 2017 to over 500 acres by 2020. This expansion provided farmers with new income opportunities.

iv) As reported in the Stories of Change (2024), by 2024, the programme successfully piloted hybrid maize seed production (*WHM-1*) in Udzorong, Trashigang. This initiative included capacity building, on-farm trials, and seed production, all validated by the RAA during a site visit.

Notwithstanding these positive developments, the RAA observed challenges in achieving the vegetable production targets established in the PIM (2016). To assess performance against this target, the RAA reviewed the actual vegetable production data collected during the programme period. As the methods for recording and reporting production data varied, the analysis drew on three distinct data sources, as outlined below:

i) Comparison with production data recorded based on the vegetables sold to schools and institutes

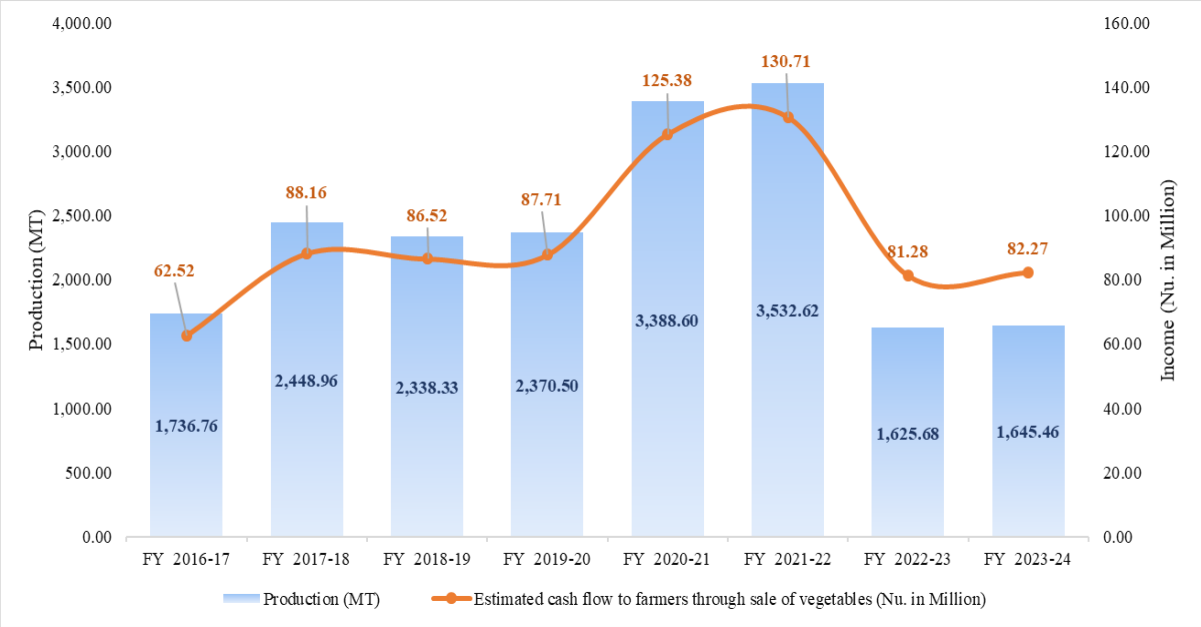
Farming households were mobilised into groups and linked to schools and institutions for supplying vegetables as intended by the programme. **Figure 3.1** presents the production trend predicted by the sale of vegetables by these groups to schools and institutions, which was aggregated and furnished to the RAA by OPM.

As seen in **Figure 3.1**, the overall trend in vegetable production remained relatively steady over the period of eight years, with a gradual increase from 1,736.76 MT in 2016-17 to 3,388.60 MT in 2020-21, reaching its highest in 2021-22 at 3,532.62 MT. However, the production declined from 21-22 to 2022-23, and it stayed low through 2023 to 2024. The annual production

did not meet the programme target of 3,600 MT in any year, indicating a high risk of not achieving the desired target by the end of the programme.

The dataset does not capture sales made by the farmers groups outside these institutions and, therefore, may not represent their actual production.

Figure 3.1: ***Vegetable production in six eastern Dzongkhags as predicted by the quantity of vegetables sold by the registered farmers groups to schools and institutes***



Source: *Computed and developed by OPM, Mongar*

ii) Comparison with production data reported in the Annual Outcome Survey Reports

According to the PIM (2016), the Annual Outcome Survey (AOS) was designated as the means of verifying programme outcomes. These surveys were meant to be conducted every year from the second year of implementation, but they took place only in 2018, 2019, 2021, and 2023. Considering the production data reported in AOS reports, a generally stable level of production was noted across the years, with 817 MT in 2018 and outputs remaining consistently above 1000 MT in 2019, 2021, and 2023 (**Figure 3.2**). When compared against the targets specified in the PIM (2016), production reported in the AOS consistently fell short throughout 2018 to 2023, reinforcing the indication that the programme was not on track to achieve its intended production target.

The AOS data, however, had limitations in scope:

- The 2023 AOS included production data for carrot, broccoli, tomato, onion, cabbage, asparagus, chilli, peas, cauliflower, radish, potatoes, beans, brinjal, pumpkin, spinach, spinach, and lettuce, which were collected from 8 Gewogs.

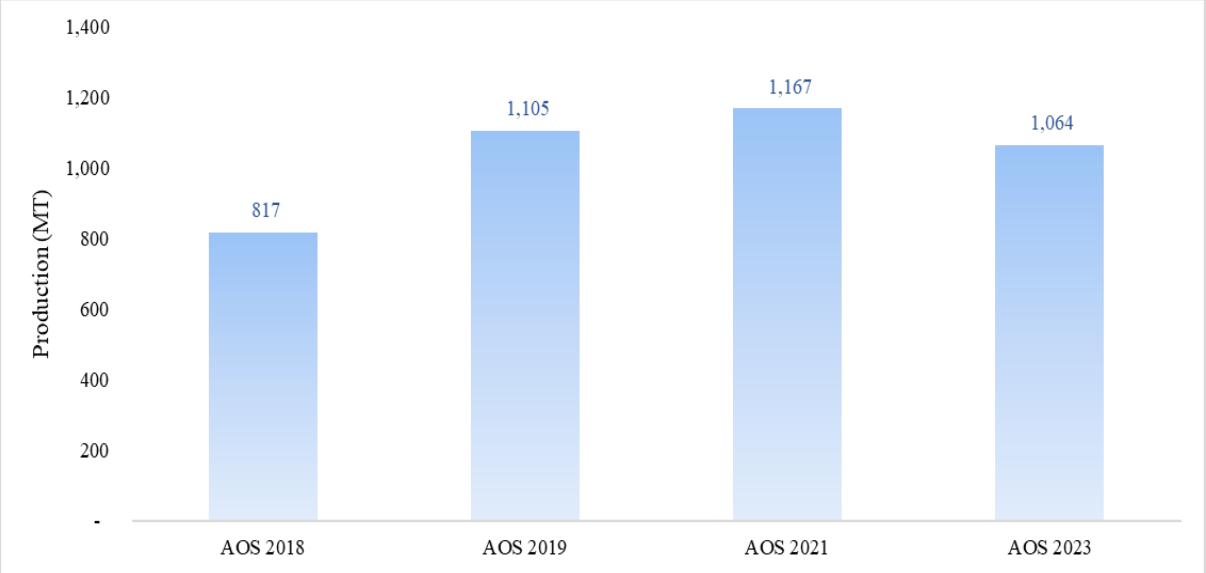
- The 2021 AOS covered carrot, broccoli, tomato, onion, cabbage, asparagus, chilli, peas, cauliflower, radish, potatoes, beans, brinjal, pumpkin, and spinach, which were collected from 13 Gewogs.

- The 2019 AOS included only carrot, broccoli, tomato, onion, cabbage, asparagus, chilli, cauliflower, and radish, which were collected from 10 Gewogs.

- The 2018 AOS covered carrot, broccoli, tomato, onion, cabbage, asparagus, chili, cauliflower, radish, and other crops for which details were not available; which were collected from 10 Gewogs.

Given the absence of consistent data collection and geographical coverage across the different AOS, the RAA had to exercise caution when analysing year-on-year comparisons.

Figure 3.2: ***Vegetable production in six eastern Dzongkhags as per the AOS Reports of CARLEP***



Source: *Developed by RAA based on the data reported in AOS Reports*

iii) Comparison with production data published by the National Statistics Bureau (NSB)

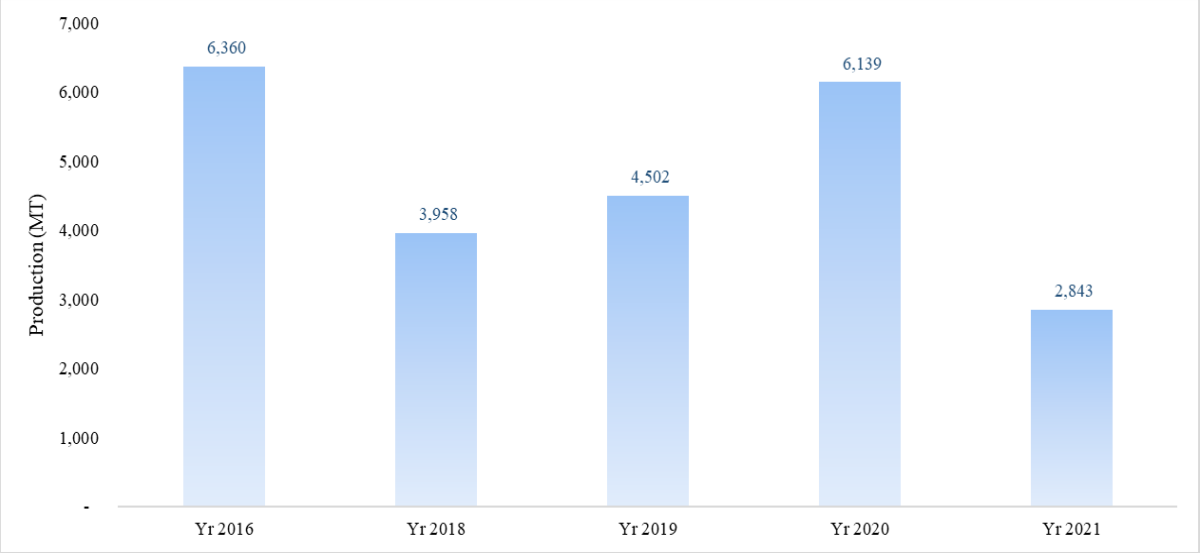
The RAA also considered the production data reported in the Agricultural Statistics published by NSB to provide an alternative means of predicting vegetable production trend in the region. The production data of NSB consists of an exhaustive list of vegetables but the RAA considered selective list of vegetable (Cauliflower, Beans, Broccoli, Chilli, Tomato, and Carrot) for this assessment based on the highest instances of seeds supplied under CARLEP, and to match with the common types of vegetables considered for AOS. While the production figures reported by the NSB significantly exceeded CARLEP's targets, the overall trend indicated a decline, as shown in **Figure 3.3**.

However, the data published by the NSB reflect production from all farming households in the six eastern Dzongkhags, not only those supported by CARLEP (where the target of 3,600 MT

was expected to be achieved by approximately 4,500 households), making direct comparison with programme-specific targets difficult.

Therefore, while the NSB data provide useful insights into overall regional trends, they cannot be solely relied upon to assess CARLEP's direct impact on vegetable production.

Figure 3.3: ***Vegetable production in six eastern Dzongkhags as per the data published by NSB***



Source: *Developed by RAA based on the data published by NSB in Annual Agriculture Statistics*

Note: *Data in this Figure consists of production of Cauliflower, Beans, Broccoli, Chilli, Tomato, and Carrot in six eastern Dzongkhags which were chosen to match the data scope of AOS.*

Thus, the absence of a single reliable and comprehensive dataset complicates the assessment of vegetable production targets under CARLEP. While the aggregated data of OPM indicates steady growth but persistent underachievement, AOS data shows stable outputs but consistently below targets, and NSB data reflects much higher production though not strictly attributable to programme beneficiaries. These discrepancies highlight the challenges of relying on fragmented and inconsistent data sources, ultimately limiting the ability of RAA to conclusively determine whether CARLEP achieved its production target as envisaged in the PIM (2016).

The OPM responded that the programme has kept vegetable production data only for farmer groups linked to schools and institutions. This data does not necessarily reflect the production of most households supported by CARLEP. The production data collected during the AoS were limited to sampled households and may not represent all CARLEP households. Thus, these data are useful only for understanding average vegetable production per household.

The OPM therefore suggested that the RAA consider the vegetable production data reported in the annual Integrated Agriculture and Livestock Census (IALC) as a reliable benchmark. This would allow a more accurate assessment of CARLEP's impact on vegetable production in relation to its targets.

For the programme areas covering six eastern Dzongkhags, the OPM stated that the production data of all farming households reported in the IALC can be directly linked to CARLEP interventions, as nearly all farming households in the region are included in the project. Household coverage has exceeded 30,000, surpassing the programme target of 28,975 households.

The RAA acknowledges the responses and the information provided by the OPM. However, it reiterates that during the programme period, there was no single, reliable, and complete dataset that provides the total vegetable production in the CARLEP regions, indicating non-monitoring of progress and targets. The available data were fragmented, incomplete, and inconsistent.

*Based on the data from the IALC (2025), the RAA took the total production of the main vegetables supported by CARLEP (considering cauliflower, beans, broccoli, chilli, tomato, and carrot) as shown in **Table 3.a** to assess the achievement of targets. Accordingly, the RAA notes that the total production is close to the target, which may suggest the target was met if all vegetables are considered. Moreover, these figures also include productions from all farming households in the six eastern Dzongkhags, not just the approximate 4,500 households anticipated. As a result, it remains unclear whether the CARLEP-supported farmers fully achieved the programme targets.*

*The RAA also observes that the overall vegetable production trend, considering all the vegetables reported by the NSB (**Figure 3.a**), shows a declining trend within the six Dzongkhags. This may be due to external factors such as a declining farming population, market access or farming practices (as discussed under finding 3.1.2).*

Regarding household coverage, the RAA acknowledges the OPM's justification for surpassing the targeted 28,975 households. In view of the issues related to data reliability and completeness, this figure could not be independently confirmed.

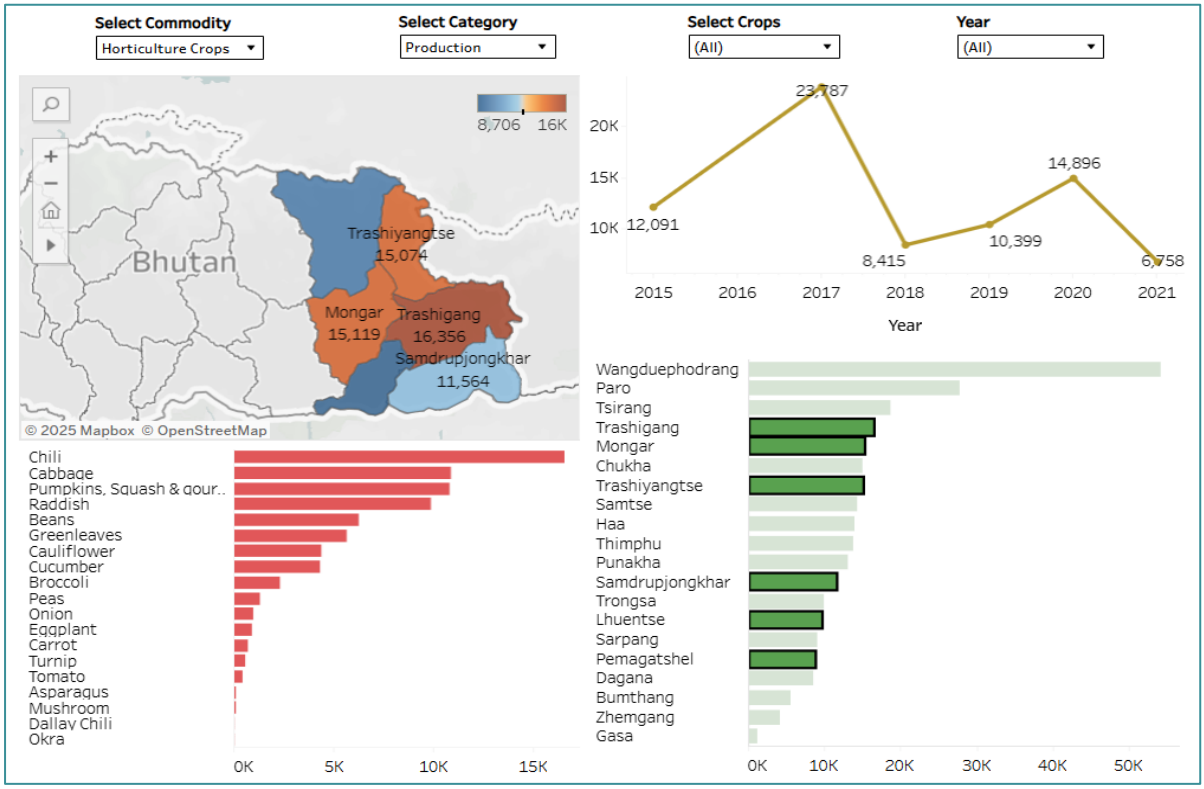
Table 3.a. Production data as per IALC (2025)

Dzongkhag	Cauliflower	Beans	Broccoli	Chilli	Tomato	Carrot	Total
Lhuentse	16.61	41.06	18.15	302.60	2.88	3.61	384.91
Monggar	105.38	156.13	124.79	402.76	3.56	17.82	810.44
Pema Gatshel	22.18	54.45	24.64	85.13	6.63	2.48	195.51
Samdrup Jongkhar	33.45	128.57	37.68	108.26	8.57	4.85	321.38
Trashigang	70.75	185.06	80.54	704.54	5.79	10.90	1,057.58
Trashi Yangtse	25.56	66.80	41.50	365.07	2.76	5.29	506.98
Total	**273.93**	**632.07**	**327.30**	**1,968.36**	**30.19**	**44.95**	**3,276.80**

Source: *Compiled by the RAA based on data published in IALC (2025).*

Note: *Data in this Table consists of production of Cauliflower, Beans, Broccoli, Chilli, Tomato, and Carrot in six eastern Dzongkhags which were chosen to match the data scope of AOS.*

Figure 3.a: Vegetable production trend in six eastern Dzongkhags as per Agriculture Dashboard



Source: *Agriculture Dashboard available at https://doa.gov.bt/agriculture-at-a-glance/ . The data reported in the dashboard matched the annual agriculture statistics published by the NSB.*

3.1.2. Vegetable Farmers Participation Targets

The organisation of farmers into groups has long been recognised as an important strategy to improve agricultural productivity and support rural livelihoods. This approach was first noted in the 8th FYP and gained considerable momentum during the 10th and 11th FYPs. Over time, forming farmers groups has become a central part of national agricultural policy, including its clear inclusion in the Economic Development Policy of 2016.

In line with this strategy, the IFAD supported the registration of 70 vegetable farming groups through the MAGIP between 2010 and 2015. Building on this foundation, the CARLEP, launched in 2016, also aimed to expand this effort significantly. CARLEP set an ambitious goal of ***organising at least 4,500 farming households into structured vegetable groups, with a minimum of 60% female members*.** These groups were expected to produce 3,600 MT of vegetables annually by the end of the programme. The objective was not only to increase production but also to empower rural communities and improve food security.

However, analysis of data obtained from RAMCO showed that a total of 163 vegetable farming groups were registered during the period of both MAGIP and CARLEP. Of these, 89 groups were formed during the CARLEP period, with a membership of **804** women members and **444** male members. While the programme has not yet achieved its overall target household of 4500 members (as shown in **Table 3.1),** it successfully met and exceeded its female participation target of a minimum of 60%, with women accounting for 66% of the total membership.

Table 3.1: ***No. of registered agricultural FGs***

Particulars	No. of FGs registered	Membership Details	No. of FGs currently active	Membership Details
Vegetable FGs registered during the period of MAGIP (2010 - 2015)	70	*Female = 556* *Male = 438*	53 (76%)	*Female = 436* *Male = 310*
Vegetable FGs registered during the period of CARLEP (2016 - 2023)	**89**	***Female = 804 (64%)*** ***Male = 444***	**79 (89%)**	***Female = 723 (66%)*** ***Male = 375***
No. of vegetable FGs whose registration date and membership details are not mentioned in the record	4	*Details not available*	1 (25%)	*Details not available*
Total	**163**		**133 (82%)**	

Source: *Compiled by RAA based on the farmers group data furnished by RAMCO, Mongar*

As seen in **Table 3.1**, only **133** out of **163** groups remained active at the time of audit, indicating a 20% decline in the number of registered groups. This drop also reduced women's participation to 723 members, raising concerns about the sustainability and long-term viability of the groups.

The RAA noted that the shortfall in achieving the targets, as well as the sustainability challenges faced by the groups in the region, was largely caused by several interrelated factors, some of which are beyond the control of CARLEP. Content analysis of interviews and discussions with beneficiaries, local government officials, and extension supervisors reasonably supports the following as the key contributing factors:

(i) Demographic Changes

Through the household visits and farmers interviews, corroborated with inputs from the LG leaders and extension officials, the RAA observed that a key challenge to sustaining the farmers' groups and strengthening farmers participation in vegetable production is the significant decline in the number of productive-aged individuals within farming households. Young people were reported to have migrated to urban areas for education or employment, leaving behind an ageing and shrinking agricultural workforce.

This demographic change is corroborated by data from the past three Bhutan Living Standard Survey (BLSS) reports, which show a steady decline in the involvement of younger age groups in agriculture over the past decade (**Table 3.2**). Participation rates among children aged 0-14 and youth aged 15-19 have consistently decreased, while the proportion of farmers aged 64 and above has increased. Although the 20-64 age group currently forms the core of the agricultural workforce, it is gradually ageing, with limited entry of younger individuals into the sector. This growing dependence on older farmers raises concerns about the long-term sustainability of domestic agricultural production.

Table 3.2: ***Analysis of aging pattern of rural population using the data reported in BLSS Reports***

Age Group	Number of Male (BLSS 2012 → BLSS 2022)	Changes	Number of Female (BLSS 2012 → BLSS 2022)	Changes
0-14 years	59,878 → 49,581	-10,297	56,348 → 48,219	-8,129
15-19 years	22,030 → 17,642	-4,388	21,791 → 17,748	-4,043
20-64 years	98,989 → 106,612	+7,623	110,145 → 116,921	+6,776
64+ years	16,977 → 21,454	+4,477	14,823 → 20,874	+6,051

Source: *Compiled by RAA based on the data published in BLSS 2012 and BLSS 2022*

The combined effects of youth outmigration, demographic shifts, and a declining agriculture workforce pose a serious threat to the long-term sustainability of agriculture sector in the region. Adverse impacts are already evident during RAA's visits to farming households, where portion of fields were left fallow, cattle were sold due to lack of household members to care for them, and farming activities were largely limited to subsistence farming despite huge investments made through CARLEP and its predecessor projects.

(ii) Scattered Settlements

Scattered settlements and difficult terrain have hindered effective coordination among group members. A typical example is the Climate-Smart Village (CSV) of 16 households in Woongborang, Dungmaed Gewog in Pema Gatshel Dzongkhag, which initially pooled farmland and resources for collective vegetable cultivation. However, the group has eventually became inactive, as members were scattered across locations to manage joint activities efficiently. As a result, resources such as greenhouses and sprinkler irrigation systems were found managed solely by one member, the former chairperson of the group.

Many farming groups faced similar challenges, with members citing long distances as a barrier to fulfilling responsibilities. Inactive participation often led to member withdrawals, causing some groups to dissolve due to reduced commitment and participation.

(iii) Lack of accessible market

Market access is one of the significant barriers to group sustainability, with produce often wasted due to lack of timely access to markets. *For instance*, the RAA noted from the beneficiary list that ARDC has promoted ginger cultivation in Daksa, Gongdu Gewog in Mongar Dzongkhag, by supplying ginger seeds to 41 households. However, while assessing the current status of ginger production in the area, the RAA noted that ginger-producing farmers no longer produce ginger. Some of the beneficiaries shared that they were once forced to leave a large heap of unsold gingers due to lack of buyers causing a huge loss to the farmers. Such post-harvest losses have discouraged farmers to continue with ginger cultivation.

The RAA noted that the CARLEP has relied heavily on the effective functioning of farmers groups as a critical means to achieve its intended programme results. However, the unsustainability, inactivity of farmers groups, and shortfall in forming the targeted numbers of groups have inhibited the programme's ability to achieve the vegetable production targets highlighted in *Finding 3.1.1*. Without measures to ensure the long-term viability of these groups, the sustainability of benefits of the CARLEP may not be guaranteed. As a result, progress towards strengthening rural livelihoods and enhancing food security, as originally envisaged, may have been significantly constrained.

Notwithstanding the above, the RAA noted that the programme has been able to cater to around **25,000 households** (after removing the duplicate entries) in terms of various interventions as per the record provided to the RAA by the OPM.

3.1.3. Agricultural land development

With the support of CARLEP, approximately **1,410.12** acres of land were developed on a cost-sharing basis between the programme and beneficiary farmers. The interventions encompassed terracing, surface stone removal, and wetland consolidation. These activities were undertaken with the objective of enhancing land suitability for cultivation, expanding the cultivated area, and, most importantly, rehabilitating fallow land for productive use, thereby contributing to increased agricultural output.

The records furnished by the OPM showed that approximately **430.13** acres of fallow land have been brought back into cultivation under the CARLEP initiative to date. **Table 3.3** shows the summary of the furnished record.

Table 3.3: ***Total acres of land developed under CARLEP***

Dzongkhags	Dryland (Ac)	Wetland (Ac)	Total Area (Ac)	Actual Fallow land Reversed (Ac)
Lhuentse	73.29	231.47	294.94	24.24
Mongar	133.12	38.32	202.57	64.74
Pema Gatshel	37.72	23.38	187.99	136.29
Samdrup Jongkhar	86.39	95.75	249.07	66.93
Trashigang	49.64	50.19	211.17	121.1
Trashi Yangtse	121.04	167.74	264.39	16.83
Total	**501.20**	**606.85**	**1,410.12**	**430.13**

Source: *Compiled by RAA based on infrastructural data furnished by OPM, Mongar*

Note: *The table contains some discrepancies, such as totals not matching the sum of individual figures, and has been compiled from raw data provided by the OPM. The figures are presented as received to ensure transparency of the source information.*

During site visits to randomly selected locations, beneficiaries expressed appreciation for the support received. They reported that the developed land had enabled them to adopt mechanised farming practices, particularly through the use of power tillers, which they considered an

important response to the declining farming population within households. Some fallow lands were also found to have reversed as shown in **Picture 3.1**.

The RAA noted that neither the OPM nor the Dzongkhags maintained data on the exact acreage of developed land currently under cultivation. During RAA's physical verification at 25 sites (seven in Lhuentse, five in Mongar, six in Samdrup Jongkhar, five in Trashi Yangtse, and one each in Trashigang and Pema Gatshel), inefficiencies were observed in the utilisation of developed dryland sites. Two sites were found completely fallow, while the remaining sites commonly had portions left fallow (example shown in **Picture 3.2)**. Although formal agreements had been signed between the Gewog Administrations and landowners, requiring full utilisation of the developed land or recovery of associated costs, these agreements were ineffective in ensuring compliance. Nonetheless, wetland sites visited were found to be fully utilised.

Picture 3.1: ***Example of fallow land reversed through land development initiatives of CARLEP***

A sample of reversed fallow dryland (Drepoong Gewog, Mongar)

A sample of reversed fallow wetland (Khaling Gewog, Trashigang)

Picture 3.2: ***Examples of land developed under the CARLEP left uncultivated***

Portion of dry land left fallow/repurposed after development (Shermuhoong Gewog, Mongar; developed in FY 2020-21)

Entire dry land left fallow after development (Chongshing Gewog, Pemagarshel; developed in FY 2019-20)

Portion of dry land left fallow as surface stone collections were not carried out properly (Tsakaling Gewog, Mongar; developed in FY 2019-20)

Portion of dry land left fallow development (Khamdang Gewog, Trashi Yangtse; developed in FY 2012-21).

Field visits and interviews with beneficiary farmers and local government leaders revealed that one of the main reasons for underutilisation of land was the shortage of farm labour, as detailed in *finding 3.1.2*. Additionally, threats from wildlife were frequently cited as another reason for leaving portions of developed land uncultivated, particularly in remote areas. Farmers often maintained these areas as buffer zones to deter wildlife, as crops grown in these zones are regularly damaged by wild animals.

The underutilisation of developed land has led to a loss of potential capacity, which may have contributed to the shortfall in production targets noted earlier. In addition, it has defeated the very objective of CARLEP to reverse the trend of fallow land through the land development initiatives. Nonetheless, the land developed under CARLEP is considered as valuable long-term asset. With improved enabling conditions, these lands hold significant potential to contribute meaningfully to the broader goal of expanding and intensifying vegetable production.

3.1.4. Supply of seeds and seedlings

During the design phase, CARLEP has identified inadequate domestic seed production as one of the major challenges to building agricultural resilience. Accordingly, providing subsidies for seeds and seedlings has been one of the priorities of the programme. This has successfully introduced new varieties of vegetables to farmers within the region, including hybrid cole crops and other heat-tolerant seeds. This intervention also includes the supply of seedlings of various types of fruits to selected farmers (especially to lead farmers) in line with the mandate of ARDC, Wengkhar and the Million Fruit Tree Plantation Programme.

Initially, vegetable seeds were distributed free of cost, and later a cost-sharing mechanism was adopted in accordance with the government's subsidy policies. This support helped farmers to access essential agricultural inputs and sustain vegetable cultivation, and experiment with new fruit varieties.

While the programme aimed to promote seed self-production as a sustainable strategy, the RAA found that it did not establish a strong foundation for long-term seed system resilience and self-sufficiency, despite more than a decade of support.

As a result,

a) Farmers continue to rely on imported hybrid vegetable seeds supplied by the National Seed Centre (NSC), particularly the cole crops that have higher market demand. Bhutan currently lacks the technical capacity to produce hybrid seeds domestically, both at the farm level and within the NSC. Although some local vegetable varieties can be reproduced at the farm level, farmers generally lack technical knowledge regarding seed maturity and quality. Moreover, these local seeds have limited market value compared to hybrid varieties and are primarily cultivated for self-consumption.

Consequently, the transition from subsistence to commercial vegetable farming will likely continue to depend heavily on imported hybrid seeds, making farmers vulnerable to global supply disruptions. The challenges related to limited domestic seed production, as identified in the PIM (2016), therefore remain unaddressed within the region even at the concluding period of the CARLEP.

b) The farmers will have to continue to depend on the government subsidies. If the subsidies are discontinued, the farmers may have to bear the full cost of seeds, which ranges from Nu. 400 to Nu. 700 per packet. Moreover, the limited number of seed agents in rural areas implies that the farmers will continue to rely on gewog agriculture extension offices for seed access, much as they did during the subsidy period under the CARLEP. This may impose an economic burden on the farmers and impede the broader objective of transitioning subsistence agriculture to market-oriented farming.

c) Furthermore, despite a decade of implementation, the programme efforts did not translate into the development of any new policies to build national capacity for seed self-sufficiency, as envisioned under the Programme Component 3.

The absence of a clearly articulated sustainability strategy within the PDR (2015) and PIM (2016) may have resulted in these shortcomings. Although these important documents identified seed and seedling support as a key intervention, they lacked the detailed procedures required to strengthen the seed distribution system.

Specifically, the roles and responsibilities of the implementing agencies were not defined clearly. For instance, the ARDC and the Dzongkhags were engaged in seed distribution, resulting in duplication of efforts. Although the PIM mandated the ARDC to promote permaculture models, the seeds distributed by ARDC were similar to those distributed by the Dzongkhags, with no evident application of permaculture principles. This has also limited the generation of any new research outputs by ARDC to affect seed and seedling policies and regulations in the country, despite its research mandate.

The OPM explained that while most farmers preserve seeds through traditional methods, concerns about seed quality and its impact on productivity persist. Consequently, the CARLEP intervention aimed to improve farmers' access to high-quality seeds as a means of boosting production in the short to medium term.

The OPM justified that to ensure a sustainable supply of seeds and seedlings, it was strategised that the *Agriculture Sales and Service Representatives* will keep providing vegetable seeds throughout the seasons, while *Private Nursery Operators*, partially supported by the CARLEP, will ensure the availability of fruit tree seedlings whenever required by farmers. Additionally, the NSC plans to establish a mobile seed distribution system, which will further benefit farmers by making seeds more readily accessible.

The RAA acknowledges the existence of private nurseries, Agriculture Sales and Service Representatives, and the planned mobile distribution system to improve seed access in future.

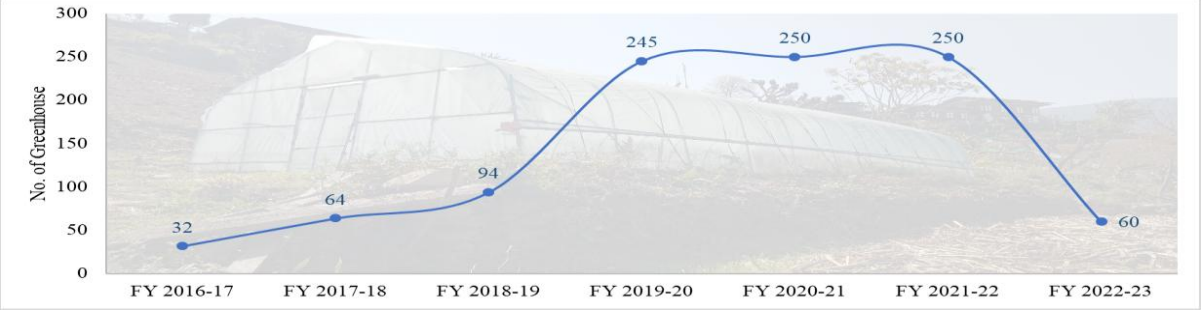
However, the RAA reiterates that these initiatives will benefit the farmers to have access to quality seeds in the short term, but developing domestic capacity for high-yield vegetable seed production and a national strategy for seed self-sufficiency may require further attention. Continued reliance on imported seeds and government subsidies highlights the need for long-term measures in capacity building, policy support, and coordination among institutions to move towards national seed self-sufficiency.

3.1.5. Supply of greenhouse

The CARLEP has played a significant role in supporting farmers in the regions to transition from traditional farming to greenhouse farming by providing subsidies in greenhouse materials and also financing the awareness programmes to farmers about their benefits. Greenhouse farming has the potential to substantially increase crop yields by offering controlled environmental conditions. It enables year-round and off-season cultivation of fruits and vegetables while reducing the incidence of pests, diseases, and insects due to the protected growing environment.

As per the records of the OPM, around **995** numbers of greenhouse were issued benefiting **1,345** households (in groups as well as individuals) with direct implications on the lives of **652** women as detailed under **Figure 3.4** and **Table 3.4**. Initially, these greenhouses were issued only to lead farmers. However, with increasing demand from the general farming community, Dzongkhags and gewogs began supplying greenhouse materials to groups as well as individual farmers under CARLEP's subsidy as part of their routine agricultural services.

Figure 3.4: ***Number of greenhouses distributed annually***



Source: *Developed by RAA based on the data reported in Annual Progress Report of OPM, Mongar*

Table 3.4: ***Number of households to whom greenhouse materials were supplied under CARLEP***

Dzongkhag	No. of Greenhouses supplied	No. of Households benefitted	No. of Women benefitted
Lhuentse	152	202	108
Mongar	172	285	150
Pema Gatshel	125	153	59
Samdrup Jongkhar	201	202	83
Trashigang	230	353	173
Trashi Yangtse	115	150	79
Total	**995**	**1,345**	**652**

Source: *Compiled by RAA based on the data reported in Annual Progress Report of OPM, Mongar*

Upon physical inspection of 24 greenhouses (eleven in Mongar, four in Trashi Yangtse, three in Pema Gatshel, and one each in Trashigang and Lhuentse) the RAA found that many farmers were making good use of the facilities except for two instances where greenhouses were repurposed for non-agricultural uses such as cow sheds or poultry shelters. In group-based allocations, it was noted in a few cases that only one member was utilising the greenhouse and other members were not using it, which may reduce the intended collective benefit. Variations in the uses of greenhouses supplied under CARLEP are illustrated in **Picture 3.3** and **3.4**.

In addition, there was no disaggregated record of greenhouses supplied till date particularly the types distributed, their utilisation, or cultivation, making it difficult to evaluate the outcomes of the greenhouse. The review of the OPM's monitoring reports showed installation status of greenhouses at some locations but there was no information on whether these greenhouses were being used for their intended purpose. This deficiency indicates inadequate monitoring and supervision of the utilisation of these materials.

Picture 3.3: ***Examples of greenhouses used for the intended purpose***

Example of greenhouse used for nursery raising (vegetable)

Example of greenhouse used for winter cropping

Example of greenhouse used for nursery raising (fruit)

Picture 3.4: ***Two of 24 greenhouses verified by the RAA repurposed for other uses***

Greenhouse used as cattle shed

Greenhouse used as a poultry shelter

3.1.6. Irrigation facilities for vegetable farming

As part of broader efforts to promote efficient water use and strengthen both agricultural productivity and climate resilience in vegetable farming, irrigation and water management support were provided under the CARLEP. During field visits to selected locations, the RAA identified two categories of such support:

a) Water-efficient and climate-resilient irrigation facilities provided to individual households

This intervention involved the supply of water storage tanks, HDPE pipes, sprinkler heads, drip irrigation sets, cement bags for tank construction, and gutter pipes for rainwater harvesting to selected households. The primary objective was to enable vegetable cultivation throughout the year through improved access to water. Drip irrigation sets were specifically provided to individuals operating greenhouses.

The RAA observed that while these supports provided short-term benefits to the farmers, they were largely used for subsistence-level activities, such as irrigating kitchen gardens. The supports appeared to be a one-time, with limited alignment to long-term agricultural goals. Materials such as HDPE pipes, sprinklers, and drip irrigation systems were prone to damage and required regular maintenance and replacements, for which future supply was not guaranteed. Consequently, the benefits were sustained only as long as the materials remained functional.

For instance, in Sershong village under Kurtoe Gewog in Lhuentse, a beneficiary reported that the Syntex tank cracked within two years of installation and became unserviceable. Another beneficiary in the same village received a Syntex tank without the necessary complementary materials, leaving it unused inside a greenhouse. In some cases, beneficiaries repurposed the tanks for storing drinking water, which was not the intended purpose of the support. In other locations, tanks provided no benefit at all due to lack of a nearby water source. A few examples are illustrated in **Picture 3.5**.

Picture 3.5: ***Illustrations of sustainability issues in water-efficient and climate-resilient irrigation facilities provided to individual households***

A syntax tank was provided to irrigate vegetables inside a greenhouse but was supplied without inlet pipes.

Example case: a syntax tank issued for irrigating vegetable garden was instead used as a multipurpose water storage container because of water scarcity.

Example case: a drip irrigation set was discarded after it became clogged with mud during its first use and was rendered useless.

Example case: from Dungmaed Gewog, Pema Gatshel, where the sprinkler head supplied to a farmers group now got worn-out. No such sprinkler heads are available in market to replace.

Example case from Jarey Gewog, Lhuentse, where the farmer received only a Sintax tank without pipes.

Example case from Yangneer Gewog, Trashigang, representing a typical plastic pit developed under CARLEP's support to store water for orchard and kitchen garden (example of a best practices to replicate in other places).

These shortcomings were largely the result of improper delivery of the intervention, as evident from instances where, within the same community, one household received only a Syntex tank while others received a Syntex tank along with pipes, and some received no complementary materials at all.

b) Community-based dryland irrigation schemes

In contrast to the earlier cases, the RAA found that the community-based irrigation schemes have a more positive impact towards the mass agricultural production by benefiting a larger number of households and demonstrated greater potential to enhance agricultural productivity. The intervention under this category generally included the construction of a large concrete overhead tank positioned at a higher elevation to tap the water from water sources. From this central tank, water was distributed to several smaller tanks located at lower elevations at strategic locations from which beneficiaries channel the water using HDPE pipes to irrigate their fields. Examples of such facilities are provided in **Picture 3.6**.

These systems were designed to serve the wider community and deliver collective benefits. They also promote more sustainable and equitable use of water resources, making them a more effective model for future interventions.

Given that the beneficiaries of such schemes experienced tangible improvements in crop production and land use, it suggests that such models may offer a more viable pathway for future scaling.

Picture 3.6: ***Example of a community-based dryland irrigation systems***

Reservior tank to tap the water from the sources (Chaling Gewog, Mongar)

Several distribution tanks installed at strategic locations to distribute the water to surrounding fields (Chhali Gewog, Mongar)

Cole crops cultivated as an outcome of the irrigation scheme (Chhali Gewog, Mongar)

Reservior tank to tap the water from the source (Shongphu Gewog, T/gang)

Distribution tanks (Shongphu Gewog, T/gang)

Pipelines channeling the water to beneficiary households (Shongphu Gewog, T/gang)

Land development with assured irrigation facilities which is among the successful interventions of the CARLEP (Norbugang Gewog, Pema Gatshel)

Dryland irrigation system consisting of a small concrete tank with HDPE pipes currently serving as a main driver of mass vegetable production (Drametse Gewog, Mongar)

Mass wheat cultivation (besides vegetables) by a youth group as an outcome of the dryland irrigation (Khaling Gewog, Trashigang).

3.1.7. Electric fencing support

Recognising the long-standing human-wildlife conflict, electric fencing support was one of the infrastructural supports provided under the CARLEP. As per the data obtained from the OPM, a total of approximately **1,180.93** kilometres of electric fencing has been installed within the six Dzongkhags, benefiting around **2,682** households with direct implications on the lives of **1,136** women, as detailed in **Table 3.5**.

Table 3.5: ***Length and number of beneficiaries covered through CARLEP electric fencing support***

Row Labels	Length of Electric Fencing (Km)	No. of Households Benefitted	No. of Women Benefitted
Lhuentse	129.00	178	117
Mongar	177.80	331	144
Pema Gatshel	49.63	232	75
Samdrup Jongkhar	355.00	563	171
Trashigang	172.50	617	233
Trashi Yangtse	297.00	761	396
Total	**1,180.93**	**2,682**	**1,136**

Source: *Compiled by RAA based on the infrastructural data furnished by OPM, Mongar*

Upon discussing with the framers and LG leaders, and physically inspecting 12 electric fencing sites (two in Mongar, one in Pema Gatshel, and four each in Samdrup Jongkhar and Trashigang), the RAA noted that electric fences were found to be functioning effectively, with a positive impact on beneficiary communities. Farmers reported substantial reductions in crop damage, which had previously resulted in significant crop losses to wildlife. Such experiences shared by the farmers indicate that the electric fencing has not only safeguarded the crops from wildlife threats but also restored farmer confidence and encouraged investment in crop production.

Across the Dzongkhags, electric fencing support provided to communities as groups demonstrate stronger maintenance practices that keep the fences functional for many years, compared to that provided to individual households. These practices, including regular cleaning, shared responsibility, clear rules and timely repairs, illustrate effective models of fence maintenance. Taking Trashi Yangtse as an example, in Bumdeling households clear the fence line twice a month and carry out annual repairs of wires and poles, with fines or additional work imposed on those who do not participate. Similarly, in Bayling and Shali, households either maintain their own sections or work collectively on the main line. Damaged energisers and poles are also replaced promptly, reflecting a strong community commitment to upkeep.

Despite these benefits and effective maintenance practices, several challenges remain, including:

a) Unsustainability of wooden posts

One of the main elements of electric fencing is the wooden post that supports the wires. Farmers pointed out that these posts are an inherent weakness of the system. They

usually last less than two years, depending on the quality of wood, as the base decays from moisture or insect damage. The collapse of even a single post disrupts the current flow along the wires. Frequent replacement is therefore required, which imposes recurring costs and logistical burdens on farmers. This highlights the need to explore more durable materials for future fencing systems.

b) Vulnerability of energiser

A common issue raised by farmers and LG leaders was that the energiser device, which powers the fence, is vulnerable to lightning damage. The programme has no provision for replacement, and any new devices must be sourced from a single dealer in Thimphu. Making such devices available in local markets therefore remains an important area for future development.

c) Ineffectiveness in protecting certain sections of animals

Farmers reported that electric fencing has helped them defend against wildlife, but it does not provide protection from all animals. Monkeys, which are among the main threats, are hardly deterred by the fences. This points to the need for further improvements in the system to make it more effective.

d) Declining effectiveness (current flow) as the wire ages

Another weakness, as pointed out by the farmers, is that once the fencing wires gets old, it conducts lesser current and wild animals can easily bypass the fence. This also contributes to the economic burden to the farmers from replacement.

e) Cost of replacement and major maintenance

One of the primary issues reported by farmers is the labour-intensive nature of maintaining the fence. The system requires regular clearing of vegetation around it, as any contact between grass and the electric wire causes energy dissipation, rendering the fence ineffective in preventing the animals. This is particularly burdensome during the summer season when vegetations grow rapidly. For households with a limited farming population, this task diverts critical time and effort away from other essential farming activities.

These challenges undermine the long-term benefits of electric fencing. While the initial results are promising, the difficulties in maintaining the fencing lead to eventual discontinuation or reduced effectiveness of the system. When fences are left unrepaired or not properly maintained, the threat of wildlife intrusion resurfaces, and the original gains in agricultural productivity and farmer morale begin to erode. **Picture 3.7** illustrates the common challenges farmers face in the upkeep of the electric fence.

Picture 3.7: ***Examples of different conditions of electric fencing observed during field visits***

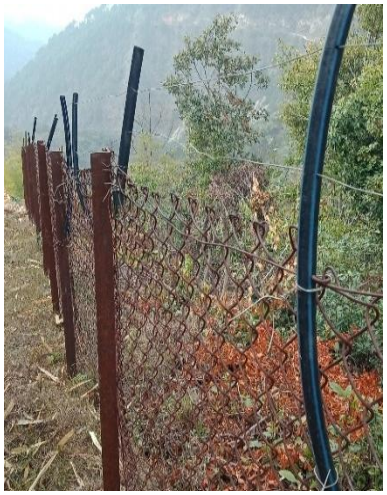
Example of a well-maintained electric fence – Farmers are required to frequently clear bushes from the surroundings and replace old wooden poles, a task they consider tiresome and time-consuming.

Example of electric fence covered in bush – in such cases, the electric currents are absorbed by the bushes, making the wires in the fence ineffective in preventing the animals.

Fallen wooden post with disconnected wires causing power loss to the entire fence, allowing animals to pass through.

Typical example of an electric fence with worn-out wires replaced by barbed wire.

Example of a potential innovation: electric fence using iron posts and wires reinforced with nylon rope (not supported by CARLEP).



Example of a potential innovation: a hybrid chainlink and electric fence, known to protect against monkeys (piloted at ARDC-Wengkhar; not supported by CARLEP).

A sample of the energiser used in electric fencing – these devices have been reported to be vulnerable to lightning strikes, requiring farmers to unplug the power supply during storms. However, this is not always feasible, especially when no one is at home during the farming season. If damaged, the energiser must be replaced by purchasing a new one (without subsidies) from a sole supplier based in Thimphu.

3.1.8. Post-harvest equipment

PIM (2016) identified post-harvest losses as one of the key challenges prior to implementing the programme and prioritised support for subsidised post-harvest tools and equipment to enhance production resilience and intensify agricultural output.

In this area, the RAA noted that several post-harvest tools and equipment were distributed on a cost-sharing basis to selected beneficiaries, including chilli grinders, electric and solar dryers, sealing machines, weighing balances, wheat flour mills, quinoa de-husking machines, and carrying trays.

However, as seen in **Table 3.6**, the distribution of post-harvest equipment was carried out on a limited scale, with only **319** instances recorded, of which **172** were recorded without any details on the equipment provided. Further, it was noted that there were no clear criteria or basis used for the selection of beneficiaries. For instance, some supports were provided to farmers in groups while some supports were provided to individual farmers based on their placement of demand to the extension centres. **Picture 3.8** illustrates the example of major post-harvest infrastructure established under the CARLEP.

Table 3.6: ***Types of post-harvest equipment supplied and number of beneficiaries***

Type of post-harvest Equipment	No. of Beneficiaries			
	Lhuentse	Trashigang	Trashi Yangtse	Total
Chilli Grinder	51			51
Electric Dryer & Sealing Machine	21			21
Set of Wheat Flour Mill Machine (Weighing Balance, Multi-Grinder, Frying Pan)		1		1
Solar Dryer (Example given in **Picture 3.8**)		24	47	71
Weighing Balance		3		3
- No details -			172	172
Total	**72**	**28**	**219**	**319**

Source: *Compiled by RAA based on the beneficiary list furnished by OPM, Mongar*

Picture 3.8: ***Post-harvest infrastructures supported by CARLEP noted by the RAA during the field visits***

Solar dryer (Phuntshothang Gewog, S/Jongkhar)

Solar dryer (Gongdu Gewog, Mongar)

Example of onion curing shed provided to a farmers group (Kidlung, Gangzur Gewog, Lhuentse)

Example of onion curing shed provided to an individual farmer (Gongthung, Yangneer Gewog, Trashigang)

The RAA noted instances of such post-harvest equipment remaining underutilised. *For instance*, the stock register of RAMCO showed that six number of Quinoa de-husking machines supplied to Quinoa farmers groups but were not installed and utilised since the date of their receipt.

The limited scale of distribution, coupled with the lack of clarity in selection of targets, indicates an inadequate and inconsistent approach to addressing post-harvest needs. With insufficient support for critical post-harvest stages, it remains unclear if farmers are able to reduce losses, add value to their produce, or access markets effectively. Such approach does not ensure alignment with project objectives and long-term sustainability.

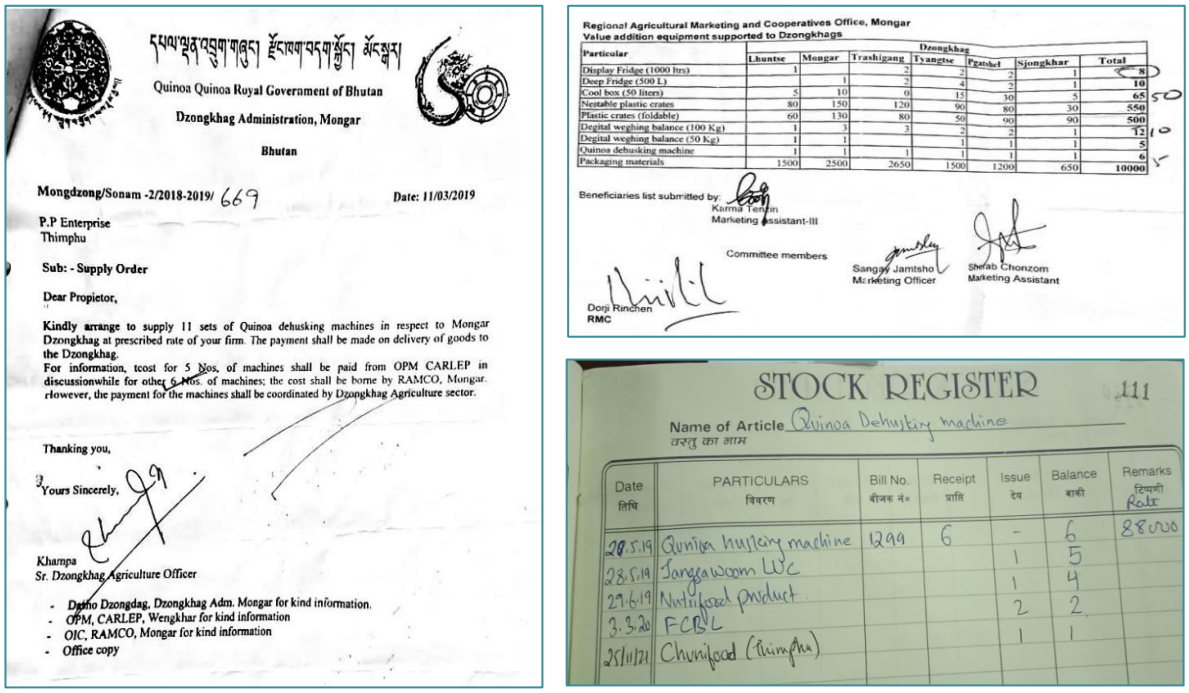
One of the reasons could be the lack of strategic distribution of the post-harvest equipment based on the predefined target beneficiaries which would otherwise ensure alignment with project objectives and long-term sustainability.

The OPM has responded that the onion curing sheds are used only during the onion harvest and curing season. For instance, the shed provided to Rinchen Wangmo at Gongthung under Yangnyer Gewog, Trashigang, generated Nu. 25,000 from the onion harvest and proper curing carried out in the shed. Regarding the observation on the underutilisation of quinoa de-husking machines supplied by RAMCO, the OPM clarified that these machines were not procured with funding assistance from CARLEP. The RAA was requested to verify the source of support before taking further action on this observation.

The RAA notes the OPM's response highlighting the benefit of the onion curing shed, which enabled the owner to earn Nu. 25,000. This demonstrates the shed's potential to generate seasonal income for farmers and could be considered as a good practice for future support. Areas with higher onion production potential could particularly benefit from multiple sheds to support collective and large-scale production. Notwithstanding this, the RAA reiterates that without systematic targeting and monitoring, there remains a risk of post-harvest equipments being underutilized, thereby undermining the long-term returns of such investments.

*While the RAA acknowledges OPM's clarification that that the underutilised quinoa de-husking machines were not funded by CARLEP, it cannot be ruled out that some of these machines remain underutilised or unmonitored. During verification of RAMCO's financial records, the RAA noted an instance where six quinoa de-husking machines were procured by Mongar Dzongkhag vide Supply Order No. Mongdzong/Sonam-2/3018-2019/669 dated 11.03.2019, of which five were forwarded to be booked under the CARLEP funding support (**Figure 3.b**). Upon tracking their deployments, the RAA learned that some of the de-husking machines had not been installed or put to use.*

Figure 3.b: Instance of quinoa de-husking machines procured under CARLEP support.



Quinoa Quinoa Royal Government of Bhutan
Dzongkhag Administration, Mongar
Bhutan

Mongdzong/Sonam -2/2018-2019/ 669 Date: 11/03/2019

P.P Enterprise
Thimphu

Sub: - Supply Order

Dear Propietor,

Kindly arrange to supply 11 sets of Quinoa dehusking machines in respect to Mongar Dzongkhag at prescribed rate of your firm. The payment shall be made on delivery of goods to the Dzongkhag.
For information, tcost for 5 Nos. of machines shall be paid from OPM CARLEP in discussionwhile for other 6 Nos. of machines; the cost shall be borne by RAMCO, Mongar. However, the payment for the machines shall be coordinated by Dzongkhag Agriculture sector.

Thanking you,

Yours Sincerely,

Khampa
Sr. Dzongkhag Agriculture Officer

- Dasho Dzongdag, Dzongkhag Adm. Mongar for kind information.
- OPM, CARLEP, Wengkhar for kind information
- OIC, RAMCO, Mongar for kind information
- Office copy

Regional Agricultural Marketing and Cooperatives Office, Mongar
Value addition equipment supported to Dzongkhags

Particular	Dzongkhag						
	Lhuntse	Mongar	Trashigang	Tyangtse	Pgatshel	Sjongkhar	Total
Display Fridge (1000 ltrs)	1		2	2	2	1	8
Deep Fridge (500 L)		1	2	4	2	1	10
Cool box (50 liters)	5	10	0	15	30	5	65
Nestable plastic crates	80	150	120	90	80	30	550
Plastic crates (foldable)	60	130	80	50	90	90	500
Degital weghing balance (100 Kg)	1	1	3	2	2	1	12
Degital weghing balance (50 Kg)	1	1		1	1	1	5
Quinoa dehusking machine	1	1	1	1	1	1	6
Packaging materials	1500	2500	2650	1500	1200	650	10000

Beneficiaries list submitted by:
Karma Tenzin
Marketing Assistant-III

Committee members
Sangay Jamtsho
Marketing Officer
Sherab Chonzom
Marketing Assistant
Dorji Rinchen
RMC

STOCK REGISTER 111

Name of Article Quinoa Dehusking machine
वस्तु का नाम

Date दिनि	PARTICULARS विवरण	Bill No. बीजक नं०	Receipt प्राप्ति	Issue देय	Balance बाकी	Remarks टिप्पणी Rate
28.5.19	Quinoa husking machine	1299	6	-	6	88000
28.5.19	Tangawoom LIC			1	5	
29.6.19	Nutrifood product			1	4	
3.3.20	FCBL			2	2	
25/11/21	Chunifood (Thimphu)			1	1	

Source: *From RAA's documentation of audit process – rapid vouching held at RAMCO.*

3.2. Milk Production Target and Input Utilisation

Similar to the vegetable productions, the CARLEP also envisioned to achieve a certain level of milk production (exact target not determined) by the end of the programme period from the six eastern Dzongkhags. In order to achieve this, minimum of 2,600 households will be organised into dairy farming groups, with at least 50% female participation, and various investments were prioritised to be made, such as cattle shed constructions, fodder development, milking canes and buckets, along with implementation of various cattle quality promotion activities like supply of cows, supply of breeding bulls, and supply of AI materials.

With regard to the achievement of the milk production target, the RAA noted the following observations:

3.2.1. Milk Production Target

The RAA noted that CARLEP played a pivotal role in transforming dairy farming in the region by improving both the quantity and quality of milk. The clean milk production practices promoted through the programme have enhanced milk quality and paved the way for the commercialisation of dairy farming, which in turn has increased production, improved the livelihoods of many farming households.

However, as the PIM (2016) did not clearly specify milk production targets, assessing whether the programme achieved its intended production levels required a careful analysis of actual production trends over the implementation period to at least indicate the direction in which it has been heading.

To understand the milk production trend, the RAA reviewed the actual production data collected during the programme period. Given that the methods of recording and reporting the data varied, the analysis drew on three separate data sources, as outlined below:

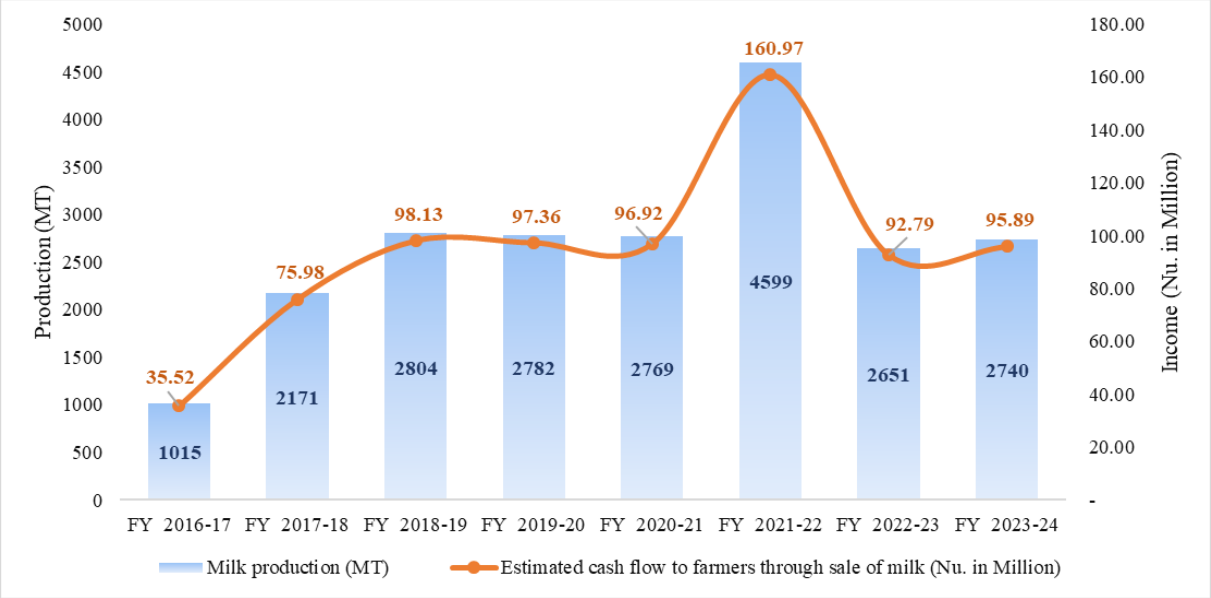
i) Comparison with production data recorded based on the milk sold to KIL, schools and institutes

Milk production data provided by the OPM indicates a general increasing trend during the programme period. As illustrated in **Figure 3.5**, production increased steadily, peaking in 2021-2022, before declining in 2022-2023. It then stabilised, showing a modest upward movement in 2023-2024. This reflects an overall growth trajectory, followed by a temporary setback and partial recovery.

The decline in the overall milk production in the later stage may be linked to external disruptions such as the COVID-19 pandemic or climatic challenges. This decline however highlights the need for enhanced resilience measures to sustain gains in dairy productivity.

The dataset does not capture sales made by the farmers groups outside these institutions and, therefore, may not represent their actual production.

Figure 3.5: ***Milk production in six eastern Dzongkhags as predicted by the quantity of milk sold by the registered farmers groups to KIL, schools and institutes.***



Source: *Computed and developed by OPM, Mongar*

ii) Comparison with production data reported in the Annual Outcome Survey Reports

Considering the data reported in AOS reports, milk production reached its highest point in 2018 at 20.56 MT, but it declined steadily over the following years, dropping to 15.98 MT in 2019 and further to 13.75 MT in 2021 (**Figure 3.6**). However, there was a recovery in 2023, with production increasing to 18.86 MT, though it still remained below the 2018 level. This indicates fluctuations in output, with a significant dip in the middle years before showing signs of improvement.

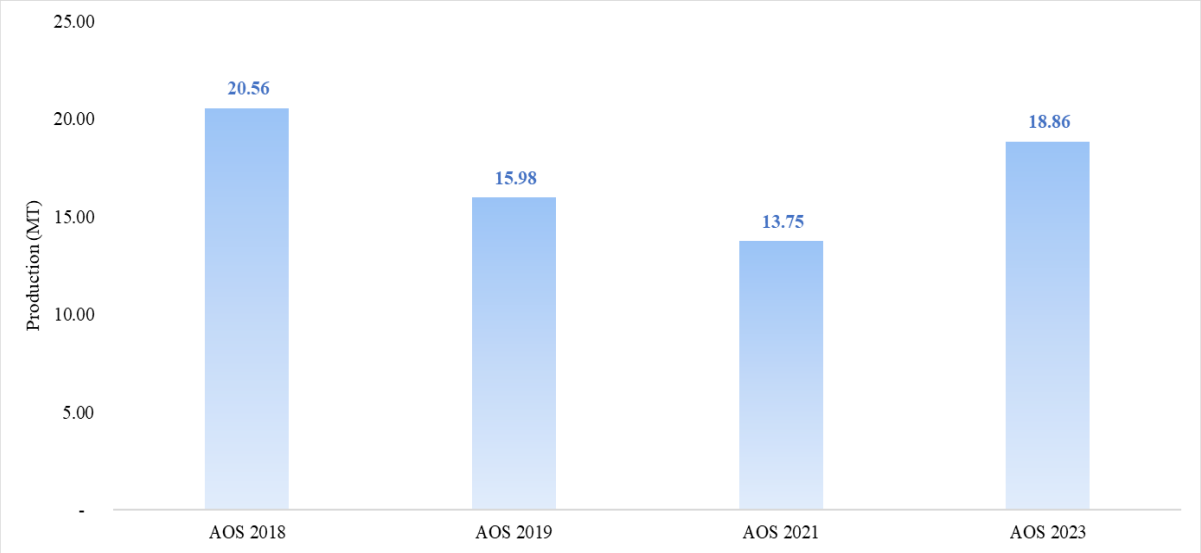
The AOS data, however, had limitations in scope:

- The 2023 AOS included production data from 8 Gewogs, with one Gewog having farmers groups connected with KIL.
- The 2021 AOS included production data from 13 Gewogs, with two Gewogs having farmers groups connected with KIL.
- The 2019 AOS included production data from 10 Gewogs, with one Gewog having farmers groups connected with KIL.
- The 2018 AOS included production data from 10 Gewogs, with none of the Gewogs having farmers groups connected with KIL.

Given the lack of consistent data collection and uneven geographical coverage across the different AOS, year-on-year comparisons should be interpreted with caution. Furthermore, when milk production data in litres were converted to metric tonnes, the reported figures appear

much lower than expected. While **Figure 3.5** shows milk production in thousands of metric tonnes, **Figure 3.6** showed only in two digits, indicating the possibilities of underreporting.

Figure 3.6: ***Milk production in six eastern Dzongkhags as per the Annual Outcome Survey Reports of CARLEP***



Source: *Developed by the RAA based on the data reported in AOS Reports.*

Note: *The data presented in the AOS were based on information collected from a representative sample of farmers. These data were used to calculate the average milk production per household (in litres). To estimate the total production for all households registered under the Farmers Groups, the RAA extrapolated this average by multiplying it by the total number of households. The estimated total milk production, initially expressed in litres, was then converted to kilograms and subsequently to metric tonnes using the standard milk density conversion factor, where one litre of milk equals 1.35 kilograms. This approach enabled a uniform and comparable estimation of total production across different groups and years*

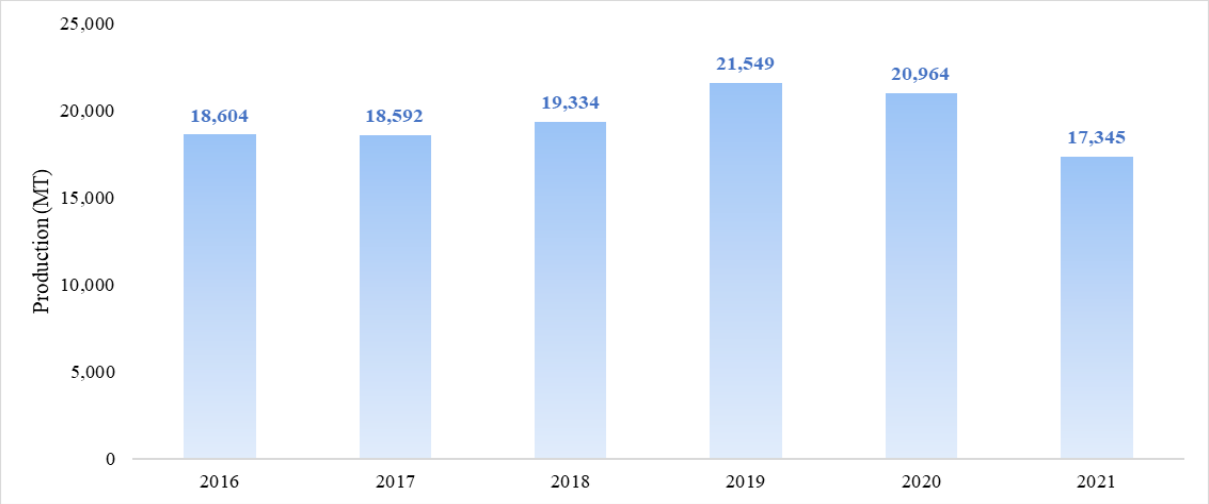
iii) Comparison with production data published by the NSB

The RAA also considered the production data reported in the Livestock Statistics published by NSB to provide an alternative means of measuring milk production trend in the region. As presented in **Figure 3.7,** the combined milk production of six eastern Dzongkhags showed a steady increase from 2016, peaking at 21,550 MT in 2019. However, production declined significantly thereafter, reaching a low of 17,345 MT in 2021. This drop was observed across all Dzongkhags except Trashigang, which remained the highest and most stable contributor.

However, the data published by the NSB reflect production from all farming households in the six eastern Dzongkhags, not only those supported by CARLEP (where the target was expected to be achieved by approximately 2,600 households), making direct comparison with programme-specific targets difficult.

Therefore, while the NSB data provide useful insights into overall regional trends, they cannot be solely relied upon to assess CARLEP's direct impact on milk production. Nevertheless, the observed trends can help contextualise programme outcomes within broader regional production patterns and inform planning for future interventions.

Figure 3.7: ***Milk production in six eastern Dzongkhags as per the data published by NSB***



Source: *Developed by RAA based on the data published by NSB in Annual Livestock Statistics Report.*

The OPM responded that similar to vegetable production target as justified in 3.1.1 above, the RAA should consider milk production data reported in annual *Integrated Agriculture and Livestock Census (IALC)* as a credible benchmark to assess the target, thereby allowing a more accurate assessment of CARLEP's impact on dairy production in line with project's target. The decline in milk production in 2021 was probably due to COVID-19 as the dairy farmer groups were not able to collect the milk from the farmers because of the simultaneous lockdowns. The decline could also attribute to disease outbreak such as lumpy skin disease.

The RAA maintains its stance as highlighted in its further comment in finding 3.1.1. Based on the production data reported in the IALC, the milk production trend is presented in ***Table 3.b****. The data show a noticeable drop in figures between the Annual Livestock Statistics of 2021 and the IALC reports of 2023 and 2025. This variation likely reflects differences in data collection methods and reporting practices over the years.*

Table 3.b: Milk production as per ALS and IALC.

Dzongkhag	***Milk Production (MT)***		
	ALS-2021	***IALC - 2023***	***IALC - 2025***
Lhuentse	*1,139.76*	*1,413.82*	*1,368.71*
Monggar	*2,997.33*	*3,461.95*	*3,433.39*
Pema Gatshel	*1,596.43*	*1,626.66*	*1,571.99*
Samdrup Jongkhar	*3,376.53*	*2,223.52*	*2,310.43*
Trashigang	*6,819.69*	*5,502.88*	*6,676.80*
Trashi Yangtse	*1,414.92*	*1,186.53*	*1,283.01*
Total	***17,344.66***	***15,415.36***	***16,644.33***

Source: *Compiled by the RAA based on the data reported in ALS (2021) and IALC (2024 &2025).*

The IALC (2023) reported Trashigang (5,503 MT) and Mongar (3,462 MT), alongside Samtse, as the highest milk-producing Dzongkhags in the country. Similarly, IALC (2025) reported

milk production of 6,677 MT in Trashigang and 3,433 MT in Mongar, indicating that these Dzongkhags have sustained their position among the leading milk producers. This is likely supported by the assured market for milk in these Dzongkhags through the presence of KIL, as detailed under Finding 3.3.2(iii).

However, the lack of defined targets in the PIM (2016) creates ambiguity regarding whether the milk production targets have been achieved.

3.2.2. Dairy Farmers Participation Target

CARLEP aimed to organise at least 2,600 dairy farming households from six eastern Dzongkhags into groups, with a minimum of 50% women's participation.

The data from RAMCO showed that only 1,274 households were mobilised into groups, resulting in the formation of just 38 dairy farming groups during the CARLEP period with female participation of 46%, falling short of the target. As seen from **Table 3.7**, 31 out of 38 farmers groups remained active, with 547 women members, showing declining numbers of both groups and the women's participation. This reduction indicates concerns regarding the sustainability of the farmers group.

Table 3.7: ***No. of livestock FGs of six eastern Dzongkhags registered under the DAMC***

Particulars	No. of FGs registered	Membership Details	No. of FGs currently active	Membership Details
Dairy FGs registered during MAGIP period (2010 - 2015)	46	*Female = 357* *Male = 631*	35 (76%)	*Female = 299* *Male = 527*
Dairy FGs registered during CARLEP period (2016 - 2023)	**38**	***Female = 583 (46%)*** ***Male = 691***	**31 (82%)**	***Female = 547 (49%)*** ***Male = 562***
Dairy FGs with missing registration date and membership details in the record	2	*Details not available*	0 (0%)	*Details not available*
Total	**86**		**66**	

Source: *Compiled by RAA based on the farmers group data furnished by RAMCO, Mongar*

The RAA noted that the shortfall in achievement of the dairy farmers participation target was due to similar factors highlighted in *finding 3.1.2*. Due to the ageing farming population, some dairy infrastructures were found idle. *For instance*, the milk collection and processing unit in Dawazur, Khaling, Trashigang, and the processing unit at Laneri, Dungmaed, Pema Gatshel were closed after the dairy farming groups ceased operations due to the ageing and physical incapacity of their members.

In addition to those factors, the RAA noted that zoonotic diseases affecting cattle have also impacted the sustainability of the dairy farmers groups. *For instance*, a dairy farmers group in Yakpugang village, Mongar, became inactive following an outbreak of a severe cattle disease.

These cases are illustrated in the accompanying **Picture 3.9**.

Picture 3.9: ***Example of facilities constructed under CARLEP left idle after the defunct of the farmers group***

Upper Yakpugang MCS – left idle following an outbreak of cattle disease, after which the group became inactive.

Lower Yakpugang MCS – left idle on same reason.

The non-operational Dawazur milk collection and processing unit in Khaling remained closed after the group members became elderly. In the picture, auditors are seen interviewing the group members in front of the defunct processing plant alongside livestock sector officials, and a milk churner left idle inside with visible signs of wear and tear.

The non-operational Laneri MPU Dungmaed remained closed after the group members became elderly. In the picture, auditors are seen interviewing the representatives of the group members in front of the defunct processing plant alongside LG Members and extension officials, and equipment left idle insides the plant

3.2.3. Improvement in cattle breed

Since cattle breed has a direct link to quantity of milk produced, the CARLEP envisioned to supply around 2,000 crossbreed cattle to farmers at subsidised rates as part of its strategy to intensify milk production. Simultaneously, the programme also intended to further strengthen the Contract Heifer and Bull Production Program, procurement of sex-sorted semen, and supply of Artificial Insemination (AI) inputs to the Dzongkhags, including the training and engagement of Certified Artificial Insemination Technicians (CAIT) to ensure the wide-reach of the services.

The programme during the period has sourced and distributed 2,311 cattle to the farmers as shown in **Figure 3.8 and 3.9**, exceeding the anticipated targets. During the field visits, the RAA observed that the programme has promoted two main high-yield cattle breed: Jersey and the Holstein Friesian as shown in **Picture 3.10** marking one of the significant transformations in the region under the programme.

Figure 3.8: ***No. of cow distributed per year***

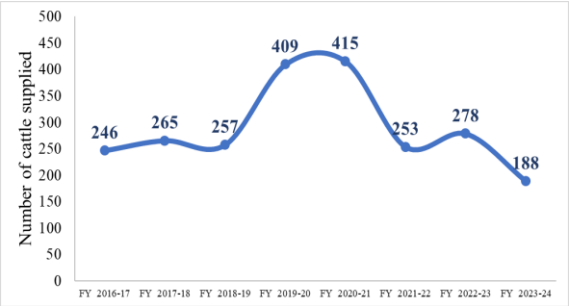
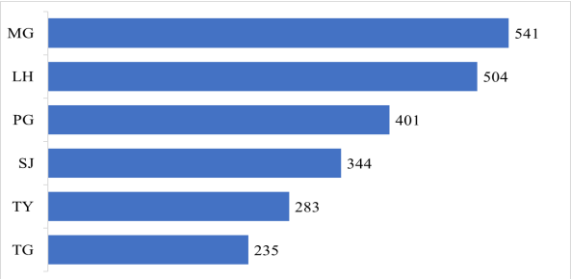


Figure 3.9: ***No. cow distributed to each Dzongkhag***



Source: *Adapted from Annual Progress Report of OPM, Mongar*

Picture 3.10: ***Examples of two main high-yielding cattle breeds promoted by the CARLEP.***

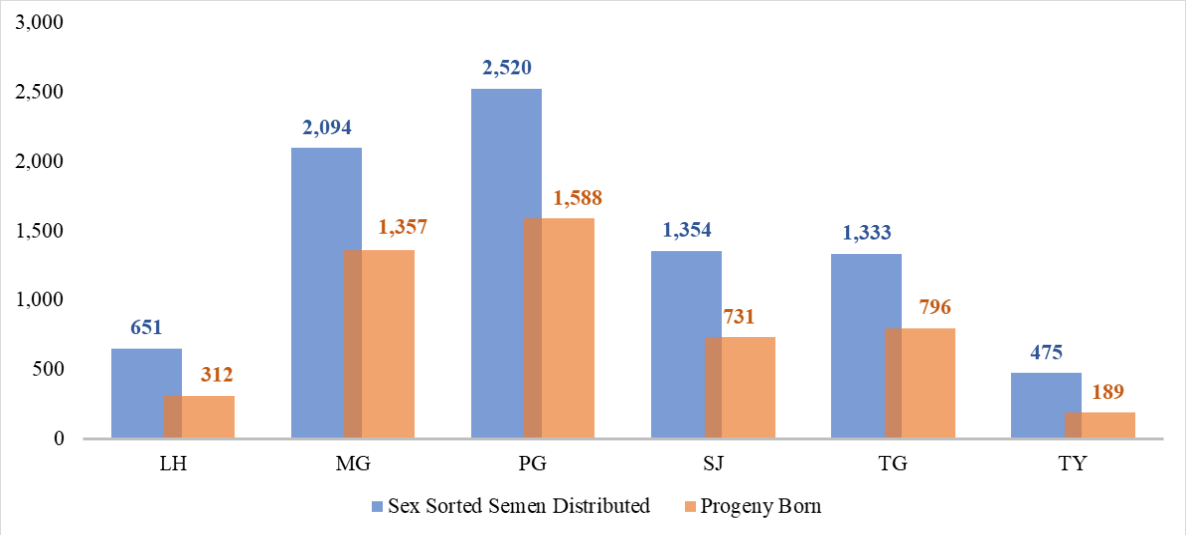
Jersey breed

Holstein Friesian (HF) breed

In addition to the cattle sourcing, records furnished by the RLDC showed that 8,427 doses of sex sorted semen were distributed to farmers between 2020 to 2024, with 4,973 progenies born, indicating a success rate of around 59% as detailed in **Figure 3.10**. Such missions were successful through extension offices, Dzongkhag veterinary hospitals and the trained CAITs, mostly under the support of the CARLEP. To facilitate this, records showed that 83 CAITs were trained between 2018-2024 and currently 45 CAITs are operating while others left the

job for better opportunities. In addition, 59 semen banks and 67 mobile cans were distributed to the Dzongkhags.

Figure 3.10: ***Sex sorted semen distributed vs. number of progenies born (2020-2024)***



Source: *Compiled and developed by RLDC, Khangma, Trashigang*

Although milk production has shown an irregular trend in recent years (as detailed under *finding 3.2.1*), the impact of AI interventions, with a 59% success rate, holds significant potential for increasing milk production once the progenies reach the heifer stage.

However, disaggregated data showing cattle supplied and bred through AI, survival rate, milk production, and other household-level details were not maintained separately. Such information would provide a more comprehensive basis for tracking progress and identifying suitable interventions to address issues related to cattle management and sustaining productivity.

3.2.4. Improvement in fodder cultivation

The PIM (2016) identified inadequate production of quality fodder and feed as a major constraint in the livestock sector. Accordingly, the CARLEP placed strong emphasis on the distribution of fodder seeds and slips as a strategic intervention to intensify milk production.

According to records obtained from the OPM, a total of **6,076** instances of fodder seed and slip distribution were recorded across the six Dzongkhags during the programme period, sufficient to cover about **3,689.7** acres of pasture, as shown in **Table 3.8**. The distributed fodder varieties included grasses such as Napier (Pakchong), Winter Oat, Stylo, Ruzi, and Molasses grass, among others, representative specimens of which are shown in **Picture 3.11**. Among all, Napier is a common fodder grass due to its convenience of multiplication through stem cutting.

In addition, **2,590** chaff cutters (example shown in **Picture 3.12**) were supplied to encourage the fodder plantation and reduce the drudgery of chopping fodder, especially for women, who are involved in cattle-related tasks more than men.

Table 3.8: ***Number of beneficiaries for fodder seeds and slip distribution and chaff cutters supplied***

Dzongkhag	Supply of Fodder Seeds and Slips		Number of Chaff cutters supplied
	Total Coverage (Acres)	No. of distributions made (Times)	
Lhuentse	436	697	87
Mongar	903	1605	851
Pema Gatshel	387.5	713	775
Samdrup Jongkhar	577.5	412	387
Trashigang	854.6	2,176	327
Trashi Yangtse	531.1	473	163
Total	**3,689.7**	**6,076**	**2,590**

Source: *Compiled by RAA based on beneficiary list and data in Annual Progress Report of OPM, Mongar*

Picture 3.11: ***Examples of the common types of fodder provided under CARLEP***

Picture 3.12: ***Example of Chaff Cutters supplied under CARLEP's support***

Despite the extensive distribution efforts, the RAA, during the field visits to six Dzongkhags, observed that fodders were mostly planted on a limited scale, along the fence or in small corners of arable land, rather than being undertaken as a large-scale cultivation effort. Also, in some cases, farmers have used orchards to grow fodder along with fruit trees. The record of the OPM also showed that around **282** households cultivate the fodder by earmarking a portion of arable land for which the CARLEP has issued the barbed wire fence. Random pictures of a fodder plantation are shown in **Picture 3.13**.

Picture 3.13: ***Example of fodder cultivation practices***

Napier grass planed in small scale along the fence (random example)

Fodder planted by earmarking the dryland with barbed wire fencing supported by the CARLEP (Picture from Khamdang Gewog, T/Yangtse).

Orange orchard used for fodder cultivation (Picture from Yangneer Gewog, T/gang)

The current fodder development was purely driven by farmers' demand for fodder seeds and slips, along with their willingness to cultivate them. There is no estimation of fodder consumption capacity in the region based on the existing number and types of cattle. Such

estimations could have supported in development of strategies to determine the actual acreage of land required for fodder cultivation, thereby ensuring greater milk production in the region.

As a result, a large number of farmers continued to rely on traditional fodder sources besides the cultivated fodders, such as wild grasses from nearby forests, banana plants, and excess vegetable produce. This indicates that the intervention, though well-conceived, has not yet led to a sustainable transformation in quality fodder production practices.

The OPM responded that while this observation is valid, the intervention was primarily targeted at enhancing fodder availability for small-scale farmers due to the smallholder farmers with limited land holdings. Positioning fodder cultivation within this framework would help balance expectations between large-scale expansion and the project's actual focus on localised, farmer-level improvements.

CARLEP promoted cultivation of annual fodder crops (Oats) after crop harvest to enhance fodder resource base during lean season (winter), besides promotion of perennial fodder such as Napier, Molasses and Ruzi in fallow and communal land. All of these interventions have helped farmers despite the challenges faced in maintaining it.

The resulting impact of investment in fodder development can be measured from the increasing amount of milk production over the years. In order to determine fodder needs, the OPM has conducted a fodder inventory in Mongar Dzongkhag as a pilot study which revealed a significant fodder deficit against livestock units. Drawing inferences from this pilot study, the fodder development program was promoted strategically targeting fallow and communal land to address both short-term and medium-term fodder shortages.

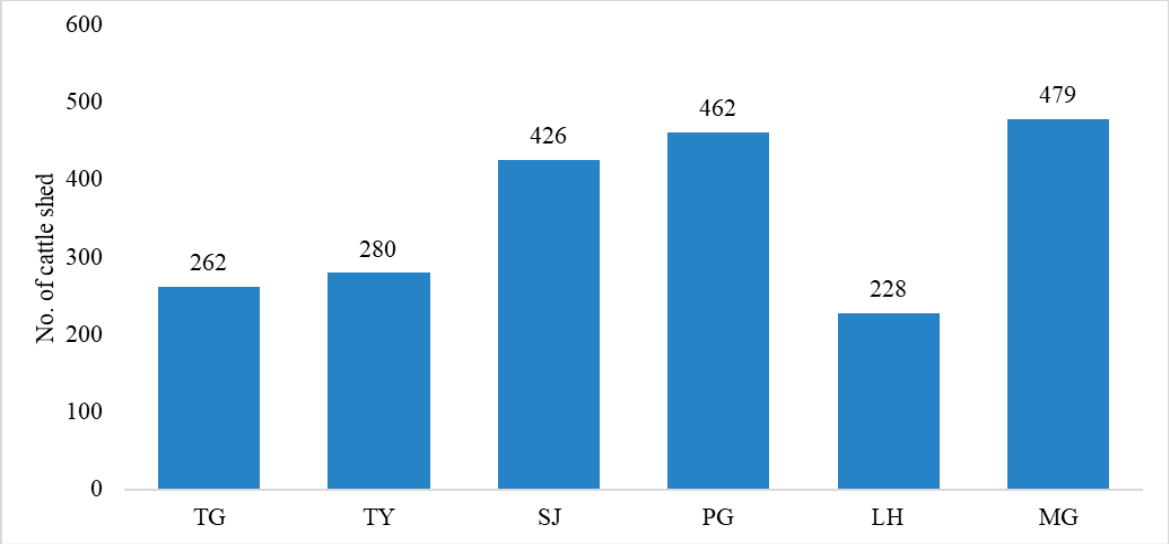
The RAA notes the OPM's explanation and acknowledges that fodder development initiatives were largely successful in reaching smallholder farmers and promoting annual and perennial fodder on fallow and communal lands to address seasonal shortages. However, it remains uncertain whether the quality fodder shortage highlighted in the PDR (2015) and PIM (2016) has been fully addressed.

3.2.5. Improvement in cattle shed construction

In addition to the promotion of the cattle breed, the CARLEP supported the upgradation of 2,137 traditional cattle sheds to promote clean milk production (**Figure 3.11**). The support included the supply of essential construction materials such as Corrugated Galvanised Iron (CGI) sheets, cement bags, and cow mats. Its primary objective was to improve hygiene standards in dairy farming by encouraging the development of more durable and sanitary cattle sheds, thereby enhancing milk quality that is suitable for commercialisation. It was also intended to prevent cows from contracting mastitis, a disease typically caused by bacterial infection in poorly maintained or unhygienic environments, such as dirty shed floors.

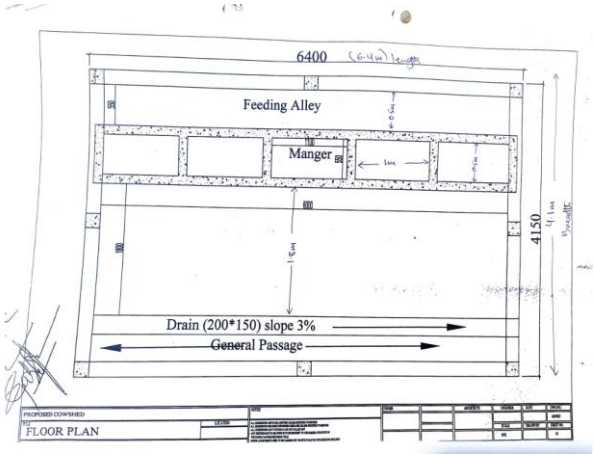
In order guide this initiative, the government released an architectural design, as illustrated in **Picture 3.14**.

Figure 3.11: ***Number of traditional cattle sheds provided with materials to upgrade to the standard design***

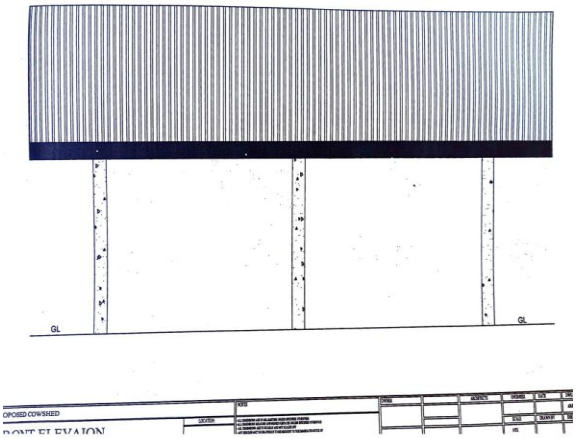


Source: *Adapted from Annual Progress Report of OPM, Mongar*

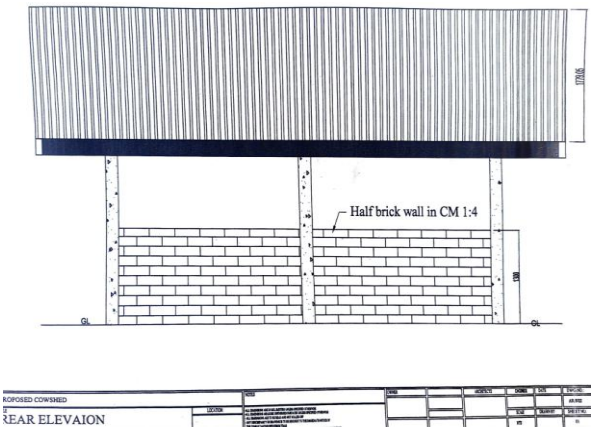
Picture 3.14: ***Architectural design of the cattle shed for commercial dairy farming***



Floor Plan



Front Elevation



Rear Elevation

Example of a cattle shed constructed partially in compliance with the drawings

While verifying a sample of 23 cattle sheds selected from various locations across the six Dzongkhags, including those of the lead farmers, the RAA observed that the design requirements for the cattle sheds were not followed in most cases. Although some farmers adhered to the standard design to a certain extent, compliance was generally limited to cementing the floors, feeding troughs, and drainage systems, as illustrated in **Picture 3.15**, rather than constructing the entire structure according to the prescribed design.

Picture 3.15: ***Variations in cattle shed design***

Random pictures of cattle sheds (Trashi Yangtse, Mongar and Lhuentse)

The prescribed design required cattle sheds to have cemented floors, but the majority of the farmers preferred using floors with leaf litter and straw. This preference was based on the experiences of the farmers who cemented the floors, especially in higher altitudes and in winter, affect the health of the cattle, which has a direct impact on the milk production. Farmers also shared concerns that cement floorings often result in pressure sores and bursitis on knees and joints of cows. Moreover, the farmers, mostly being agropastoralists, prefer floors with leaf litter (even it is cemented) as they ensure a sufficient supply of manure for the vegetable cultivation. The varying practices of flooring the cattle sheds are illustrated in **Picture 3.16**.

Additionally, the standard design included the construction of concrete feeding troughs. However, some farmers shared that their cattle were becoming ill after ingesting traces of cement mixed with the feeds, hampering the quantity of milk production. As a result, they discontinued using the concrete troughs. The RAA also observed some farmers resorting to alternative materials, such as scrap vehicle tyres, for feeding troughs. The variations in the use of the feeding trough are illustrated in **Picture 3.17**.

Picture 3.16: ***Variations in the flooring of the cattle shed***

Cattle shed not complying the standard design and concrete flooring (CARLEP support: cement and CGI sheets)

Cattle shed not complying the standard design and concrete flooring (CARLEP support: cement, cow mat and CGI sheets)

Cemented flooring with cattle mat supplied under the support of CARLEP.

Example of manure extracted from the cattle shed consisting a mix of leaf litters and paddy straw.

Picture 3.17: ***Examples of various feeding troughs being used by the farmers***

Example of a cemented feeding trough as per the standard design

Example of a cemented feeding trough with a worn-out base, about which farmers complain about a risk of cement ingestion.

Examples of alternative feeding troughs used by farmers, the hygiene of which is also questionable

Given all these conditions, the RAA is of the view that the design could not be enforced despite being supported with the required materials under the programme.

This may be due to a lack of meaningful consultation with farmers during the design phase, which limited the understanding of their preferences and the practical challenges they face. Additionally, there was insufficient recognition of their indigenous knowledge and traditional cattle management practices. *For instance*, some beneficiary farmers' cattle sheds, as illustrated in **Picture 3.15**, were constructed even before the launch of CARLEP. As a result, farmers only renovated their existing shelters instead of reconstructing them to meet the standard designs. Exploring ways to integrate modern clean milk production techniques with traditional cattle management practices could have yielded better outcomes for the farmers.

One of the best practices of the cattle shed developed for the commercialisation can be referenced to the Tshowoongpoktor integrated farming model developed by the Trashigang Dzongkhag, as shown in **Picture 3.18**.

Picture 3.18: ***Model commercial cattle shed at Tshowoongpoktor***

Exterior design of the Cattle Shed

Interior design of the Cattle Shed: double-row face-to-face stall layout with concretasied feeding trough

Cemented floor with cow mats

3.2.6. Supply of milking cans and buckets

The programme provided milk cans and buckets to dairy farmers as part of an effort to support post-harvest handling of the milk, promoting better hygiene standards, and enhancing overall efficiency in dairy farming (**Picture 3.19**).

During the field visits, the RAA observed that the milk cans and buckets were distributed not only to dairy farmer groups operating the milk collection centres and processing units but also to individual farmers who owned cattle. However, the records regarding the total number of milk cans and buckets purchased and distributed under CARLEP were not available. The existing records were fragmented and mixed with equipment procured under other funding sources in a common stock register, making it difficult to verify the full extent of distribution and presenting challenges in assessing its effectiveness. As seen in **Table 3.9**, around **439** households were supplied with milk cans and buckets according to OPM records.

Therefore, while the distribution reached a considerable number of households, the incomplete records limit the ability to fully evaluate the coverage and impact of this support.

Table 3.9: ***No. of beneficiaries of milk cans and buckets (excluding cans and buckets supplied to the milk collection centres and processing units***

Dzongkhag	Total no. of beneficiaries	No. of women beneficiaries
Lhuentse	10	5
Mongar	280	154
Trashigang	84	17
Trashi Yangtse	65	23
Total	**439**	**199**

Source: *Compiled by RAA based on beneficiary list furnished by OPM, Mongar*

Picture 3.19: ***Illustration of milk cans and buckets supplied under the CARLEP.***

Example of a milk can distributed to individual households (Photo from a house of one of the lead farmers)

Example of milk can and bucket in MCCs (Phosorong MCC, Mongar Gewog, Mongar)

Example of milk cans and buckets distributed to milk collection centres and processing units

3.2.7. Biogas facilities

As part of its broader strategy to promote climate-smart farming systems, the CARLEP supported the installation of biogas units for households engaged in dairy farming. Biogas systems have been identified as a key component of the Climate Smart Village (CSV) model promoted under CARLEP.

The biogas facilities serve a dual purpose. Firstly, they provide a sustainable and renewable source of energy for cooking, reducing reliance on liquefied petroleum gas or firewood. Secondly, they contribute to climate change mitigation efforts. Specifically, biogas facilities capture methane, a potent greenhouse gas, generated from cow dung. Instead of being released into the atmosphere, the methane is collected in a biodigester and directed to household kitchens, where it is combusted as cooking fuel. This process significantly reduces methane emissions, thereby lowering the household's carbon footprint.

In addition, the slurry by-product from the biodigester, which contains nutrient-rich organic matter, is repurposed as organic fertiliser for household kitchen gardens, promoting circular waste management and improving soil fertility.

This integrated use of livestock waste exemplifies a sustainable approach to farming that aligns with CARLEP's goals of enhancing climate resilience and promoting environmentally friendly agricultural practices.

The RAA noted several challenges associated with the biogas facilities due to which farmers discontinued their use. Many such facilities became non-functional within just a few years of their construction. *For instance*, the RAA physically checked **14** biogas facilities and found six were not functional or not used, besides learning that Ngarpongtang CSV has **59** biogas facilities, but **33** are reported as non-functional by the LG leaders (**Table 3.10**). **Picture 3.20** illustrates non-functional/unused biogas facilities.

Table 3.10: ***Functional status of random biogas units physically inspected by the RAA***

SN	Dzongkhag	Gewog	Village	Name	Functional Status
1	Mongar	Mongar	Wangling	Yangchen (Lead Farmer)	Non-functional
2	Mongar	Thangrong	Ngarpongtang	CSV	33 units non-functional 26 units functional
3	Mongar	Drepoong	Bachala	Neten Wangchuk	Non-functional
4	Mongar	Drepoong		Singey	Functional
5	Trashi Yangtse	Toedtsho	Seb	Dazamo	Functional but not effective
6	Trashi Yangtse	Yalang	Yalang	Tshewang Dema	Functional
7	Trashi Yangtse	Yalang	Yalang	Tenzin Wangchuk	Non-functional
8	Samdrup Jongkhar	Orong	Orong	Chimi Yuden	Functional
9	Samdrup Jongkhar	Dewathang	Bangtsho	Tshering Gyalpo	Functional
10	Samdrup Jongkhar	Dewathang	Rikhey	Tshering Darjay	Non-functional
11	Samdrup Jongkhar	Pemathang	Pemathang	Lila Bdr. Pokhrel	Functional
12	Samdrup Jongkhar	Pemathang	Yusernang	Lok Bdr. Rai	Functional
13	Samdrup Jongkhar	Phuntshothang	Khameydthang	Bhagwati Bhandari	Functional
14	Samdrup Jongkhar	Gomdar	Amshing	Chimi Rinzin and Nima Zangmo	Functional but not used
15	Samdrup Jongkhar	Gomdar	Gomdar	Tshomo	Functional

Source: *Compiled by RAA based on beneficiary list furnished by OPM, Mongar and verified by the RAA during field visits*

Picture 3.20: ***Random pictures illustrating non-functional/unused biogas facilities***

One of the Non-functional biogas facilities in Ngarpongtang CSV, Thangrong, Mongar

A non-functional biogas facility in Drepoong, Mongar

A non-functional biogas facility in Yalang, Trashi Yangtse

Functional biogas facility but not used, Gomdar, S/Jongkhar

Challenges commonly shared by the LG leaders, livestock officials and beneficiaries are:

a) Although biogas systems are generally designed with a life expectancy of up to 30 years, practical observations reveal a significantly shorter functional period. Many systems became non-functional within a year of installation, largely due to poor construction quality and technical faults. Common issues included leakages, rusting, and problems related to air or pressure regulation. In several instances, such defects led to incomplete combustion or a weak flame that produced insufficient heat for even basic cooking, thereby rendering the systems practically unusable.

b) The performance of biogas systems was also found to be highly sensitive to environmental conditions. These systems rely on sunlight and ambient heat, indicating that their efficiency drops during colder seasons, particularly in winter. This seasonal decline further contributes to their unreliability for regular household use.

c) An additional and significant operational challenge reported by the farmers was the irregular availability of cattle manure, which is a critical input for Biogas production. Households that experienced livestock losses or owned only a few cattle struggled to maintain an adequate supply of dung, resulting in inactive systems or complete abandonment of the biogas facility. Furthermore, the process of collecting and managing dung was also considered labour-intensive, which has also discouraged regular usage of the facility.

d) Efforts in training and knowledge dissemination have also been limited. For instance, in one of the villages, the RAA noted that only two individuals were trained in biogas construction and were then expected to pass on their skills to all other farmers, which did not happen effectively. Such minimal transfer of expertise adversely affected both the quality of installations and the availability of repair services. Some farmers have received training only once, with no subsequent technical support, leaving them unprepared to address breakdowns or carry out basic maintenance.

e) Economic constraints further hindered the adoption and sustained use of biogas facilities. Although construction materials were provided under the CARLEP programme, farmers reported that substantial labour inputs and associated costs were still required. In the absence of clear financial returns or savings, the economic burden of installation and maintenance discouraged many from participating fully and often led to incomplete implementation.

f) The adoption of biogas was also found to be challenged by the increasing availability of more convenient alternatives such as subsidised LPG gas stoves and electric cooking appliances. In regions where these alternatives are easily accessible, many farmers have discontinued the use of biogas facilities due to their unreliability and the effort required for their operation.

g) Concerns were also noted regarding the implementation and monitoring mechanisms of the programme, as some households reportedly did not receive biogas installations despite being listed in official records. *For instance*, while the beneficiary list obtained from OPM indicated that ten households in the Woongborang CSV, Dungmaed, Pema Gatshel, were equipped with biogas facilities **(Table 3.11)**, site inspection of the RAA revealed that none of the households had such installations. This discrepancy raises questions about the accuracy of beneficiary data maintained by the OPM, the reliability of reported outreach achievements, and the need for closer scrutiny to ensure transparency and accountability in programme implementation.

Table 3.11: ***Households in Woongborang CSV, Dungmaed Gewog, Pemagatshel reported as biogas recipients in OPM records, but found without installations during site visit***

Fiscal Year	Beneficiary Name as per the record	House No	Support	Type
2017-2018	Cheten Tshering	Ta-3-**5	Biogas	CSV site
2017-2018	Sonam Geltshen	Ta-3-**7	Biogas	CSV site
2017-2018	Tashi Dorji	Ta-3-**1	Biogas	CSV site
2017-2018	Ugyen Yeshi	Ta-3-**2	Biogas	CSV site
2017-2018	Karma Zangmo	Ta-3-**3	Biogas	CSV site
2017-2018	Sangey Lhendup	Ta-3-**3	Biogas	CSV site
2017-2018	Dorji Drakpa	Ta-3-**4	Biogas	CSV site
2017-2018	Kelzang Wangchuk	Ta-3-**5	Biogas	CSV site
2017-2018	Karma Dochen	Ta-3-**8	Biogas	CSV site
2017-2018	Yoesel Dorji	Ta-3-**0	Biogas	CSV site

Source: *Compiled by RAA based on beneficiary list furnished by OPM, Mongar*

Despite the widespread challenges, a small number of households reported long-term and effective use of biogas systems for periods ranging from three to five years. These households typically had reliable access to cattle dung and better technical knowledge, such as in cases where a user was a trained mason. These examples demonstrate that, under the right conditions, biogas can serve as a viable and preferred source of energy.

The ARDC, the implementing agency for CSV, responded to this finding confirming that the beneficiary list had been wrongly submitted based on household lists generated during the planning phase.

Samdrup Jongkhar Dzongkhag responded that the plant in Gomdar Gewog was temporarily inactive as the owner had migrated the cattle, leaving insufficient cow dung. The plant in Rekhey had low gas production, but after the livestock team rectified the issues, it has now been brought back into operation.

While the RAA acknowledges the responses provided, the issues highlighted in the findings remain valid. The RAA identified several challenges affecting the operation and sustainability of biogas facilities, including the need for a regular supply of cattle dung, proper maintenance, and adequate technical knowledge among users.

Furthermore, discrepancies observed in beneficiary data, such as those in Woongborang CSV, demonstrate the need for stronger verification and monitoring mechanisms to ensure accuracy of reporting. The submission of unverified or "dummy" entries in beneficiary lists is not acceptable, as it may create a misleading impression of programme reach and achievements. In the worst-case scenario, such practices could indicate potential irregularities, including payments for biogas plants that were never actually constructed, which cannot be entirely ruled out. Thus, the RAA reiterates the importance of enhancing oversight, user training, and technical support to ensure that biogas facilities remain functional, efficient, and sustainable in the long term.

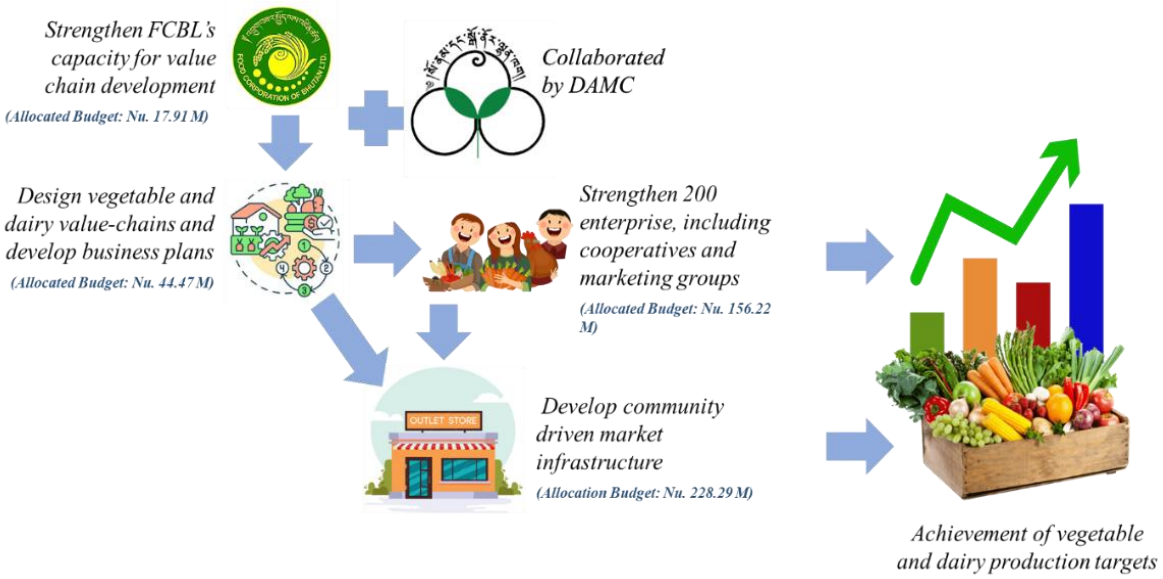
3.3. Value-chain and market development targets

The primary aim of the CARLEP was to transform the current subsistence-based rural agricultural tradition into a market-driven productive sector and improve the farmers income level. As a means to achieve this aim, CARLEP prioritised to support farmers groups, cooperatives, and agricultural enterprises in undertaking profitable, market-oriented farming and processing activities.

The FCBL has been identified as the main agency to lead the market-led value chain development, working in close coordination with the DAMC (RAMCO, Mongar) with the allocated programme budget of **Nu. 503.48 Million**, as per the PIM (2016). It was supposed to deliver all physical agricultural marketing services while the DAMC (RAMCO) was responsible for facilitating agricultural marketing efforts, support the formation of marketing groups and cooperatives, and helping establish the necessary infrastructure, jointly identified with FCBL and the Dzongkhags.

Figure 3.12 represents the sequence of key deliverables desired to be followed.

Figure 3.12: ***Key interventions planned under Component 2 of the CARLEP***



Source: *Developed by RAA based on the review of the PIM (2016).*

Note: *The total allocated budget also includes Technical Assistance provisions of Nu. 56.60 million in addition to the allocations for each of the above elements.*

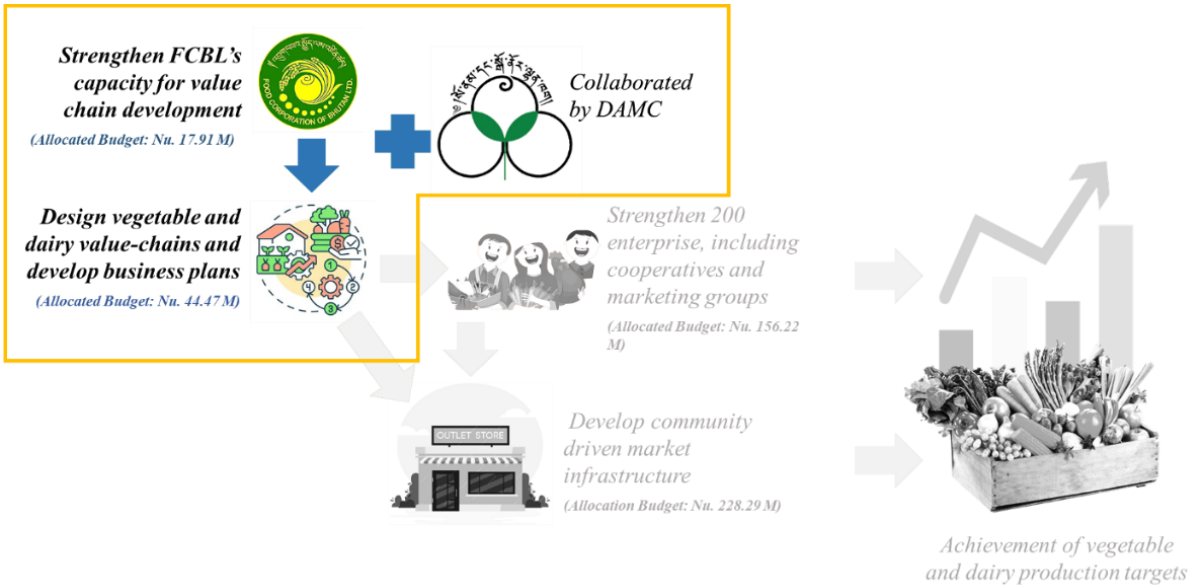
Despite designing such a system of critical interrelated initiatives, the RAA has observed several shortfalls in realising the benefits mainly due to inadequate implementation of key initiatives presented in **Figure 3.12** as detailed in this section.

3.3.1. Value chain and business plan development

As a critical first step towards value chain development, comprehensive vegetable and dairy value chain strategies and business plans were to be developed during the early stage of programme implementation (between 2016 and 2017, as per PIM [2016]) and subsequently implemented (**Figure 3.13**). These plans were intended to serve as strategic roadmaps and targeted action plans for value chain development initiatives at the Dzongkhag level.

FCBL was designated as the lead agency responsible for developing these strategies, while DAMC and relevant line agencies at the Dzongkhag and gewog levels were expected to provide supporting roles. The development process was to involve detailed stakeholder consultations, adaptation to local contexts, and integration of backward and forward linkages, infrastructure requirements, economic and financial feasibility, climate resilience, and sustainability considerations. The implementation of these plans was expected to be coordinated effectively to ensure long-term value chain strengthening, sustainable market linkages, and smooth transition of responsibilities to local actors such as farmers' groups, entrepreneurs, and private sector partners.

Figure 3.13: ***Predefined steps for value-chain design and business plan development***



Source: *Developed by RAA based on the review of the PIM (2016).*

In contrary to the above intents, the RAA noted the following:

a) Partial fulfilment of FCBL's role:

The PIM (2016) envisaged a Subsidiary Agreement between OPM and FCBL to formalise roles and responsibilities and this agreement was signed in 2016 between MoAL and FCBL, assigning FCBL responsibilities beyond export facilitation, including leadership in national value chain development. Despite this framework, FCBL withdrew from the programme midway through the implementation, leaving its roles only partially fulfilled. In its withdrawal letter (***No. FCBL/DoCB/ASMD/49/615***

dated ***31 December 2019***), FCBL stated that its role had been confined mainly to export facilitation. These activities were of limited relevance in the CARLEP region, where agricultural production volumes were too low to justify such interventions. As a result, the broader responsibilities envisaged for FCBL, viz. guiding value chain development, formulating a national strategy, and supporting entrepreneurship and market facilitation, remained unfulfilled, creating significant gaps in the programme implementation.

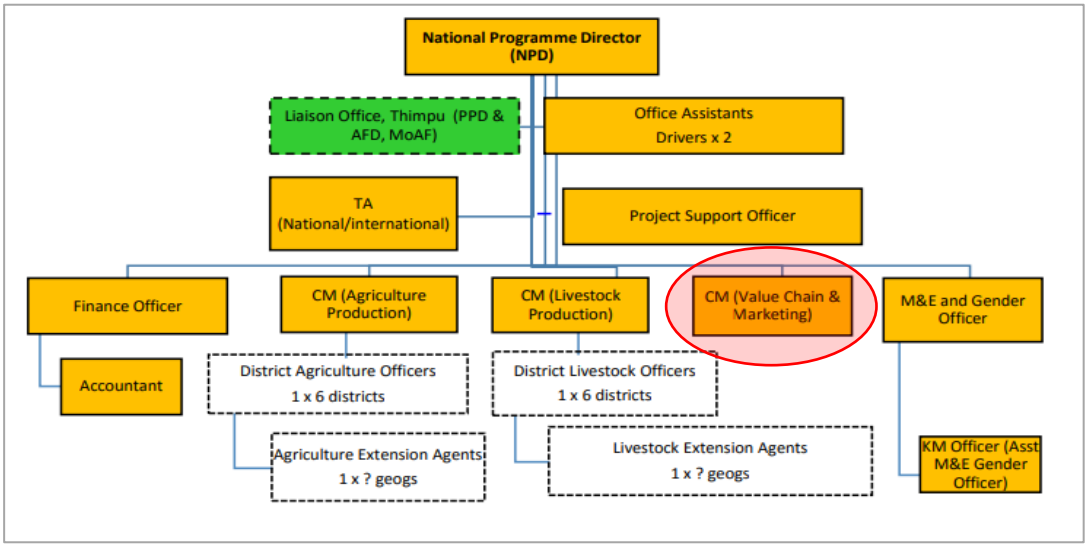
b) Incomplete value chain strategies

In 2017, FCBL engaged a private consultant to conduct a rapid value chain assessment for the vegetable and dairy sectors at a cost of approximately Nu. 1.70 million. Although the assessment was completed and the report submitted, no action plans were developed to guide value chain development, as envisaged in PDR (2015) and PIM (2016). While FCBL reportedly initiated strategies such as farm shops, buy-back schemes, and linkages between farmers groups and institutions, these were neither formally documented nor handed over to Dzongkhags upon FCBL's exit from the programme.

c) Gap in value-chain coordination:

The PIM (2016) planned dedicated Component Manager posts within OPM for Agriculture, Livestock, and Value Chain components (**Figure 3.14**). While the Agriculture and Livestock managers were consistently in place with clear coordination and reporting lines to Dzongkhags and Gewogs, the Value Chain component manager post remained vacant for a prolonged period. The absence of a focal point, combined with undefined institutional linkages to Dzongkhags and Gewogs, reflects a structural weakness and low prioritisation of value chain activities at the central level. This may have contributed to poor stakeholder coordination, unclear strategic direction, and weak monitoring and evaluation.

Figure 3.14: ***Prescribed Organogram of OPM***



Source: *Reproduced from the PIM (2016).*

Without the value chain strategies and roadmap, Dzongkhags operated with limited capacity and unclear guidance for value chain and market development. Activities were largely ad hoc, responding to isolated demands rather than following a cohesive strategy aligned with the objectives and timelines of the PIM (2016).

Moreover, the limited engagement of FCBL as the lead agency further contributed to several unrealised opportunities. For instance, FCBL's key infrastructure, such as the Gomchhu Cold Storage and farm shops (**Picture 3.21**), as well as mechanisms like buy-back schemes, were not effectively integrated into the value-chain strategy. Consequently, the cold storage facility remained underutilised and farm shops were closed after incurring losses. Proper integration of these resources could have reduced post-harvest losses, stabilised prices, and expanded market access for perishable products, thereby strengthening the overall efficiency and sustainability of the value chain.

Picture 3.21: ***Underutilised FCBL infrastructures that could not be integrated into the value chain***

Gomchu Cold Storage constructed jointly by DAMC and FCBL (Not supported under CARLEP but had potential for integration into the value chain strategies and business plans.)
(Only one out of thirteen units was found uilised during the RAA's visit)

Example of an idle Farm Shop

The OPM responded that the Mid-Term Review of the programme saw a major institutional reform whereby FCBL, as a key actor in value chain development and marketing, was disengaged from the CARLEP because of the incapacity of the FCBL to carry forward both the dairy and vegetable value chain as mandated in the Programme design. Instead, Kofuku International Limited, Chenery, as the definite market for fresh milk produced by farmer groups, was taken on board as one of the active contributors to dairy value chain development. Similarly, RAMCO has been designated to facilitate vegetable marketing contributing to vegetable value chain development. With the change in implementation settings and mandates of the implementing agencies becoming more pronounced, the outlook of programme implementation improved.

With regard to observation on underutilised cold storage facilities, the OPM submitted that none of the cold storage facilities was supported by CARLEP and may not be relevant to be reflected in the report.

The RAA acknowledges OPM's response regarding the institutional reforms and the engagement of KIL and RAMCO to support the dairy and vegetable value chains after FCBL's disengagement. While these measures addressed some operational gaps during the programme, the absence of value chain strategies and business plans affected the coordination mechanisms with Dzongkhags. This issue highlights the importance of proper planning and documentation for future interventions to ensure continuity and sustainability.

Although the Gomchhu Cold Storage facility was not directly financed through CARLEP, it remains an important national asset, established through the joint efforts of the DAMC and FCBL, who are both responsible for implementing value chain and market development component the programme. The PDR (2015) identified FCBL's existing depots, warehouses, and business experience as key factors for its selection to lead this component. The PIM (2016) further recognised FCBL's role to establish storage facilities, buy-back mechanisms and farm shops as part of the programme's sustainability strategies. These facilities were therefore more than physical structures; they were intended to support farmers, reduce post-harvest losses, and improve market access.

The withdrawal of FCBL in 2019, prior to the launch of the Cold Storage facility in 2023, represented a missed opportunity to integrate the cold storage into the value chain strategy of CARLEP, enhancing its use and impact within the programme area. Media reports highlighted that the launch of the facility in 2023 was welcomed by community leaders and agricultural stakeholders, who recognised its potential to benefit local farmers.

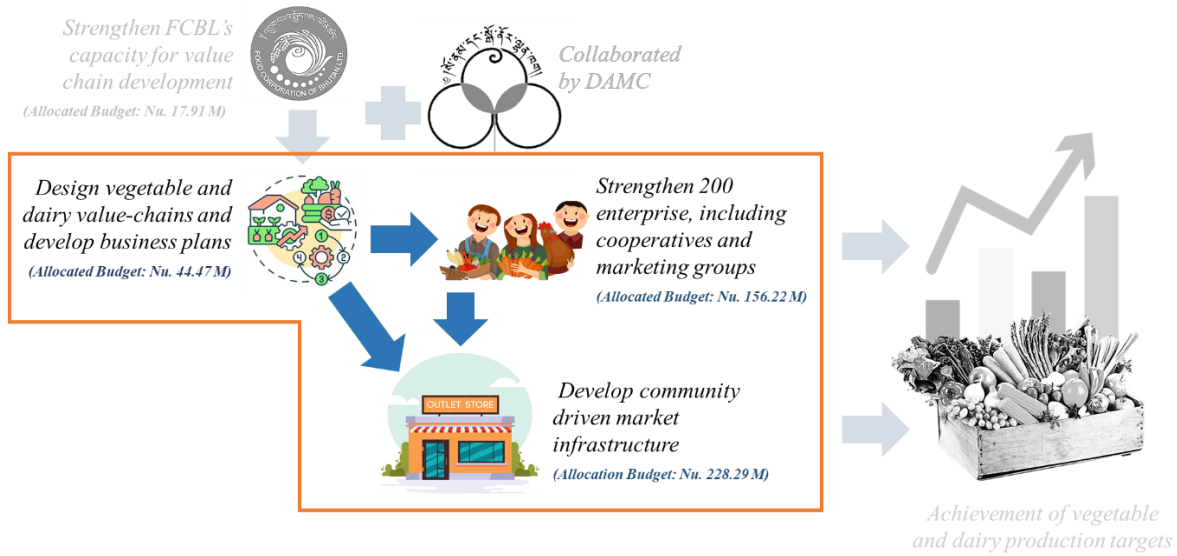
The RAA's view is that, as a national asset, its underutilisation underscores the importance of a whole-of-governance approach, where programmes are aligned and mutually reinforced rather than implementing in isolation. Only through such coordination can resources be optimised and farmers be effectively supported.

3.3.2. Strengthening agriculture enterprises and cooperatives

Based on the value-chain strategy and business plans developed by the FCBL, the CARLEP envisioned that 200 agricultural enterprises, including cooperatives, would be established over the course of the programme (**Figure 3.15**). At the end of the programme, at least 140 commercial enterprises were expected to operate profitably, and 115 marketing groups were anticipated to be functioning within the vegetable and dairy value chains.

To enable a conducive environment for the enterprise, community-owned infrastructure such as storage houses, cold stores, and market sheds was to be developed. For this, FCBL was supposed to prepare detailed plans and designs for the infrastructure based on demand projections, potential for multiple uses, economic feasibility for privatisation or public-private partnership models, and climate resilience features.

Figure 3.15: ***Predefined steps for enterprise and infrastructural development***



Source: *Developed by RAA based on the review of the PIM (2016).*

However, the RAA noted a significant gap in fulfilling these intents and meeting the anticipated targets. According to OPM records, around **33** enterprises were established through CARLEP facilitating many farmers to engage in commercial activities either as groups or individuals.

The following section outlines the current situation as observed during the RAA's field visits:

i) Engagement of farmers groups in agro-processing units

Between the financial years 2017-2018 and 2022-2023, CARLEP extended partial support to six agro-processing units across five eastern Dzongkhags: Trashi Yangtse, Pema Gatshel, Samdrup Jongkhar, Lhuentse, and Mongar. These interventions were designed to promote and to create income-generating opportunities for farmers groups and individuals through agro-enterprises. The support provided was selective, focusing either on infrastructure or equipment.

The agro-processing units supported during this period include the Urka Bangala Processing Unit, Tsatsi Guram Processing Unit, Peanut Processing Unit, Druk Green Product (a ginger processing unit), Lingabe Agro-Processing Unit (Za-Zhim-Zhakham), and the Nutri-Food Products biscuit factory, as detailed in **Table 3.12**.

Table 3.12: ***Agro-processing units supported by the CARLEP***

Name of processing unit	Location (place, gewog and Dzongkhag)	Year of support	Functional Status as per RAA's assessment	Type of support from CARLEP
Urka Bangala Processing Unit	Yangtse Throm, Trashi Yangtse	2020-21	Functional *(Being operated by 13-member women farmers group - Tshergom Aumtshu Sonam Detshen)*	CARLEP supported only the construction of the building and landscaping works.
Tsatsi Guram Processing Unit	Nanong Gewog, Pema Gatshel	2022-23	Functional *(Operated by a 37-member farmers group - Nanong Chiwog Meser Sanampai Tshoesey Rango Rangdrong Detshen)*	CARLEP supported only the construction of the building and landscaping works.
Peanut Processing Unit	Khamdang Gewog, Trashi Yangtse	2020-21	Functional *(Operated by a Desuup)*	CARLEP supported only the construction of the building and landscaping works.
Druk Green Product (Ginger processing unit)	S/Jongkhar Throm, S/Jongkhar	2019-20	Functional *(Operated by an individual person)*	CARLEP supported only the machine and equipment
Lingabe Agro-processing Unit (Za-Zhim-Zhakham)	Gangzur Gewog, Lhuentse	2020-21	Partially Functional *(Initially established for a youth group but failed. Now it is partially operated by an individual farmer with many machines and equipment lying idle)*	CARLEP supported only the machine and equipment
Nutri-Food Products (Biscuit factory)	Mongar Throm, Monagr	2017-18	Non-operational *(Initially established for a youth group and now abandoned, with all infrastructure, plants and equipment lying idle)*	CARLEP supported only some equipment

Source: *Compiled by RAA based on infrastructural data furnished by OPM, Mongar*

While three of these units were assessed as fully functional at the time of the RAA's visit, the remaining three had either become non-operational or were functioning only partially. Notably, the units that continue to operate successfully are either managed by organised farmers groups or driven by committed individuals, whereas those intended for youth groups have largely failed to sustain operations.

The following two cases illustrate how the farmers groups operating these units have achieved measurable success in agro-processing:

Case Study-1
Success Story of Urka Bangala Processing Unit

*Urka Bangala Processing Unit, located in Yangtse Throm (**Picture 3.22**), is operated by six women from Tshergom Aumtshu Sonam Detshen. The group was registered in 2017 and currently has 13 active members, all of whom are women. Initially, the group received equipment to process chilli pickles under one of the government projects; it did not have a designated building. During the financial year 2020-2021, CARLEP supported the group by constructing a new building to house the processing facilities at a cost of Nu 6 million. The processing unit has successfully remained in operation to date.*

The unit purchases chillies from its members at market price and currently produces a range of seven chilli-based products. Among the most popular are Crispy Chilli, Chilli Paste, and Dried Chilli, which are sold through OGOP outlets and CSI markets in Thimphu, Phuentsholing, and Samdrup Jongkhar. The processing unit operates at full capacity during the chilli season, producing over 5,000 bottles of processed products annually. During the off-season, production is limited to dried chilli, depending on availability. To ensure long-term financial sustainability, the group deposits 5% of its sales income into a group savings account, while the remainder is used to pay members and cover the unit's operating costs.

Picture 3.22: ***Urka Bangala Processing Plant***

Building constructed by CARLEP

Processing Equipment

Finished Products

Case Study-2
Success Story of Tsatsi Guram Processing Unit

*Tsatsi Guram Processing Unit, located in Nanong Gewog, Pema Gatshel (**Picture 3.23**), is operated by Nanong Chiwog Meser Sanampai Tshoesey Rango Rangdrong Detshen, a farmers group registered under RAMCO in 2022 with the support of CARLEP. It currently has 37 active members.*

In 2019, the group received sugarcane processing machines through one of the government projects, but they lacked a designated building for consistent operations. A makeshift hut was built to operate their business. During the financial year 2023-2024, CARLEP supported the group by constructing a new building to house the processing facilities, complete with landscaping and fencing, at a cost of Nu 4.94 million.

The unit operates during the peak sugarcane season, producing approximately 60 kilograms of Tsatsi Guram per cycle. During the off-season, operations are suspended due to the unavailability of raw materials, and the facility remains closed with its machines remaining idle.

Picture 3.23: ***Tsatsi Guram Processing Plant***

Building constructed by the CARLEP

Processing Machineries (Not a part of CARLEP's support)

In contrast to the two successful cases highlighted above, other processing units listed in **Table 3.12** have faced challenges that have impacted their sustainability.

The Nutri-Food Products biscuit factory in Mongar, originally established for a youth group under another government initiative, received partial equipment support from CARLEP. However, due to technical faults and the absence of follow-up support, the facility is now completely non-operational, with its machinery remaining idle and the building locked since operations ceased.

Similarly, the Lingabe Agro-Processing Unit in Lhuentse, also established for a youth group, received equipment support under CARLEP but failed to remain operational after the initial team was unable to sustain the enterprise. Although the unit has since been transferred to an individual farmer, it remains only partially functional, with most of the equipment lying idle and underutilised.

Picture 3.24 illustrates the condition of the two processing units observed by the RAA during the site visits.

Picture ***3.24: Current conditions of non/partial functioning units observed by the RAA***

Equipment remains underutilised at the Lingabe Agro-Processing Unit.

Equipment remains idle at Nutri-Food Products, visible through the window, as the unit has been locked and non-operational since it ceased operations (the RAA took the photo form the window).

In reference to the above projects, following are the factors contributing to the success of the projects:

a) Comprehensiveness of the support:

The support provided in the above projects was highly fragmented with support from different sources. None of the six agro-processing units received comprehensive packages under CARLEP; some were supplied only with buildings and site development, while others received equipment without the necessary infrastructure. This piecemeal assistance led to confusion over monitoring responsibilities, with no clear designation of whether CARLEP or the other supporting projects should take ownership and oversee progress. As a result, accountability and effective monitoring were compromised.

b) Revival plans:

There is a lack of institutional mechanisms to revive non-operational units or ensure ongoing operational oversight. Neither RAMCO nor the Dzongkhag Administrations have established structured approaches for follow-up, training, or mentoring. The partial operation of Lingabe and the non-operationality of Nutri Food were the results of these deficiencies.

c) Skills to maintain the machinery:

Interviews conducted by the RAA highlighted a critical skills gap among group members. Many lack the technical expertise required to maintain machines and equipment, leading to failure of business due to frequent breakdowns of machines, like in the case of Nutri Food.

In light of these cases, the RAA is of the view that success depends not only on initial investment but also on integrated and sustained support. Units managed by organised and motivated farmer groups have shown clear potential for income generation and value addition, while those lacking cohesive management or technical capacity have quickly declined.

ii) Engagement of fruit grower groups in contract farming with BAIL

Under the support of CARLEP, fruit trees worth Nu. 1.76 million were distributed across six eastern Dzongkhags during the financial year 2016-17 as part of a crop diversification initiative. Later, between 2022 and 2024, CARLEP contributed to the noble Million Fruit Trees Plantation initiative by distributing fruit trees worth Nu. 6.77 million.

In line with these developments, RAMCO and BAIL's Lingmithang Plant jointly organised the *"Market Linkage and Market Lead Production Workshop"* at ARDC, Wengkhar on 12 October 2021. During the workshop, BAIL, in collaboration with ARDC and the respective Dzongkhags, introduced a contract farming model. This joint strategy aimed to ensure a steady

supply of raw materials for BAIL while simultaneously promoting an accessible market for farmers groups.

Based on the resolutions of the workshop, 11 pineapple producer groups and 10 passion fruit farming groups across the Dzongkhags of Lhuentse, Mongar, Pema Gatshel, Trashigang and Trashi Yangtse entered into the contract of supplying fruits to BAIL's Lingmathang Plant in the financial year 2022-23, involving 334 households as detailed in **Tables 3.13** and **3.14**. Under the contract agreement, the buy-back prices were also fixed at Nu. 37 and Nu. 42 per kilogram for pineapples at the farm and factory gates respectively, and Nu. 38 and Nu. 43 per kilogram for passion fruit.

As seen in **Table 3.13** and a few examples illustrated in **Picture 3.25**, BAIL has partnered with **11** pineapple farming groups, collectively including **281** households. However, only six groups, representing **231** households, are currently active, while the remaining groups have become non-functional either due to their inability to supply the required quantities of pineapples or expiry of their contract periods.

While the high rate of initial participation reflects an effective design and delivery of support mechanisms specific to pineapple production, the inactivity of five groups raises concerns about the sustainability of the farmers' production capacities and the government's continued support in renewing contracts.

In contrast to pineapple, passionfruit contract farming yielded negligible results. As seen in **Table 3.14**, despite having a formal contract established with 10 groups across five Dzongkhags, none have delivered any passion fruit to BAIL. Although the groups were provided with comparable support as those cultivating pineapple, the contracts did not translate into operational success.

Table 3.13: ***List of FGs who entered into pineapple contract farming with BAIL***

SN	Name of the Group	Dzongkhag	Total Households	Current Functional Status (No. of Households left)
1	Pineapple Growers of Ngarupongtang	Mongar	20	20
2	Yangbari Pineapple Growers Group	Mongar	60	51
3	Jurmey Pineapple Growers Group	Mongar	32	Non-functional
4	Durungri Pineapple Growers Group	Pema Gatshel	45	50
5	Yagjur Pineapple Growers Group	Pema Gatshel	19	Non-functional
6	Khenadang Pineapple Growers Group	Pema Gatshel	26	Non-functional
7	Nanong Pineapple Growers Group	Pema Gatshel	20	20
8	Khangma Pineapple Growers Group	Pema Gatshel	19	19
9	Khamdang Pineapple Growers Group	Trashi Yangtse	11	Non-functional
10	Chudawoong Pineapple Growers Group	Trashigang	27	Non-functional
11	Marpheng Youth Commercial Farm	Trashigang	2	1

Source: *Compiled by the RAA from the Annual Progress Reports of CARLEP, and their current functional status verified from the BAIL, Lingmithang Plant.*

Picture 3.25: ***Pineapple farms of contract farmers in Durungri and Khangma, Pema Gatshel***

Pineapple farm belonging to farmers of Durungri Pineapple Growers Group

Pineapple farm belonging to farmers of Khangma Pineapple Growers Group

Table 3.14: ***List of FGs who entered into passionfruit contract farming with BAIL***

SN	Name of the Group	Dzongkhag	Total	Current Functional Status (Households)
1	Phosorong Vegetable	Mongar	1	BAIL has not received a raw passion fruit from the established farms despite an assured market
2	Mongar Passion Fruit	Mongar	8	
3	Chali Zarula (Passion	Mongar	11	
4	Jarey Passion Fruit	Lhuentse	3	
5	Minjay Passion Fruit	Lhuentse	7	
6	Yalang Passion Fruit	Trashiyangts	3	
7	Denchi Passion Fruit	Pema Gatshel	16	
8	Kurichilu Passion Fruit	Pema Gatshel	1	
9	LUC Kherey	Trashigang	2	
10	Pam Passion Fruit	Trashigang	1	

Data Source: *Compiled by the RAA from Annual Reports of CARLEP and their current functional status verified from the BAIL, Lingmithang Plant.*

While the contract farming model provided farmers with assured market access and income-earning opportunities, its overall performance did not meet initial expectations. The following are some of the factors contributing to the non-success of the contract farming model:

a) Implementation gap:

While an investment of **Nu. 8.53 million** has been made in the supply of fruit tree saplings, it appears that the support lacked a strategic focus, resulting in the distribution of various types of fruit trees without adequate consideration of market demand. The RAA noted that the OPM and the ARDC have not prioritised fruit varieties that have established market potential, particularly those suitable for processing by BAIL and other juice factories within the country. Based on field observations, many of the fruit varieties currently promoted by ARDC, regardless of funding source, appear to have limited commercial viability. *For instance*, pear and avocado varieties distributed were found to be widely planted across the villages visited by the RAA, despite these fruits currently lacking potential for value addition within the country.

b) Oversight gap:

A lack of timely monitoring and technical support from the ARDC and the Dzongkhag administrations contributed to low farm-level performance among the contract farmers. Dzongkhag agriculture sectors claimed they had never been involved in this initiative, although the records of discussions from the "*Market Linkage and Market Lead Production Workshop*" indicated the full participation of agricultural sectors of all six Dzongkhags, with each presenting their fruit production capacities and committing to support the idea proposed by BAIL. The contract agreements were also signed between the BAIL (as a buyer), the farmers or groups (as producers), and the Dzongkhag administrations (as promoters). This reflects an absence of accountability among the relevant agencies in monitoring the success of the farms once established.

Moreover, limitations in farmers' capacity to meet production requirements further compounded the issue as continued capacity-building supports were not provided by the relevant agencies.

c) Unattractive pricing of farm produce:

The record of discussions from the "Market Linkage and Market Lead Production Workshop" also indicated that the contract price offered by the BAIL was not found attractive to farmers, citing that, in several cases, the prices offered to farmers were even lower than the actual cost of production. Without sufficient price motivation, farmers likely had disengaged from the arrangement, leaving the initiative unable to meet its objectives.

Thus, the pricing issue, compounded by BAIL's relatively small raw material consumption capacity, has undermined the viability of the broader market linkage programme envisioned under the contract farming model.

As a consequence, it resulted in a missed opportunity to earn income by the farmers without being able to seize the assured market offered by the BAIL. Additionally, the BAIL's objective

of promoting local fruit juice (especially the passionfruit) was hampered due to inconsistent raw material supply.

BAIL's Lingmithang Plant responded that following the meeting held on 12 October 2021, it implemented a revised pricing structure, which came into effect on 1 May 2022.

The RAA acknowledges the revision of the contract pricing structure. However, it maintains its stance that inadequate prioritisation of initiatives, weak oversight and follow-up support by the agencies, and farmers' expectations of higher prices remain challenges to the success of the linkage, despite it being a noble initiative.

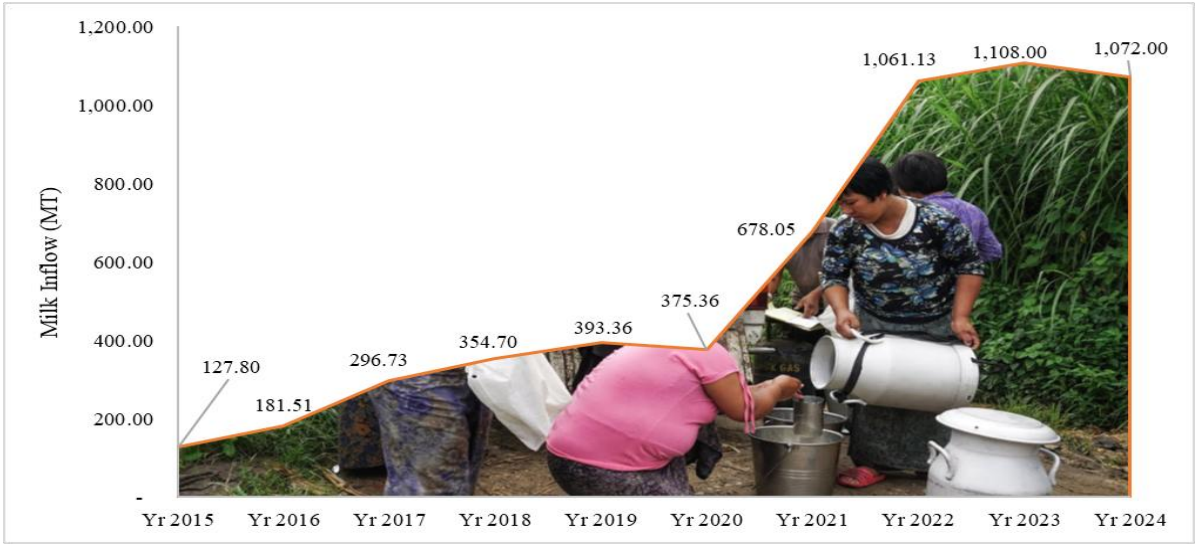
iii) Linking of dairy farmers groups with Koufuku International Limited (KIL)

The RAA observed that farmers groups and cooperatives in the livestock sector overall demonstrated relatively stronger performance compared to those in the agriculture sector. One of the key contributors to this success was the establishment of KIL, which served as the assured market for the milk produced by the dairy farmers.

KIL is a DHI owned company established in 2012 whose productions started in 2015 coinciding with the launch of CARLEP. Recognising its potential to absorb the milk produced by the farmers in the eastern Dzongkhags, CARLEP has supported the KIL with Nu. 77.06 million loan to finance its expansion, including two milk tanker trucks.

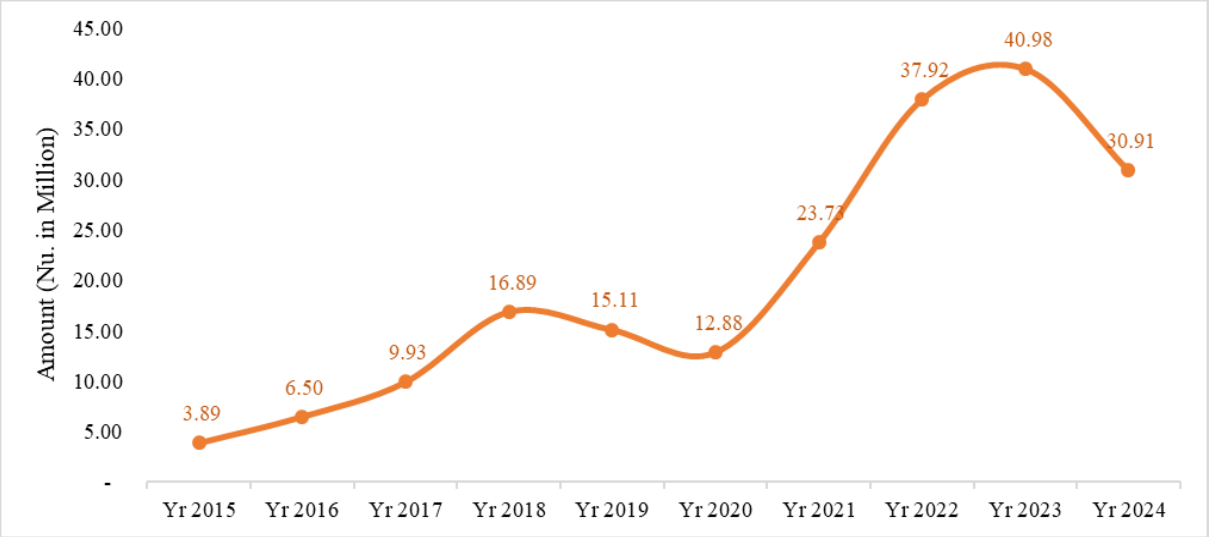
As shown in **Figure 3.16**, KIL currently collects over 1,000 MT of milk annually from more than 19 dairy farmer groups based in Trashigang (*Yangneer, Samkhar, and Shongphu Gewogs*), Mongar (*Chaskhar, Ngatsang, and Balam Gewogs*), Trashi Yangtse (*Jamkhar Gewog*) and Samdrup Jongkhar (*Gomdar Gewog*), comprising around 1,046 households, including over 627 women members. It now disburses around **Nu. 50** million annually to farmers (**Figure 3.17**).

Figure 3.16: ***Total quantity of milk collected by KIL from farmers groups***



Source: *Furnished by OPM, Mongar*

Figure 3.17: ***Payments made by KIL on purchase of milk (income to dairy farmers)***



Source: *Furnished by OPM, Mongar (figure for 2024 consists of half-year revenue)*

The success of this linkage was enabled by a network of milk collection sheds and chilling centres established by CARLEP. Official records from the OPM indicate that 57 milk collection centres have been established, of which 11 are equipped with milk chilling machines, as detailed in **Table 3.15**.

Table 3.15: ***Total number of MCCs and MCSs established under CARLEP support***

Dzongkhag	No. of Milk Collection Centres with chilling facilities	No. of Milk Collection Centres/Sheds without chilling machines	Total Infrastructures
Mongar	5	11	16
Pema Gatshel		17	17
S/Jongkhar	1	13	14
Trashigang	4	5	9
Trashi Yangtse	1		1
Grand Total	**11**	**46**	**57**

Source: *Compiled by RAA based on the infrastructural data furnished by OPM, Mongar*

The collection centres without chilling machines function as primary aggregation points where milk from individual farmers is measured and collected. This milk is then promptly transported to centres equipped with chilling machines for safe storage. This network of milk collection sheds and chilling centres constitutes a vital component of the dairy value chain infrastructure established by CARLEP. Moreover, it forms a critical upstream supply chain for KIL, ensuring a consistent and uninterrupted supply of raw milk.

The following two cases illustrate how the dairy farmer groups have capitalised on the milk collection and chilling centre system linked to KIL to engage in commercial dairy farming.

Case Study-3

<u>Success Story of Druk Chigthuen Nyamley Tshogdey</u>

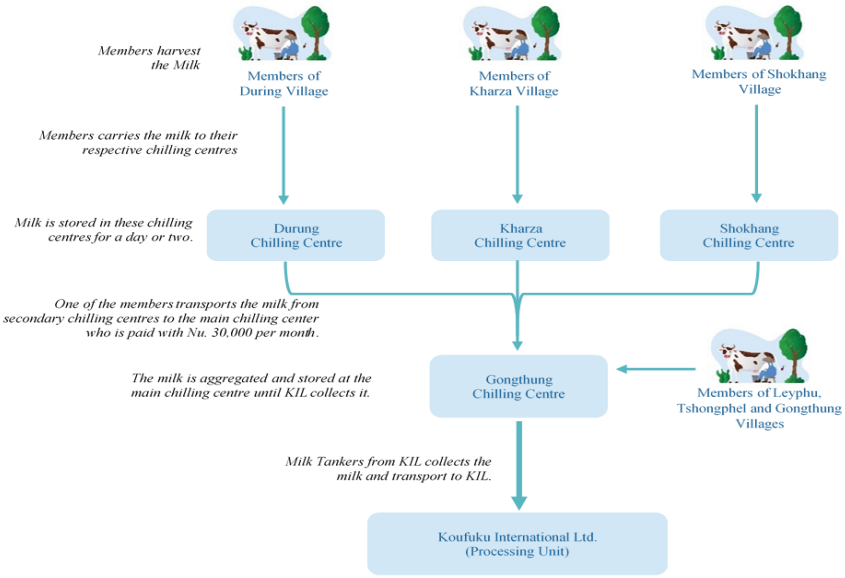
Druk Chigthuen Nyamley Tshogdey is one of the 19 dairy farmers groups linked with KIL. It was formed and registered as a "Cooperative" in 2020 under the RAMCO through the support of CARLEP. It is based in Yangneer Gewog, Trashigang, and currently has 33 active members from five villages: Shokhang, Durung, Leyphu, Tshongpel, and Gongthung.

*In order to enable the group to supply milk to KIL and avail the income-earning opportunities, CARLEP has supported the establishment of a chain of milk chilling centres at the cost of over Nu. 1.3 million (**Picture 3.26**). These chilling facilities now serve as the hub for the business operation of the group. As learned from the interview with the group representatives, members of the group collectively aggregate an average of 1,000 litres of milk daily, which is transported to KIL once in two days. It currently stands as a highest milk supplier to KIL. **Figure 3.18** illustrates how the milk from the members of Druk Chigthuen Nyamley Tshogdey reaches KIL through a chain of chilling centres.*

The members earn Nu. 35 per litre of milk (now revised to Nu. 39 per litre) whenever they supply it to the chilling centres. From their monthly earnings, each member contributes Nu. 100 to a joint savings account, which is used to manage group expenses. From this common fund, the cooperative pays Nu. 30,000 per month to a designated member responsible for collecting and transporting milk from various secondary chilling centres to the main chilling centre. The fund is also used for meeting operational costs such as electricity bills, which average Nu. 700 per month, along with minor repair and maintenance expenses.

This case reflects a strong model of collective ownership, shared responsibility, and sustainable income generation from their link to KIL, enabled with chilling facilities.

Figure 3.18: ***Illustration of how milk flows to KIL from farmers through a chain of chilling centres***



Source: *Developed by the RAA to roughly illustrate the chain.*

Picture 3.26: ***Milk Chilling Centres operated by the Druk Chigthuen Nyamley Tshogdey Cooperative***

Main Milk Chilling Centre located at Gongthung

Chilling machines and equipment in Gongthung Milk Chilling Centre
(chiller is seen empty in the picture as the entire milk was transported to KIL few hours before the RAA's visit)

Durung Chilling Centre (one of the three subsidiary of Chilling Centre)

Milk Tanker that transports the milk from Gongthung Chilling Centre to KIL

Case Study-4
<u>Success Story of Thumpapuenshi Gonor Detshen</u>

Thumpapuenshi Gonor Detshen is a dairy farmers group registered under the RAMCO in 2019. It is based in Ngatsang Gewog, Mongar and currently has 24 active members as per the record of RAMCO.

*Due to its proximity to KIL, the group was linked to the company for raw milk supply under the CARLEP's support. To facilitate them, CARLEP has established a chilling centre at Yadi Town equipped with two chiller machines, each with a capacity of 547 litres (**Picture 3.27**). The facility serves not only the group but also the dairy farmers of Sheremuhoong Gewog who are willing to sell the milk to KIL through this chilling centre.*

Members earn Nu. 35 per litre of milk supplied to the chilling centre and contribute Nu. 100 per month to the group fund as a savings as well as to support the operation of the centre. The milk is stored until it is collected by KIL.

Picture 3.27: ***Yadi Milk Chilling Centre operated by Thumpapuenshi Gonor Detshen***

Milk Collection Centre

Milk Chilling Machines

The above two cases illustrate that as long as the network of milk collection sheds and chilling centres is in operational condition, the dairy farmers groups and cooperatives are in position to actively participate in commercial milk production by linking with KIL and earn income for their livelihood.

Despite these progresses, the RAA noted concerns about the sustainability of the chilling centres and the continuity of the linkage with KIL in the future, as highlighted below.

a) Lack of skills to maintain milk chilling machines

A key challenge to the sustainability of milk chilling centres is the lack of technical skills among group members to repair the chilling machines. This problem is

exacerbated by the absence of local repair service providers in the local market as well. Farmers expressed that only KIL and RLDC are known to possess the necessary skills to carry out minor maintenance, but their services are not always available when needed.

As a result, some chilling machines, supplied through the programme, have already been damaged, with no possibility of replacement. Others remain unused, either because of technical problems or due to the absence of an operator, as illustrated in **Picture 3.28**.

Further, the RAA observed that there are no clear plans for replacing the machines in the future. It remains unclear whether this responsibility lies with the groups or the government. If the government is to continue supporting such replacements, the mechanism for financing this support after the completion of CARLEP is also unclear.

Picture 3.28: ***Few examples of milk chilling machines either damaged or left idle***

b) Absence of proper data at OPM

Records obtained from the OPM indicated that 57 milk collection centres were established across five Dzongkhags under CARLEP's support, as detailed in **Table 3.15**. However, this figure appears to be underreported, as the RAA identified additional facilities established by the Dzongkhags that were not reflected in the OPM's records. This indicates weaknesses in data management and the absence of an up-to-date central inventory. *For instance*, in Trashigang Dzongkhag, the RAA found **19** milk collection sheds established under CARLEP, of which **11** were installed with chilling machines (**Table 3.16**). In contrast, OPM's records listed only nine such sheds indicating the absence of an updated record.

Table 3.16: ***List of milk collection centres in Trashigang Dzongkhag established under CARLEP support between 2017 and 2024***

SN	Gewog	Village	Installed with Chilling Machine	Year of Establishment	Visited by RAA?
1	Shongphu	Gongsepphangma	Yes	2017-2018	
2	Yangneer	Durung	Yes	2017-2018	Yes
3	Radhi	Pakaling	No	2017-2018	
4	Phongmey	Bumthang	No	2017-2018	
5	Sakteng	Jongkhar	No	2017-2018	
6	Khaling	Dawazor	No	2018-2019	Yes (Non-operational)
7	Khaling	Barshong	No	2018-2019	Yes (Non-operational)
8	Yangnyer	Gongthung	Yes	2019-2020	Yes
9	Kanglung	Rongthung	No	2019-2020	Yes
10	Samkhar	Bikhar	Yes	2020-2021	
11	Kanglung	Martsham	No	2020-2021	
12	Samkhar	Bazor, Bikhar	Yes	2021-2022	
13	Samkhar	Lungdama, Bikhar	Yes	2021-2022	
14	Yangnyer	Kharza	Yes	2021-2022	
15	Yangnyer	Shokhang	Yes	2021-2022	
16	Shongphu	Challing	Yes	2022-2023	
17	Udzarong	Udzarong	Yes	2022-2023	Yes
18	Samkhar	Bikhar Gonpa	No	2022-2023	
19	Samkhar	Rangshikhar	Yes	2023-2024	

Source: *Furnished by Dzongkhag Livestock Sector, Trashigang Dzongkhag*

c) Oversight gaps:

In Mongar, two milk collection sheds in Yakpugang village, Mongar Gewog, were found abandoned (**Picture 3.29**). According to farmers, the sheds had once been actively used, but a severe cattle disease outbreak led to the death of many cows and rendered the milk unfit for consumption. Consequently, the dairy group became inactive, and the sheds were left unused.

Similarly, in Drametse Gewog, two milk collection sheds remained unused since their construction. Farmers attributed this to the prolonged vacancy of the gewog livestock extension official position. The former official left immediately before successfully linking the group with KIL. As a result, the group never became operational.

Similar instances were also noted in Khaling Gewog of Trashigang where two milk collection centres were left idle due to the declining strength of the farmers group and inadequate monitoring by the extension centre.

These instances highlight both the collapse of the groups and the lack of effective intervention by the relevant agencies to restore operations. While these are specific examples, similar situations may recur if continuous monitoring and timely support are not provided, thereby undermining the sustainability of farmers' enterprises.

Picture 3.29: ***Instances of underutilised milk collection centres***

Upper Yakpugang milk collection shed (Mongar Gewog)

Lower Yakpugang milk collection shed (Mongar Gewog)

Barshong milk collection centre (Khaling Gewog)

d) Market for KIL's products:

In addition to the above issues, the noted challenges, particularly in marketing their final products. KIL shared that they face strong competition from imported goods, which have already established a firm presence in the domestic market. Additionally, although KIL is a DHI company, it continues to operate with limited capital, which is barely sufficient to support the ongoing expansion of its physical infrastructure. This situation raises concerns not only for KIL itself, but also for the dairy farmers involved in its upstream supply chain, and for the Ministry in ensuring the long-term sustainability of CARLEP's benefits.

The OPM responded that they have trained the Technicians of RLDC, KIL and private individuals (Electronic service centre) on refrigeration and cold chain maintenance in India. The current modality of milk chilling equipment repairs and maintenance is being undertaken jointly by the group, KIL and the project. Hereafter, the KIL will take full responsibility not only in cold chain maintenance but also in the replacement of the equipment after the end of its useful life. Such arrangements between the end users (processor and community) who share a common sense of belongingness will go a long way in sustaining the project outcomes and impact.

KIL, however, responded with a different view stating that KIL has fully taken on the maintenance of milk chillers at MCCs. However, it has not committed to replacing them, nor has any formal agreement been made about this. KIL believes that the RGoB should continue to be responsible for MCCs and their equipment, as is the current practice. This would help strengthen the national dairy value chain.

According to KIL, they cannot afford to take on the full responsibility of replacing milk chillers at MCCs. The company's main focus is on keeping the KIL plant running to provide a steady market for milk farmers. This effort is supported by an ongoing expansion plan, which is financed by Nu. 77 million loan from the CARLEP project. This has created an extra financial burden for KIL, making it even less feasible to handle the replacement of milk chillers.

KIL highlights the need for shared responsibility and a sense of ownership among all stakeholders to ensure the long-term success and impact of project outcomes.

The RAA notes the OPM's initiative to train technicians and establish joint maintenance arrangements for milk chilling equipment involving KIL, the groups, and the project. However, the differing views between the OPM and KIL regarding responsibility for replacement highlight the absence of a formal agreement on post-project obligations to ensure accountability and the sustainability of the cold chain system.

iv) Engagement of dairy farmers groups in milk processing and marketing

KIL has strengthened the dairy value chain as detailed above but its reach remains limited to a few Gewogs of Trashigang and Mongar, and one Gewog each in Trashi Yangtse and Samdrup Jongkhar. Although other Gewogs in Pema Gatshel and Samdrup Jongkhar Dzongkhags were found to have potential in high milk production, farmers are unable to access KIL's commercial milk processing services due to distance and the associated high transportation costs.

To address this constraint, CARLEP has established several milk processing units (MPUs) within these localities, enabling farmer groups to process and market dairy products without having to depend on KIL.

CARLEP supported the establishment of over **13** milk MPUs across five eastern Dzongkhags, excluding Trashigang. As shown in **Table 3.17**, nine of these units are located in Pema Gatshel, while two are in Samdrup Jongkhar, and one each in Lhuentse and Mongar Dzongkhags. Out

of the **13** processing units visited by the RAA, **11** were found to be functional, whereas two units in Pema Gatshel Dzongkhag had ceased operations.

Table 3.17: ***Total number of MPUs established under CARLEP's support***

SN	Dzongkhag	Gewog	Year of establishment	Visited by RAA?
1	Lhuentse	Minjey	2020-2021	Yes
2	Mongar	Mongar	2019-2020	Yes
3	Pema Gatshel	Shumar	2019-2020	Yes
4	Pema Gatshel	Nanong	2018-2019	Yes
5	Pema Gatshel	Norbugang	2020-2021	Yes
6	Pema Gatshel	Yurung	2020-2021	Yes
7	Pema Gatshel	Dungmead	2017-2018	Yes (Non-operational)
8	Pema Gatshel	Zobel	2016-2017	Yes (Non-operational)
9	Pema Gatshel	Nanong	2019-2020	Yes
10	Samdrup Jongkhar	Dewathang	2018-2019	No
11	Pema Gatshel	Nanong	2018-2019	Yes *(Not in the list of OPM but found and visited by RAA)*
12	Pema Gatshel	Nanong	2023-2024	Yes *(Not in the list of OPM but found and visited by RAA)*
13	S/Jongkhar	Gomdar	2019-2020	Yes *(Not in the list of OPM but found and visited by RAA)*

Source: *Compiled by RAA based on the infrastructural data furnished by OPM, Mongar*

These MPUs were established primarily to enable decentralised milk processing and marketing business among dairy farmers that are not linked with KIL. The following two cases illustrate how dairy farmer groups and cooperatives in these Dzongkhags engage in commercial dairy farming by operating their own processing plants established through the CARLEP:

Case Study 5
Woongchilo Milk Processing Unit

*Woongchilo MPU (**Picture 3.30**) is currently operated by Terda Puensum Gonor Detshen, one of the many dairy farmer groups registered with RAMCO. The group was registered in 2020 with support from CARLEP and is based in Woongchilo village, Nanong Gewog, Pema Gatshel. According to records of RAMCO, the group currently has 64 active members.*

The group produces butter, cottage cheese, and yoghurt from their processing unit. These products are sold both within the locality and in Samdrup Jongkhar town, including orders placed in advance by consumers.

A review of records at the processing unit showed that the group was in a position to generate monthly revenue ranging from Nu. 198,795 to Nu. 262,5951 from the sale of the

products. The revenue was utilised for paying the members towards the supply of milk and covering the operating expenses of the processing unit. Any balances are retained as group savings.

Records also showed that each member earns Nu. 37 for every litre of milk they supply to the processing unit, which is a direct income to them. In the first half of 2024, a total of Nu. 1.15 million has been paid to its members for milk supplied, as shown in ***Table 3.18****.*

Table 3.18: ***Financial highlights of the processing unit during the first half of the year 2024***

Month	Total Milk Collected from members* (litres)	Rate per litre of Milk (Nu.)	Total Amount Paid to Member Farmers during the Month (Nu.)	Gross Income (Nu.)	Net Income (Nu.)
Jan-24	5,142.20	37	190,261	243,595	35,352
Feb-24	4,268.40	37	157,931	198,795	10,859
Mar-24	4,818.70	37	178,292	210,075	4,191
Apr-24	4,768.60	37	176,438	208,665	366
May-24	5,912.60	37	218,766	256,378	4,912
Jun-24	6,264.40	37	231,783	262,595	799
Total			**1,153,471**	**1,380,103**	**56,479**

Source: *Compiled by RAA based on the records maintained by the Treasurers of the group at the processing unit.*

Note: *Total milk collected from members represents the quantity of milk collected from group members who had a milking cow during the reporting months.*

The RAA analysed the profitability of the plant based on the estimated breakeven income based on the median income and expenditure values obtained from the first six months of 2024 as shown in ***Table 3.19****. The analysis showed that the processing plant is operating on extremely thin profitability, with a median net income of only Nu. 4,552 (about 2% of revenue) and a low PV ratio of 18.76%, indicating that variable costs consume the vast majority of income. While the current median monthly income exceeds the break-even point by Nu. 66,888, providing some cushion, the small margin of safety (~29.50%) means even moderate sales declines or cost increases could undermine the profitability of the plant.*

Table 3.19: ***Estimation of breakeven income of the processing plant***

Month	Income	Variable Cost	Net Income	Fixed Cost
	(a)	(b)	(c)	(a-b-c)
Jan	243,595	190,261	35,352	17,982
Feb	198,795	157,931	10,859	30,005
Mar	210,075	178,292	4,191	27,592
Apr	208,665	176,438	366	31,861
May	256,378	218,766	4,912	32,700
Jun	262,595	231,783	799	30,013
Median	**226,835**	**184,277**	**4,552**	**30,009**

	Income	226,835
Less:	Variable Cost	184,277
	Gross Contribution	42,559
	PV Ratio	0.1876188
	Break-Even Income (Fixed Cost / PV Ratio)	159,947
	Margin of Safety	66,888

Source: *Computation of the RAA.*

Overall, the plant has been operating above the break-even point. Although the processing unit incurs significant variable costs, these represent payments to group members and thus considered a successful venture. Group members have an opportunity to earn Nu. 37 per litre of milk, as long as the plant remains profitable.

Picture 3.30: ***MPU operated by Terda Puensum Gonor Detshen***

Case Study 6
<u>Norbugang Milk Processing Unit:</u>

*Norbugang MPU (**Picture 3.31**) is comparatively larger in terms of capacity. It is operated by Zambalha Natsho Nyamley Tshogdey Detshen, one of the successful dairy farmers cooperatives formed under the support of CARLEP. Zambalha is a dairy-based self-help group that was first registered with RAMCO as a dairy farmers group in 2017 and later upgraded to a community-managed cooperative in 2022. The cooperative is based in Norbugang Gewog, Pema Gatshel, and it currently has 69 active members as per the records of RAMCO.*

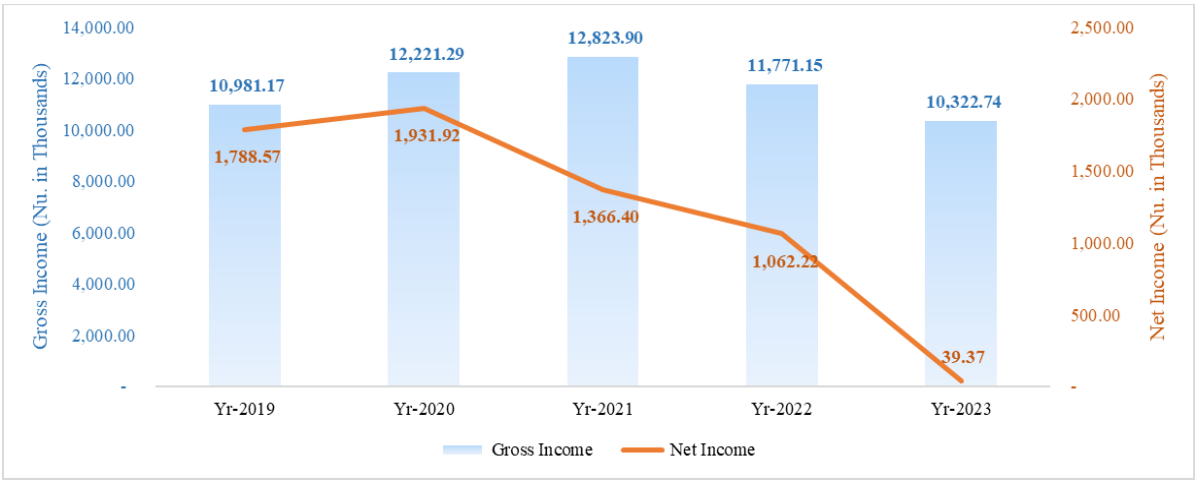
Through the processing and marketing of the dairy products, members earn regular incomes ranging from Nu. 10,000 to Nu. 45,000 per month. Surplus earnings are saved in a joint common fund, used for group needs and emergencies. Beyond income generation, the cooperative supports social welfare, such as offering Nu. 15,000 Semso in case of the demise of members and their dependents, and charity like contributing 1,000 Aguer trees to the local dratshang.

The group is currently governed democratically, with annual elections and participatory decision-making, including setting milk prices, currently at Nu. 43 per litre. It has also created local employment, hiring four youth with a monthly salary of Nu. 12,000 to operate the plant.

*Despite its successful establishment, the unit has experienced declining profitability in recent years **(Figure 3.19)**, particularly following the COVID-19 pandemic, and an instance of mismanagement occurred within the cooperatives.*

Picture 3.31: ***Norbugang MPU***

Figure 3.19: ***Financial performance of Zambalha Natsho Nyamley Tshogdey Detshen over the past five years***



Source: *Developed by RAA based on the financial data furnished by Dzonghag Livestock Sector, Pema Gatshel Dzonghagk*

The above cases of two milk processing units (one run by farmers group and one by a cooperative) illustrate that, as long as the milk processing units remain operational, members are assured of consistent income, ranging from Nu. 37 to Nu. 43 for every litre of milk they contribute to the processing unit.

However, the long-term sustainability of these interventions remains a concern due to the following factors:

a) Limited product diversity:

The MPUs continue to produce only a limited range of products, viz. butter, cottage cheese, butter milk, and yoghurt, as shown in **Picture 3.32**. The lack of diversification beyond these products presents a potential risk of saturating the market with too many producers of homogeneous goods. This may further result in excess supply and intensified competition in the market, often leading to falling prices and reduced profitability.

Although there is evidence that technical assistance and training were provided to these groups under the CARLEP in the initial stage, the RAA found these efforts to be inadequate, especially in helping farmers develop the skills needed to diversify their products.

Picture 3.32: ***Types of processed and sold across all processing plants operated by the dairy farmers groups***

Butter

Cottage Cheese

Butter Milk

Raw Milk

Yoghurt

b) Lack of skills to maintain machinery and equipment:

The MPUs are dependent on a range of specialised machinery such as milk chillers, pasteurisers, milk churners, incubators, deep freezers etc. (**Picture 3.33**), which require regular servicing. During the field visits, it was noted that group members lacked the requisite technical skills to repair the machines and equipment, and there were no readily available service providers in the locality. As a result, any equipment breakdown may pose a risk of prolonged production disruption and may cause the MPUs to become non-operational for extended periods.

Picture 3.33: ***Example of machines and equipment found in MPUs***

Milk Chiller

Milk Churner

Milk Churner

Cream Seperator

Milk Pasturiser

Incubator for Yoghurt

Display Refregerator

Deep Freezer

c) Functionality of the farmers groups:

As shown in **Table 3.17**, two MPUs in Pema Gatshel Dzongkhag, Laneri (Dungmaed Gewog) and Ngangmalang (Zobel Gewog), were found to be non-operational during the RAA's field visit. Discussions with former group members revealed that the discontinuation of operations at Laneri was due to declining membership, as younger individuals migrated for education and employment, leaving the group predominantly comprised of elderly members. In the case of Ngangmalang, coordination challenges among members dispersed across different villages led to operational difficulties and

eventual closure. These two instances may serve as indicative examples of common challenges that, if not addressed in a timely manner, may lead to similar outcomes in other processing units. During the site visits, both units showed visible signs of inactivity, with infrastructure and equipment left unused and exposed to deterioration, including rusting of the machinery (**Picture 3.34**).

Picture 3.34: ***Physical status of the two non-operational MPUs visited by the RAA***

(a) Current status of Laneri MPU, Dungmaed, Pema Gatshel

MPU left idle after the defunct of the dairy farming group without proper future plan in place.

Machines and equipment in the MPU left idle with visible wear and tear.

Artificial Insemination Travis left idle after farmers stopped bringing their cattle for multiplication and accordingly CAIT became idle.

(b) Current status of Ngangmalang MPU, Zobel, Pema Gatshel

MPU left idle after the coordination issues arisen among the dairy farming groups.

Machines and equipment in the MPU left idle with visible wear and tear (some equipment from this MPU was transferred to another village where new MPU was established)

d) Incomplete records:

Additionally, discrepancies were noted in the central records maintained by the OPM. During the field visits, the RAA found that three processing plants, Yarphu (Gomdar, Samdrup Jongkhar), Woongchiloo (Nanong, Pema Gatshel), and Resinang (Zobel, Pema Gatshel), were not listed in the records provided by the OPM, although they were a part of assets created under CARLEP support (**Picture 3.35**). This highlights a gap in the centralised documentation and tracking of project-supported infrastructure. Incomplete records may adversely affect the monitoring, support, and maintenance planning for these MPUs, and raises concerns over the governance of programme assets.

Picture 3.35: ***MPUs not listed in the records of OPM but found by the RAA***

Yarphu MPU, Gomdar, SJ

Woongchiloo MPU, Nanong, PG

Resinang MPU, Zobel, PG
(Currently installed in one of the abandoned School building)

Minjey MPU, Minjey, LH

v) Linking of farmers groups with educational institutions

One of the notable initiatives taken under the support of the CARLEP was linking the farmers groups with schools and training institutes. Most of these linkages were formed after the COVID-19 pandemic, drawing on lessons learned during that period. The primary objective of this initiative was to provide a reliable and consistent market for farmers' produce.

Table 3.20 shows the summary of total farmers groups and institutes linked by the RAMCO till the date of the audit.

Table 3.20: ***Summary of number of schools involved and total farmers groups linked***

Dzongkhag	Agriculture Sector		Livestock Sector	
	No. of Schools/institutes linked with	No. of Vegetable Farmers Groups involved	No. of Schools/institutes linked with	No. of Vegetable Farmers Groups involved
Lhuentse	16	22	4	4
Mongar	33	76	28	25
Pema Gatshel	24	34	22	25
S/Jongkhar	20	40	14	13
Trashigang	59	114	26	34
Trashi Yangtse	24	41	10	10
Total FGs		**327**		**111**

Source: *Compiled by RAA based on farmers group data furnished by RAMCO, Mongar*

During the field visits, the RAA observed that some of these linkages, especially between schools and vegetable farmers groups, were not functioning effectively. In some cases, schools had stopped ordering vegetables from the groups, or farmers had stopped supplying to the schools.

Discussions with five school authorities and members of the farmers groups, linked with these schools, revealed that the main issues were related to pricing and product quality. Some farmers indicated that they received better prices when selling their produce in local markets, making school supplies less attractive. Conversely, some schools expressed concern that farmers prioritised market sales and supplied only leftover produce to schools, which affected the quality. The school authorities are not able to negotiate better prices because of their financial resource constraints.

These issues appeared to stem from inadequate monitoring by the responsible authorities. Although RAMCO was responsible for initiating the linkages, Dzongkhag agriculture sectors considered monitoring responsibilities to be outside their mandate, while RAMCO assumed that the Dzongkhags would oversee and manage the arrangements.

Notwithstanding these challenges, some successful cases were also noted during the audit. For instance, Uzorong Central School established a successful linkage with two vegetable farmers' groups: Drotphu Tshesay Tshongdrel Detshen and Bepam Tshesay Tshongdrel Detshen. In discussions held separately with the farmers' groups and the school authorities, both parties confirmed the effectiveness of their collaboration.

Linkages in the dairy segment appear fairly successful, and the schools depend on the nearby milk collection centres and processing units for the supply of milk and dairy products.

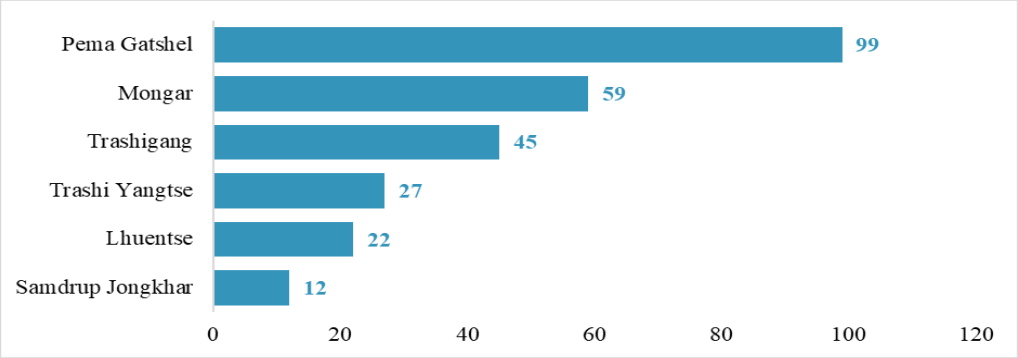
vi) Miscellaneous livestock farming supports to increase income opportunities

In addition to the CARLEP's goal of intensifying milk production, it also supported the poultry, beekeeping and piggery farms to diversify the livestock products and build production resilience among the farmers. During the field visits, the RAA has observed the following situations in these interventions:

(A) Support for Poultry Farming:

CARLEP identified poultry farming as a viable livelihood option beyond dairy and has accordingly prioritised its promotion. To support this initiative, poultry farmers were provided either with pullets or construction materials and equipment, including CGI sheets, wire mesh, feeders and drinkers, and automatic debeaking machines. The objective was to facilitate the establishment and long-term sustainability of smallholder poultry farms, with the expectation that these enterprises would eventually become self-reliant and contribute meaningfully to national egg self-sufficiency. The type of support consists of two categories: backyard and semi-commercial. **Figure 3.20** presents the number of households benefitted by the poultry support.

Figure 3.20: ***Number of households benefitted with poultry support***



Source: *Adapted from Annual Progress Report of OPM, Mongar*

The RAA observed that most of the poultry farms supported by CARLEP were not sustained beyond one year. *For instance*, Pema Gatshel Dzongkhag has the highest number of poultry beneficiaries. While reviewing the functional status of ten semi-commercial poultry farms supported by CARLEP in FY 2020-2021, it was found that five out of ten (50%) are currently non-operational (**Table 3.21**).

Table 3.21: ***List of semi-commercial poultry farms supported by CARLEP in Pema Gatshel during FY 2020-2021***

SN	Gewog	Village	Beneficiary Name	Current operational status
1	Nanong	Mongthung	Karma Jamtsho	Operational
2	Chimung	Chimung	Dawa Rinzin	Non-operational
3	Chimung	Chimung	Metsi Wangchuk	Partially operational
4	Norbugang	Tshelshingzor	Jamyang Dorji	Non-operational
5	Norbugang	Tshelshingzor	Yezer Dorji	Non-operational
6	Khar	Shinangri	Gyembo Wangdi	Non-operational
7	Shumar	Borangchilo	Nakpai	Non-operational
8	Shumar	Khothakpa	Sonam Dorji	Operational
9	Zobel	Ngorkhi	Mizang	Operational
10	Zobel	Mongling	Ngawang Yonten	Partially operational

Source: *Furnished by Dzongkhag Livestock Sector, Pema Gatshel Dzongkhag*

The primary reasons behind these sustainability challenges, as identified through interviews with beneficiaries, local government leaders, and extension officials, are outlined below:

a) High feed cost was a common challenge highlighted by both successful and unsuccessful poultry farms. Farmers explained that pullets take time to mature before they begin laying eggs. Egg production gradually rises, peaks, and then declines as the birds age. During the early and late stages of this cycle, egg production is low, whereas feed consumption remains constant, indicating that the income from egg sales during these periods is often not enough to cover the cost of feed. The mismatch between high input costs and low returns contributed to business failures, especially among smallholder farmers with limited production capacity.

In addition, the majority of the support recipients are smallholder poultry farmers who face intense price competition in the domestic market. Farmers expressed concerns about eggs being sold at lower prices, particularly those originating from bordering areas of India. According to them, such eggs are being sold at prices ranging from Nu. 220 to Nu. 250 per tray. As a result, some local farmers were compelled to lower their prices below sustainable levels in order to remain competitive, ultimately leading to financial losses and the closure of several farms.

Given such a situation, the RAA is of the view that with the expansion of the "One-Child, One-Egg" initiative to all schools, domestic egg production may struggle to meet the increased demand due to the current conditions in poultry farming. This may necessitate a greater reliance on imported eggs, further undermining the viability of smallholder farmers and defeating the core objective of CARLEP.

Notwithstanding these challenges, there were some success stories noted during the field visits. For instance, a poultry farmer in Kidlung, Gangzur Gewog, Lhuentse Dzongkhag, who rears over 1500 layer birds, produces more than 800 eggs daily. The farmer, who started with backyard poultry, has now become one of the leading suppliers in the Dzongkhag, providing eggs to eight schools under the "One-Child, One-Egg" initiative. Similarly, poultry farms in Tsongpoktor, Yangneer Gewog, and Lungtenzampa, Samkhar Gewog, both in Trashigang Dzongkhag, are examples of successful commercial poultry ventures with similar achievements. A common feature among these farms is that they operate on a larger scale, which enables them to better withstand the challenges faced by smaller poultry operations.

(B) Support for Beekeeping:

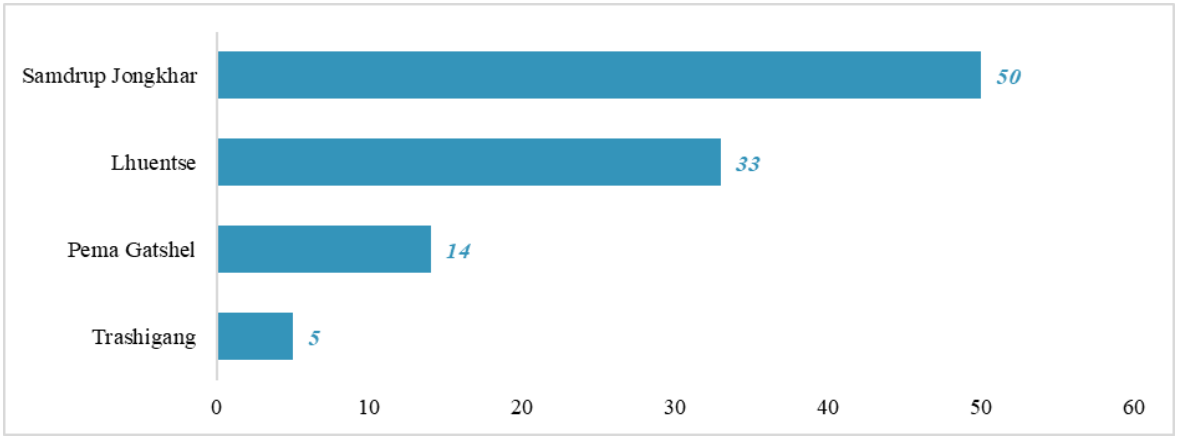
CARLEP contributed to promoting beekeeping as a livelihood option in rural communities by providing essential resources such as bee colonies and bee boxes to **102** households (**Figure 3.21** and **Picture 3.36**). This support has particularly benefitted elderly individuals, as beekeeping is a low-impact activity that requires limited physical effort and can be managed without intensive labour. Typically, a beekeeper is able to harvest between four to five bottles of honey every six months. The honey is either consumed at the household level or sold in local markets, thereby supplementing household income.

In addition to the provision of equipment, CARLEP facilitated training for farmers to enhance their knowledge and skills in apiculture. This has helped farmers better manage beekeeping activities and improve productivity.

Despite such supports, farmers reported facing several challenges in maintaining their beekeeping activities, with ant infestations being one of the most common problems. Ants are drawn to the sweet contents of the hives and often invade them, weakening the colonies and sometimes causing the bees to abandon the hives altogether. In some cases, farmers observed that bee colonies left their hives and never returned, leaving the hives empty and their efforts in vain (A case illustrated in **Picture 3.37**).

While the distribution of a small number of hives per household has introduced farmers to apiculture, the scale of support has not been sufficient to establish beekeeping as a sustainable and profitable enterprise. Increasing the number of hives per beneficiary household could have significantly boosted production and helped to make beekeeping a more dependable source of income over the long term.

Figure 3.21: ***Number of households benefitted with beekeeping support***



Source: *Adapted from Annual Progress Report of OPM, Mongar*

Picture 3.36: ***Example of beehives supplied by CARLEP and the sample of honey extracted from beehives***

Beehives supplied under CARLEP support

Honey extracted from the beehives

Picture 3.37: ***Example of an empty beehive and possible alternative solution***

A beehive in S/Jongkhar, distributed in 2019–2020, now lies empty after the colony migrated

A lead farmer in Trashi Yangtse received four beehives in 2024 (outside the audit period). Providing more hives per household could be a better alternative to sustain the beekeeping farm, as farmers would still have remaining hives even if one or two become vacant.

(C) Support for Piggery Farming:

Beneficiary records from OPM show that approximately 93 individuals received piglets under the CARLEP initiative between 2016 and 2019 as detailed in **Table 3.22**. These supports were provided as a target intervention to uplift livelihoods of the households in remote areas.

Table 3.22: ***CARLEP supports to piggery farmers (supported between 2016 to 2019)***

Dzongkhag	Gewog	Village	No. of beneficiary Households
Mongar	Thangrong	Roinangkhoi	12
Trashigang	Lumang	Lumang	16
Trashigang	Yangneer	Daliphang_Ragshigo	2
Trashigang	Yangneer	Darjeyling_Kharthung	9
Trashigang	Yangneer	Duroong_Ngambinang	23
Trashigang	Yangneer	Kharza_Lephu	10
Trashigang	Yangneer	Shokang_Tagtagpa	11
Trashigang	Yangneer	Uzorong	4
Trashigang	Yangneer	Yangneer	6
Total			**93**

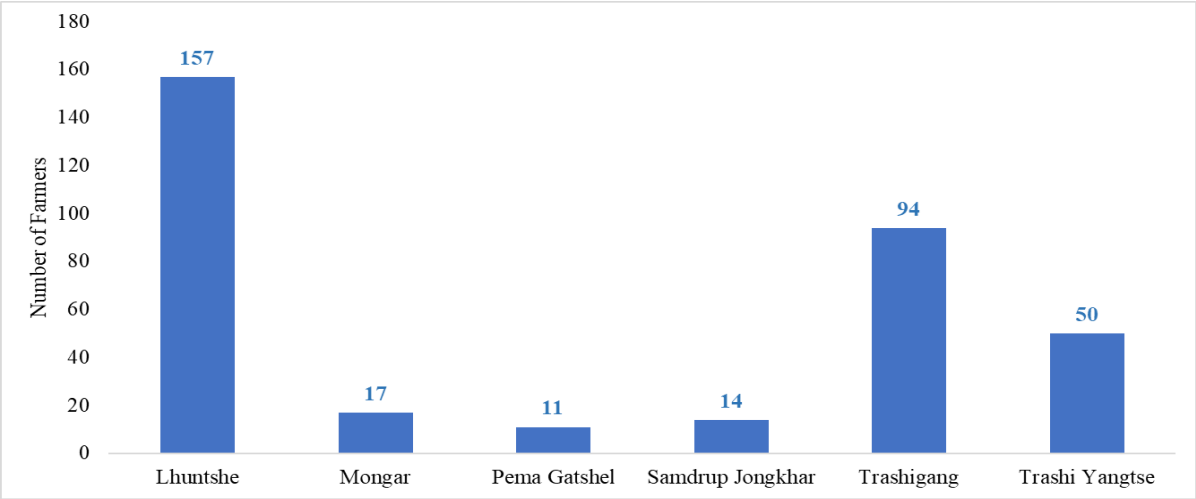
Source: *Compiled by RAA based on the beneficiary list furnished by OPM, Mongar*

Despite these interventions, the impact of piggery support on production resilience in the livestock sector remains limited. Key barriers include price competition from cheap imported pork and lack of cooperative and institutional support. These factors have prevented farmers from moving beyond subsistence to more viable commercial operations. As a result, piggery farming has benefitted individuals but not significantly contributed to broader sectoral transformation or resilience.

viii) Support for Mushroom Farming

Mushroom was identified as one of the vital entrepreneurship opportunities under the CARLEP and supported **343** mushroom farmers. The support included the supply of mushroom spawn, initial infrastructural materials, and training. Shitake and Oyster are the main types of mushrooms supported under the programme. The details on the number of farmers who have received such support are given in **Figure 3.22.**

Figure 3.22: ***Number of farmers who received support for mushroom cultivation***



Source: *Adapted from Annual Progress Report of OPM, Mongar*

The RAA visited ten mushroom farms supported by CARLEP and found that almost all had made commendable progress, successfully generating income from supplying mushrooms to schools, institutions, and local markets despite operating on a small scale.

*For instance (**Picture 3.38**),*

- Sonam Gyeltshen, a mushroom farmer well recognised through various media platforms, produces over 2,000 kilograms of mushrooms annually, earning a gross income of about Nu 980,000. He also contributes to ARDC programmes as an influencer and trainer, supporting and motivating aspiring mushroom farmers in the region.

- Karma Wangdi, a mushroom farmer in Lhuentse, has been able to earn around Nu. 250,000 annually through mushroom intensification, despite certain logistical challenges.

- Karma Yoezer, a mushroom farmer in Samdrup Jongkhar, has sustained Shitake mushroom production for nine years, generating an annual income of Nu 50,000 to Nu 60,000.

- Wangchuk, a mushroom farmer in Trashigang, has been cultivating mushrooms jointly with a friend, and has been producing mushrooms for two years and selling them successfully in the local market.

Several challenges have also been observed that hinder the long-term success of mushroom farming. In some cases, poor-quality spawn has resulted in crop failure. The support provided under CARLEP was largely a one-time assistance, with no follow-up measures. As a result, many farmers discontinued production after the first cycle due to the absence of continued support to sustain or revive their enterprises. Farmers have further shared difficulties in competing with cheaper imported mushrooms, which has affected their ability to secure

markets. Transportation remains another constraint, particularly for those in remote areas, where access to markets is limited. Seasonal variations have also affected yields, with lower production recorded during the winter months.

Picture 3.38: ***Example Mushroom Farms that received support under CARLEP***

Mushroom Production

Spawn production

IoT based climate controlling mobile apps

Samsara Organic Mushroom Farm in Mongar, one of the exemplary farms in the region.
(Established in 2019 under Priority Sector Lending support and reinforced by CARLEP in 2023-2024)

Karma Wangdi's Mushroom Farm in Lhuentse
(CARLEP supported the farm with mushroom spawn in 2021-2022)

Karma Yezer's Mushroom Farm in S/Jongkhar


A defunct mushroom farm at Tsakaling

Phuntsho Jungney Mushroom Farm in Trashi Yangtse known to face production decline (supported in 2023-2024)

ix) A lone Vegetable Aggregators Cooperative

One of CARLEP's core implementation strategies is to form and strengthen farmers' cooperatives and marketing groups that can serve as institutional platforms for produce aggregation, collective bargaining, and reliable linkages with commercial buyers such as the FCBL, BLDC, etc. These cooperatives are expected to reduce transaction costs, improve economies of scale, enhance access to finance and extension services, and provide assured markets for rural farmers.

As on the date of audit, the RAA found that only one agricultural cooperative, ***Sharchok Sanam Tshongdrel Nyamley Tshogdey*** a.k.a. Eastern Agricultural Marketing Cooperatives (EAMC) has been registered under RAMCO. The EAMC, was established in 2022 with 25 members from Mongar, Trashigang, Trashi Yangtse and Bumthang Dzongkhags; however, it now has around 22 active members as per the record or RAMCO.

According to its Business Plan, the EAMC was formed with the objectives to:

- ✓ Collect vegetables from dispersed farms across the six eastern Dzongkhags plus Bumthan Dzongkhag, and supply them to schools, hotels and vegetable markets, not only within the eastern Dzongkhags but also to central and western Dzongkhags on a gradual basis.

- ✓ Process vegetables through drying, package them appropriately, and explore export markets.

- ✓ Purchase vegetables and fruits in bulk during peak seasons, store them in cold storage facilities, and make them available in the market during off-seasons.

In order to operationalise the core functions of the EAMC, the RAMCO successfully established a B2B linkage, where 31 farmers groups from Mongar and Trashigang were formally linked with the EAMC as summarised in **Table 3.23**.

Table 3.23: ***Summary of the number of farmers groups and the number of aggregators assigned***

Dzongkhag	Gewog	No. of FGs	No. of EAMC's members assigned as aggregator
Trashigang	Lumang	2	6
Trashigang	Kanglung	4	17
Trashigang	Bidung	3	17
Trashigang	Phongmey	7	6
Mongar	Drametse	6	7
Mongar	Narang	4	7
Mongar	Balam	5	?
Total		**31**	

Source: *Details of the Cooperative furnished by RAMCO, Mongar*

The RAA found that the EAMC has not been able to achieve its stated objectives effectively. There is no evidence showing that the EAMC has ever made bulk purchasing during peak seasons, exported dried vegetables, or utilised cold storage facilities. Instead of sourcing produce from all farmers in the target Dzongkhags as envisioned in their Business Plan, it collects vegetables only from its members, mainly those nearby, defeating its core purpose of benefiting the farmers of all six eastern Dzongkhags. At present, it acts primarily as an agent for the FCBL, aggregating vegetables for FCBL to supply to the Gyalposhing Gyalsuung Academy. Besides this, the members also sell vegetables directly at the Gyalposhing Kaja Throm and in nearby markets.

Discussion with the representatives of the cooperative revealed several issues that have hindered their ability to fulfil the aims and objectives outlined in the Business Plan. The primary reasons were:

a) Transportation costs:

The transportation costs have made it economically unviable for the cooperative members to travel long distances to collect vegetables from remote farms.

b) Access to credit facilities:

The group has been unable to obtain working capital or credit, despite having enough government policies designed to promote financial inclusion in the agriculture sector. This indicates shortcomings in the design or implementation of existing loan schemes for farmers.

c) Pricing and payment:

> The representatives also expressed dissatisfaction with the pricing arrangements offered by FCBL, characterising them as unclear and often unfavourable. They further raised concerns regarding delayed payments and the absence of clearly defined responsibilities on the part of institutional buyers. These issues have discouraged the members from actively participating in the aggregation business. This indicates insufficient oversight by relevant government agencies to monitor the cooperative's operational performance and review the effectiveness of B2B linkages.

The inability of the EAMC to fulfil its stated objectives poses a risk to both its own viability and the broader cooperative movement in the region. Firstly, continued failure to deliver results has reduced member participation (from 25 during the time of registration to 22) which may lead to the collapse of the cooperative. Such an outcome may also discourage other farmers from joining or forming cooperatives, undermining CARLEP's objective of building sustainable and inclusive value chains in eastern Bhutan.

Secondly, many farmers complained that aggregators no longer visit them to purchase produce, as originally planned. In some of the most productive villages, vegetables were found in the fields overmatured due to limited market access. There were also instances where farmers have piled up the overmatured vegetables which they often fed to cattle **(Picture 3.39)**. This reflects both a waste of farmers' efforts and a loss of the resources invested by agricultural extension offices in intensifying production without establishing an assured market.

Picture 3.39: ***Example of overmatured vegetables piled up as they could not be sold on time due to a lack of an assured market***

In light of the cases highlighted above, the RAA is of the view that the establishment of the aggregators' cooperative has not been effective despite the efforts made by RAMCO. This situation is likely to persist unless the challenges related to logistical, financial, and institutional challenges are appropriately addressed. This could potentially risk the long-term sustainability of cooperative-based initiatives in the region.

In light of the above findings (***Findings i to ix***), the RAA noted the following challenges:

a) While CARLEP's interventions of strengthening agricultural enterprises reached five Dzongkhags geographically, the benefits were largely confined to the respective farmers groups. Most processing units sourced their raw materials exclusively from the members of their respective groups, with limited engagement of other farmers in the broader community or Gewog. This narrow sourcing model restricts the distribution of economic benefits and raises concerns about the inclusiveness of the farmers and alignment to Sustainable Development Goals, particularly the principle of leaving no one behind. The main cause of this issue was the fragmented and sporadic implementation of the programme rather than its design and execution being based on a comprehensive value-chain strategy.

b) There is a serious concern regarding the long-term sustainability of these interventions beyond the programme period. Key risks arise from weak institutional capacity among farmers groups, unreliable market access, lack of localised maintenance support for machinery and equipment, and the absence of a complete and updated central inventory of programme assets for exit planning and future monitoring. Field inspections have already revealed defunct processing units, underutilised infrastructure and machinery, and ineffective contract farming arrangements.

3.3.3. Construction or renovation of large market facilities

Besides the creation of several milk collection sheds, chilling centres and processing plants, the CARLEP has also supported the renovation and construction of eight community-driven market infrastructures across four eastern Dzongkhags between financial year 2017-18 and 2023-24. These included permanent market facilities, sale outlets, a seed processing unit, a collection centre with a pack house, and a vegetable market as detailed in **Table 3.24** and illustrated in **Picture 3.40**.

Table 3.24: ***List of large market facilities supported by CARLEP***

SN	Type of market infrastructure	Dzongkhag	Location/ Place	Year of estd.	Managed by	Types of support
1	Permanent Market Facility	Trashigang	Trashigang Town	2019-2020	Trashigang Dzongkhag Administration	New construction
2	Permanent Market Facility	Trashi Yangtse	Yangtse Town	2020-2021	Trashi Yangtse Dzongkhag Administration	Renovation
3	Seed processing unit, NCS, Yangtse	Trashi Yangtse	NSC farm	2017-2018	National Seed Centre	New construction
4	Sale outlet, Gangula	Mongar	Gangula Chhu road junction	2019-2020	Public	Renovation
5	Collection centre pack house	Mongar	Paitshongbee, Tsakaling	2021-2022	vegetable farmers group	New construction
6	Nanglam Vegetable Market	Pema Gatshel	Ngalam Town	2023-2024	Nganglam Dungkhag Administration	New construction
7	Farmers Sale Outlet	S/Jongkhar	Samdrupcholing Town	2023-2024	Samjong Coop	New construction
8	Farmers Sale Outlet	S/Jongkhar	S/Jongkhar Town	2023-2024	Samjong Coop	New construction

Source: *Compiled by RAA based on infrastructural data furnished by OPM, Mongar*

The infrastructures are currently being managed by various stakeholders including Dzongkhags and Dungkhag administrations, farmer groups and cooperatives, the National Seed Centre, and the general public. The type of support ranged from new construction to renovation and

provision of equipment jointly by the Dzongkhags, OPM and RAMCO. As of the audit period, all eight facilities were found operational.

The RAA noted that most of the renovation works were carried out depending on ad hoc demand without clear strategic directions. Although FCBL was expected to develop a clear plan for infrastructure development, the intent could not be realised due to FCBL's withdrawal from the programme.

Picture 3.40: ***Random pictures of large market facilities supported by CARLEP***


Nganglam Vegetable Market Newly Constructed under CARLEP

Trashi Yangtse Vegetable Market Renovated under CARLEP

Gangola Chhu Market Shed Renovated under CARLEP


Sales Outlet Constructed by CARLEP for Samjong Cooperatives in Samdrupchholing Town

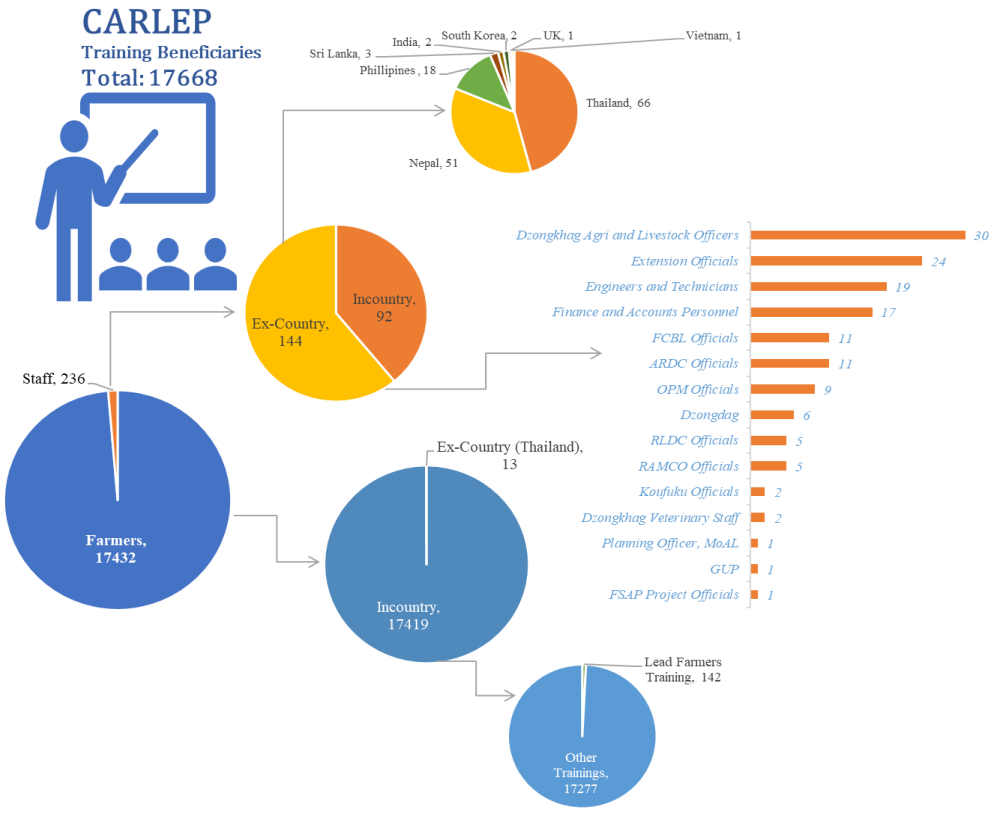
3.4. Capacity building support

To ensure the long-term sustainability of the programme, CARLEP placed strong emphasis on the capacity of both institutions and farmers groups. Accordingly, the CARLEP was designed to strengthen farmer group capacities through targeted and needs-based training, aiming to intensify market-led vegetable and dairy production. According to the PIM (2016), training interventions were to be based on identified knowledge and skill gaps. The programme also committed to supporting the development of training and extension materials informed by ongoing field tests and to ensuring that capacity-building efforts are evidence-based, relevant, and responsive to local needs.

i) General Training:

Between financial year 2016-2017 and 2023-2024, a total of 17,432 farmers and 236 staff from implementing agencies received training in various areas (**Figure 3.23**).

Figure 3.23: ***Distribution of training beneficiaries by recipient type, training location, and occupation***



Source: *Developed by the RAA based on the beneficiary list and training details obtained from OPM.*

Out of 236 staff, 144 participated in ex-country training while 92 attended an in-country programme. In the case of farmers, 17,419 attended in-country training (including demonstrations and awareness programmes), and only 13 participated in the ex-country programme. The ex-country training, workshops, and study-tours were conducted in countries such as Thailand, Sri-Lanka, South Korea, Nepal, Vietnam, Philippines, the UK, and India. Out of 17,419 farmers trained, 142 farmers were trained as Lead Farmers.

The RAA noted the following gaps in the design and delivery of capacity building interventions:

a) There was no evidence of systematic impact assessments to determine the relevance, effectiveness, or potential redundancy of training. As a result, it remains unclear whether the trainings have contributed meaningfully to enhancing farmers' skills, improving agricultural practices, or achieving the intended outcomes of the programme. There are positive indicators demonstrating the knowledge in modern farming practice such as the use of greenhouses, staggering of vegetable cultivation, training of fruit trees, mushroom spawn productions, and operating machinery. However, there are also gaps in the capacity like limited knowledge of biogas installations, lack of technical expertise required to troubleshoot or repair the machines and equipment in processing units, limited skills needed to diversify the products to remain competitive in the market, limited skills in apiculture, and lack of technical skills in self-producing the high-value vegetable seeds to remain resilient.

b) Training delivery lacked a documented methodology for identifying existing knowledge gaps or prioritising training needs. Without a structured needs assessment, there is a risk of delivering misaligned training, potentially reducing the effectiveness of the training.

c) The programme did not maintain or apply clear selection criteria for training participants, resulting in instances of repetitive training for some individuals. For instance, analysis of the training beneficiary list showed that one beneficiary attended nine different training events, while 1,934 beneficiaries received only two and 14,972 beneficiaries received just one.

d) Analysis from the training records revealed an unequal distribution of training opportunities among farmers and other participants. This indicates possible inefficiencies and inequity in the delivery of capacity-building interventions, raising concerns about fairness and inclusiveness.

The above gaps were mainly attributed to the absence of a robust assessment mechanism to assess the effectiveness and impact of training interventions, coupled with the lack of a centralised or standardised beneficiary tracking system to ensure fair and need-based selection of participants. Limited institutional coordination and accountability among implementing agencies further hindered systematic documentation and review of training outcomes. In addition, there was limited use of data generated from ongoing field tests to inform the development of relevant training and extension materials.

In the absence of proper evaluation, needs assessment, and equitable allocation mechanisms, the substantial investment in training activities may not have achieved its full potential in strengthening farmer capacity or ensuring sustainable agricultural development.

ii) Training of Lead Farmers

Of the 17,419 farmers trained under CARLEP, 142 received specialised training as lead farmers. The lead farmer model was first piloted under MAGIP and later scaled up during CARLEP. Lead farmers are experienced and skilled cultivators selected from local communities to act as mentors and role models for fellow farmers. They are chosen based on their knowledge, good practices, and willingness to share skills. To strengthen their capacity, lead farmers undergo specialised training through workshops and field demonstrations, focusing on technical, managerial, and advisory skills. At ARDC Wengkhar, structured training courses, including demonstration farms, have been established as part of the training programme.

The main purpose of the model was to guide farmers in adopting improved practices and innovations, with the expectation of enhancing productivity and promoting sustainable farming within their communities.

CARLEP initially targeted 100 lead farmers, but between 2016 and 2020, a total of 142 were trained and handed over to the respective Dzongkhags. The distribution of trained lead farmers across implementing Dzongkhags is shown in **Table 3.25.**

Table 3.25: ***Distribution of Lead Farmers across Dzongkhags***

Year	MG			LH			TG			TY			PG			SJ			Total		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
2016-17	6	0	6	3	0	3	4	0	4	4	1	5	4	2	6	6	2	8	27	5	32
2017-18	5	4	9	3	0	3	3	1	4	6	4	10	1	2	3	8	4	12	26	15	41
2018-19	6	2	8	2	1	3	5	2	7	3	1	4	4	1	5	7	2	9	27	9	36
2019-20	2	7	9	2	2	4	4	0	4	3	2	5	3	0	3	7	1	8	21	12	33
Total	**19**	**13**	**32**	**10**	**3**	**13**	**16**	**3**	**19**	**16**	**8**	**24**	**12**	**5**	**17**	**28**	**9**	**37**	**101**	**41**	**142**

Source: *ARDC, Wengkhar, Mongar*

According to the 2020 impact assessment conducted by ARDC, the services of the trained lead farmers collectively reached and benefitted over 2,000 farmers. The lead farmers themselves also reported improvements in crop productivity and increases in income as a result of the programme.

However, field visits by the RAA revealed mixed outcomes. While some lead farmers had made significant progress, including venturing into small agricultural enterprises, others showed limited advancement. *For instance,* a lead farmer in Tormashong, Tsakaling Gewog, Mongar, was provided with equipment for shiitake mushroom spawn production but later returned it due to insufficient technical knowledge and lack of continued support. Similarly, a lead farmer in Khangma, Yurung Gewog, Pema Gatshel, received a new variety of citric fruit trees to pilot but was unable to succeed, and subsequently shifted to cardamom cultivation on his own initiative. These cases highlight the need for consistent follow-up training and technical backstopping to ensure the sustainability of the model.

Another concern noted was the fulfilment of the model's core purpose of knowledge sharing. Although each lead farmer was expected to share knowledge and skills gained from training with other farmers, there was no evidence that this had been effectively achieved. Interviews with lead farmers revealed that Gewog Extension Officials had initially involved them in delivering farmer trainings on a few occasions, but such engagements were now discontinued.

In light of the above, the RAA is of the view that the benefits of developing lead farmers have not been sustained.

The guidelines for the lead farmer model developed by the ARDC include a sustainability strategy. According to the strategy, the lead farmer model should be institutionalised within annual programmes so that it becomes a regular and recognised part of extension services. The strategy also recommends promoting cost-sharing mechanisms to reduce dependency and encourage shared responsibility, providing rewards for the services of lead farmers (for example, through farmers repaying in kind or other mutually agreed arrangements), and ensuring continuous technical assistance along with effective coordination of inputs to support the farmers and maintain the effectiveness of the approach. The RAA noted that such strategies were not effectively adopted, which may undermine the sustainability of the model's outcomes.

3.5. Monitoring and Evaluation

3.5.1. Monitoring of the implementation progress

According to the PIM (2016), the planning and monitoring system of the Royal Government of Bhutan serves as the overarching framework for the monitoring and evaluation (M&E) of CARLEP. The OPM was responsible for ensuring this alignment and for sharing relevant details with planning officers and RNR sector heads at the Dzongkhag and research centre levels, so that the programme could be integrated into the Annual Performance Agreement (APA) of either the Dzongkhag or the Ministry.

At the implementation level, the Dzongkhags, Gewogs, RAMCO and FCBL were responsible for collecting data from the village and gewog levels, compiling and validating progress, and submitting reports to the component managers at OPM. These managers were then required to review and validate the data before forwarding it to the M&E officer for consolidation into half-yearly and annual reports.

While reviewing the records of the M&E, the RAA noted that the implementing agencies have carried out monitoring activities as required under the PIM (2016). However, there were some gaps noted that may impede the effectiveness of such monitoring and evaluation in fully achieving their intended purpose, as detailed below:

i) Field level

Gewog Extension Offices are the closest to beneficiaries and therefore best placed to monitor progress on the ground. However, beyond basic implementation records, post-implementation monitoring was found to be inadequate. As a result, inconsistencies

were noted in key data such as beneficiary lists, training records, and inventories of infrastructure at the Gewog level. The RAA noted manpower constraints in the Extension Offices that could have hampered such critical function. Each Gewog generally has one agriculture extension staff and one livestock extension staff, who are often unable to cover the entire area effectively as intended. In some Gewogs, extension offices remained without staff for a prolonged period and in such cases, staff from nearby Gewogs had to cover these areas as an additional responsibility. As a result, extension services and the monitoring of CARLEP activities were affected.

ii) RAMCO and FCBL level

At RAMCO, Mongar, the office was manned by three officials during the period of the audit. During the RAA's visit, one staff member was on study leave, and the remaining two were newly recruited, without institutional memory to verify the effectiveness of its M&E functions. Evidence on the ground, such as inactive farmers groups, failed linkages with schools, non-functional enterprises, and underutilised machinery and equipment, reflected gaps in RAMCO's monitoring role.

Furthermore, the withdrawal of FCBL from programme implementation after the mid-term has further disrupted data monitoring and collection within the value chain component.

iii) OPM level

The RAA noted twenty-two field monitoring reports by the Agriculture Component Manager, OPM, indicating the existence of a periodic monitoring function at the OPM level. However, due to the scattered and sporadic nature of interventions, monitoring was selective and focused only on specific areas at a time.

As required by the PIM (2016), the OPM submitted physical and financial reports, prepared in a standardised format, to the relevant authorities, including IFAD. It was noted that Outcome Survey Reports and Annual Progress Reports were the main tools used to track programme progress. The Annual Progress Reports focused on the implementation of activities, particularly agriculture and livestock inputs and subsidies, while the Outcome Survey Reports assessed results and impacts. In addition, the OPM produced knowledge products such as "*Stories of Change*" and informational and tutorial videos on YouTube through its knowledge management unit.

These shortcomings may have contributed to the underachievement of targets reported above, inconsistencies in information, instances of closure of farmers groups, and inability to pursue the sustainability strategies under various components of the programme.

3.5.2. Data Collection and Management

Reliable data is essential for informed decision-making, effective planning, and efficient allocation of resources. In programs involving multiple stakeholders, such as those related to

agriculture and livestock, data plays a crucial role in tracking implementation, monitoring progress, identifying gaps, and evaluating outcomes. Without reliable and consistent data, it becomes difficult to assess whether program objectives are being met or to adjust interventions based on actual needs. Moreover, accurate data ensures transparency and accountability by allowing stakeholders to monitor the effectiveness of activities and verify whether intended results are being achieved.

As per the PIM, for the purpose of M&E, the Dzongkhag RNR sectors, RAMCO, and FCBL are required to collect data at the activity and output level from villages and gewogs. Once compiled and validated, the data is to be submitted in prescribed Monitoring and Evaluation (M&E) formats to the respective Component Managers at the OPM on a quarterly basis. The Component Managers are required to review the submissions, validate the information, and forward it to the Monitoring and Evaluation Officer (M&EO) for consolidation into half-yearly and annual reports. M&E Officer shall maintain an updated database of progress activities on a regular basis to generate cumulative progress of the programme and for archiving the institutional memory in the event of unforeseen Human Resource changes.

Upon the review of data collection and management, the RAA noted the following issues:

a) *Spelling inconsistencies*: There were several records with multiple spellings, resulting in inconsistencies. For example, four different spellings of "*Samdrup Jongkhar*" were found as "*Samdrupjongkhar*", "*SAMDRUPJONKHAR*", and "S/Jongkhar".

b) *Inconsistent activity naming*: The same intervention was recorded under different names, which may lead to confusion and duplication. For instance, irrigation support was variously documented as "*water efficient irrigation*," "*efficient irrigation*," "*water efficient*," as well as "*climate-smart irrigation*" and "*climate-resilient irrigation*."

c) *Data mismatches*: In the house number field, CID and other data were recorded. In some cases, the recorded house numbers did not correspond accurately with the respective Dzongkhag or Gewog or gewogs or house numbers belonging to one Dzongkhag were incorrectly listed under another Dzongkhag. For example, "*Saling Gewog*" was recorded under Trashigang Dzongkhag instead of Monggar Dzongkhag.

d) *Incomplete data fields*: Important information was left blank in several instances, hindering accurate analysis and the generation of meaningful insights.

e) *Inaccurate data*: Official records did not always align with field verification findings. For example, CARLEP's report stated that ten households in Woongborang, Pema Gatshel Dzongkhag, had received biogas facilities, whereas RAA's site visit confirmed that no such facilities had been installed.

These data quality issues undermine the reliability and accuracy of the information collected for reporting purposes. Consequently, they may affect the credibility of annual progress reports submitted by the OPM and limit the ability to make evidence-based decisions or carry out accurate assessments.

PART-B: Sustainability of the Programme

Sustainability is vital to ensure that the programme continues to benefit the beneficiaries or community beyond the implementation period and minimise the risk of reverting to pre-implementation conditions. It also ensures long-term success and impact of any development programme. Without sustainability, short-term gains can quickly erode, leading to a cycle of dependency. The importance of sustainability was felt, and strategies were developed and included in the PIM (2016).

As of the end of the financial year 2023-2024, the implementing agencies collectively spent **Nu. 1,413.64** million in carrying out CARLEP activities. Of this amount, **Nu. 992.05** million was financed through an IFAD loan, while the remaining balance comprised grants and domestic contributions. From a financial perspective, the fund, being a capital investment, should be creating long-term assets that generate sustained returns through continued production, increased farmers' income, poverty reduction, and improved food self-sufficiency in the region. Accordingly, the funds were utilised to procure and distribute various machines and equipment, develop infrastructure, and implement soft components such as capacity building for farmers and the implementing agency staff. However, given the time-bound nature of these initiatives, concerns arise regarding their long-term sustainability, thereby necessitating a mechanism to ensure their continued viability and effectiveness.

CARLEP envisaged ensuring sustainability by means of building resilience into programme design, which involved strengthening the capacity of beneficiaries and implementing agencies, developing policies and establishing systems that can operate effectively without continued external support, and strategising the value chain designs and infrastructures - from production to market. These are clearly defined in the PIM (2016). The RAA's findings in this regard is discussed in this part of the findings.

3.6. Sustainability of market-led agriculture production

i) Farmers groups and extension services strengthened

The programme intended to support the existing and new farmers groups with the capacity development support for both agricultural and livestock production including trainings on improved farm practices for crops as well as livestock, sustainable land management practices and on-farm climate induced disaster preparation, including cropping patterns and crop rotation, sustainable farming systems, soil health management, prevention of soil erosion and rainwater management.

During the implementation, RAMCO has formed and registered 127 farmers groups comprising 89 agriculture groups and 38 livestock groups, along with several rounds of training and capacity development support. However, 110 groups are currently active as per the record of RAMCO, comprising 79 agricultural groups and 31 livestock groups. Such decline is attributed to demographic transition to ageing society and rural-

urban migration of the youthful lots which may have an impact on the sustainability of the farmers groups.

Thus, the further decrease in the number of farmers groups may risk the sustainability of the initiatives.

ii) Lead farmer model scaled up

As explained in detail under *Findings 3.4*, the programme has prioritised to recruit and train 142 lead farmers based on the concept piloted during MAGIP. This was to enable a more dynamic system for extension services delivery by utilising them in supporting the gewog extension supervisors in providing training and other services to the farmers groups.

Between 2016 to 2020, a total of 142 lead farmers were recruited and trained by the ARDC and handed over to the Dzongkhags. However, the engagement of the lead farmers is yet to be scaled up as the field visits of the RAA have confirmed that lead farmers are not being utilised for supporting the extension offices.

iii) CAHW revived and tied up with CAIT

As a part of breed improvement initiatives, the RLDC has prioritised to imparting AI training for field extension officers and farmers. In this line, the RLDC has trained 83 CAITs under CARLEP. Currently, 45 CAITs are active as per the record of RLDC, while others have left the responsibility for better opportunities.

Such a declining number of trained CAITs poses a risk of maintaining the current level of cattle breed improvement services.

iv) Farmers/groups adopt climate-smart agriculture technologies, including assured irrigation and water management systems

Climate-smart techniques like greenhouse-based farming, biogas, rainwater harvesting and water-efficient irrigation facilities were provided to the farmers groups, as well as to individual farmers. However, they were distributed sporadically and the use of such climate-smart agriculture technologies may not be sustained to the extent that these materials and equipment are not within the affordability of many of the farmers.

v) Assured market and buy-back mechanisms through farm shops are in place

Limited progress was made in establishing the assured market leading to market distrust among the farmers making them unwilling to group and venture into commercial production. Thus, intent of CARLEP is less likely to sustain.

FCBL has launched the buy-back mechanisms and Farm Shops across target areas to ensure year-round availability of food, essential commodities, and agricultural inputs such as seeds, fertilisers, tools, and implements. These initiatives brought financial loss

to FCBL ultimately making it discontinue these initiatives. The withdrawal of FCBL from the programme implementation team resulted in the discontinuance of farm shops and buy-back mechanisms.

3.7. Sustainability of Value-Chain Development and Marketing

i) Capacity of FCBL strengthened on the value chain and agricultural marketing; and a business plan for FCBL was developed to ensure post-project agricultural marketing

The PIM (2016) envisaged that through the implementation of CARLEP, resilient and profitable value chains in the vegetables and dairy sectors would be established that would function independently after the conclusion of CARLEP. This was to be achieved through strengthening the capacity of the FCBL, preparing comprehensive business plans for agricultural marketing, and supporting the development of commercial farming enterprises. Strategic market infrastructures were to be created and linked to well-defined business models, while initiatives such as buy-back schemes and Farm Shops were to be established with the intent of assuring farmers with reliable market access.

FCBL's institutional capacity was strengthened, and rapid value chain assessments were conducted, but these efforts did not lead to the preparation of formal value chain strategies or operational business plans.

iii) Value chains and corresponding business plans for dairy and vegetable were developed and implemented

The absence of self-sustaining business models and reliable market linkages significantly undermines the long-term viability of these value chains. Without functioning market mechanisms and enterprise management systems, farmers may have limited incentive to continue commercial production once project support ends. The risk is that production will revert to fragmented and small-scale operations with low profitability, eroding the economic gains achieved under CARLEP.

iv) Business plan for the privatisation of farm shops on the Public Private Partnership (PPP) model established

With the discontinuation of the Farm Shops, the intended strategies for privatisation of Farm Shops on a PPP model have become irrelevant despite carrying a deep wisdom behind it.

v) Marketing groups/agricultural enterprises established and strengthened

Several enterprises, including agro-processing units, milk processing units, and cold chain systems, were established without clear long-term plans and strategies to ensure financial sustainability. Buy-back schemes and Farm Shops, which initially offered farmers a guaranteed market, incurred significant financial losses due to logistical inefficiencies and counterproductive behaviours among farmers, leading to their

discontinuation. Physical assets acquired under this component have already started to depreciate, and no replacement or maintenance plans have been established.

3.8. Institutional Support and Policy Developments

It was expected that, through its continuous knowledge management process, the programme would gather and document valuable lessons and good practices, particularly in the areas of climate resilience, value chain development, and market access. These knowledge products would be shared with programme stakeholders and other relevant groups, who would work together to develop a supportive institutional and policy environment that promotes cooperation and partnerships for climate-resilient and market-based production, as well as the development of value chains in the agriculture and livestock sectors. The specific activities anticipated for implementation are detailed in **Table 3.26**.

Table 3.26: ***Key outputs to be delivered under Programme Component 3***

SN	Particulars	Allocated Programme Budget (Nu. in Million)
1	Strengthening of the DAMC market information system (including the procurement of necessary equipment)	12.51
2	Curriculum development of RNR Training and Education institutes	3.12
3	Mainstreaming climate resilience and value chain development lessons in agricultural policies	3.94
4	Development of a regulatory framework for PPP	2.38
5	National and international Technical Assistance for the above activities	14.88
Total Allocation		**36.83**

Source: *PIM (2016).*

Note: *Amounts were converted from USD to BTN by applying the exchange rate 1USD=70BTN*

In discussions with OPM, the RAA noted that these planned initiatives had not been implemented as of the date of the audit, which is substantiated by the absence of any expenditure made towards these activities. The detailed status of each of these activities is discussed below:

i) Strengthening of the DAMC market information system

CARLEP included a provision to support DAMC in strengthening its existing market information system to provide real-time data to farmers. This support was intended to encompass the expansion of information types, improved accessibility and interactivity of the system, and the promotion of mobile technology to inform and empower farmer groups.

However, financial records indicate that CARLEP's support was limited to the procurement of a few number of equipment. The DAMC had secured funding from sources outside CARLEP for the enhancement of the system, and therefore, programme

funds were not utilised beyond the procurement of equipment. The enhancement requirement of the information system was not in the record.

ii) Curriculum development of RNR Training and Education institutes

To build a more organised and lasting training system, key implementing agencies were expected to work with RNR training and education institutes such as RDTC and CNR. They were supposed to develop training materials together, use the institutes as training providers, and involve their teachers as resource persons. In return, the institutes would get support to improve their course content by including knowledge and proven practices from CARLEP. These included areas like climate resilience, climate-smart farming, sustainable agriculture, value chain development, agricultural marketing, enterprise development, community animal health workers, and lead farmer models.

However, the RAA found that these plans did not take place as expected. Therefore, the RAA is of the view that programme has failed to set up a lasting training curriculum. If the system had worked as planned, the institutes would have had ready training materials and trainers to use whenever training was needed for farmers or agricultural staff.

The OPM, however, responded that the training materials (modules) for livestock were developed by RLDC while ARDC had developed training materials for the agriculture sector. The PMU can share the published training materials for RAA reference. In addition, Trainers from RDTC, Zhemgang were engaged for training agriculture farmers in the Programme areas. In addition, RAMCO had developed a training module for financial education and business literacy training (FEBL).

The RAA notes the OPM's response and acknowledges that relevant training materials were developed by RLDC for the livestock sector, ARDC for the agriculture sector, and RAMCO for financial and business literacy training. While these initiatives demonstrate efforts to institutionalise knowledge and build farmer capacity, the RAA emphasises the importance of ensuring that such materials are effectively disseminated and implemented to show tangible outcomes.

iii) Mainstreaming climate change resilience and value chain lessons into agricultural policies and sector strategies

CARLEP was intended to assist the MoAL in establishing a consultation process involving multiple stakeholders for policy development, together with a participatory monitoring system. This would involve applying innovative models of collaborative service delivery and actively engaging policy beneficiaries, including citizens, the private sector, civil society, and local governments, in the formulation of policies. Furthermore, a feedback mechanism was to be created to assess the effects and impacts of policies and to allow for adjustments during their implementation.

It was also anticipated that, under the CARLEP, the MoAL would review existing agricultural policies to evaluate their alignment with climate resilience objectives. The Ministry would draw upon insights gained from CARLEP's fieldwork in sustainable farming, community animal health services, lead farmer initiatives, and market systems to adapt and refine these policies. Furthermore, the programme aimed to support the establishment of a regulatory framework that fosters private sector growth and facilitates effective public and private sector partnerships.

Due to a lack of formal documents, the RAA was not in a position to comment on what extent policy mainstreaming was achieved based on the experience of implementing the CARLEP.

iv) Development of a regulatory framework for PPP

The CARLEP envisages supporting MoAL in enhancing the regulatory framework to promote private sector development and public and private partnerships, with special consideration for the rural value chains. This included developing policies and regulations designed to foster healthy competition, prevent the emergence of monopolies, and protect less powerful actors within the value chains from exploitation. Additionally, there was a clear emphasis on addressing the negative environmental and social externalities associated with business activities, through the implementation of detailed cost and benefit analyses to inform decision-making.

However, the RAA found no progress made in this regard. Had these measures been effectively implemented, they would likely have stimulated agricultural enterprise development, increased employment opportunities, and attracted additional private sector investment in developing sustainable value chains. It would also have ensured fair competition and prevented exploitation within the value chains, while also managing environmental and social risks effectively. Ultimately, this would have led to a more equitable distribution of costs, benefits, and risks among all stakeholders involved.

The CARLEP recognised the importance of sustainability and identified several strategies, as discussed above, to self-sustain the interventions made under the programme. While some of the strategies were achieved, there are some predefined strategies that may need to be reinforced to adjust the potential sustainability risk as discussed above.

CHAPTER 4: RECOMMENDATIONS

Based on the findings outlined in the preceding chapter, and through a careful review of the persistent issues and challenges documented in the PDR (2015) and PIM (2016), which CARLEP was expected to address but appears to have only partially resolved, the RAA puts forward **13 recommendations**. These recommendations are intended to support future strategies and planning in similar projects, sustain the outcomes that are successfully delivered under the CARLEP, and take forward the lessons learned. The RAA is of the view that a comprehensive and coordinated implementation of these recommendations by the Ministry will significantly contribute to resolving the core issues, while fostering a resilient, well-managed and sustainable agricultural sector that delivers lasting benefits to rural communities.

A: For strengthening farmers groups

4.1. The MoAL should ensure strengthening existing farmers groups and cooperatives for greater sustainability.

In addition to farmers' groups and cooperatives existing prior to CARLEP, numerous new groups were formed as economic enterprises to enhance members' incomes. The Cooperative Act of Bhutan 2001 provides the legal framework for establishing and governing these enterprises. Strengthening these groups was identified as a key strategy for achieving project outputs. Capacity development extended beyond conventional training to equipping staff to engage effectively with farmers' groups, cooperatives, and agricultural enterprises, while fostering an enabling environment for beneficiary groups to assume responsibility for further developing and sustaining value chains.

While most enterprises remain operational, some groups have ceased functioning. Among operational groups, challenges persist in governance, financial management, and profitability, highlighting the need for ongoing support. The Ministry should focus on building capacity in the following areas:

i) Establishing robust financial management systems, including savings and funding mechanisms to support long-term business sustainability.
ii) Developing business plans to maintain market linkages and diversify products.
iii) Strengthening governance for efficient and transparent decision-making.
iv) Facilitating skill transfer within the groups and cooperatives.

4.2. The MoAL should prioritise the formation of farmers' groups based on geographic cohesion rather than shared interest alone.

Geographical fragmentation significantly hampers effective group formation. Field visits by the RAA revealed that many groups, initially formed to pool land and resources, became inactive due to dispersed membership. In several cases, vegetable groups ceased collective operations, with greenhouses and irrigation systems managed by a single member. Distance and poor accessibility further undermined cooperation, leading to withdrawals and dissolution.

The Ministry should prioritise forming farmers' groups based on geographic cohesion rather than shared interest alone. Clustering members in close proximity will facilitate joint activities, shared labour, and efficient use of communal assets. Establishing centralised "production hubs" with facilities such as cold storage, processing units, and equipment repair workshops will reduce logistical burdens, enhance group solidarity, increase productivity, and support the long-term viability of farming groups.

4.3. The MoAL should prioritise developing targeted programmes to sustain the agricultural workforce and ensure arable land remains under cultivation.

The audit revealed a concerning demographic shift within farming communities, characterised by an ageing workforce and decreasing cultivated land. This trend threatens CARLEP interventions and national goals of food self-sufficiency and security. Evidence includes fallow fields, livestock sales due to lack of caretakers, and farming reverting to subsistence levels despite programme investments.

The Ministry should develop targeted programmes to sustain the agricultural workforce and ensure arable land remains under cultivation.

4.4. The MoAL should establish local technical skilling and maintenance support systems.

The RAA found a critical gap in the technical capacity of farmers groups to maintain and repair essential agricultural and milk processing machinery, such as milk chillers, pasteurisers, and other equipment. Many machines supplied under CARLEP have become idle due to mechanical breakdowns, with no trained operators locally and no accessible repair services. Without clear plans for equipment upkeep and replacement, the sustainability of such investments is at risk.

The Ministry should establish structured local skilling and support programmes for machinery operation, maintenance, and repair. School dropouts could be encouraged to take up such training. It should train selected members from each group or cluster and actively promote small-scale local agro-equipment service enterprises, including through public-private partnerships, to ensure specialised maintenance services are available in rural areas.

4.5. The MoAL should develop strategies to continuously support the marginal farmers.

The CARLEP also included a targeted intervention to alleviate rural poverty. The interventions were implemented in the form of agriculture and livestock input supports to comparatively backward communities to ensure attainment of at least a self-sustainable production. However, the supports were provided on cost-sharing mechanism where a certain portion of the cost should be borne by the beneficiaries themselves. This poses a risk of exclusion as the marginal farmers are normally challenged with a lack of income opportunities and access to credit.

Therefore, the Ministry should continue to support the marginal farmers through appropriate strategies to address the risk of exclusion and build their capacity to sustain their livelihoods.

B: For strengthening the value chain, enterprise, and market

4.6. The MoAL should improve the value chain and market to incentivise production.

The audit identified market access as a significant barrier to the viability and sustainability of farmer groups. Without timely and reliable access to buyers, farmers often face post-harvest losses and reduced economic incentives, which can lead to the abandonment of production and undermine collective efforts at scale. This market failure limits farmers' income opportunities and threatens the long-term sustainability of agricultural enterprises supported by development programmes.

Therefore, the Ministry should,

i) Develop a robust market linkage for farmer groups, such as cooperative-managed collection centres, to enable aggregation of produce for bulk sales to processors, wholesalers, and institutional buyers, thereby improving market access and reducing post-harvest losses.

ii) Explore the establishment of accessible market information systems, using mobile technology and community notice boards to provide farmers with timely data on prices, buyer contacts, and market trends, supporting informed production and marketing decisions.

iii) Promote better coordination between producers and markets and enhance farmers' understanding of market dynamics, with the aim of sustaining production, maintaining economic incentives, and strengthening the long-term viability and profitability of agricultural and livestock enterprises.

4.7. The MoAL should also foster partnerships with local non-governmental organisations and private sector service providers to broaden the network of technical support available.

During the implementation of CARLEP, engagement with the private sector was limited, and the expected partnerships did not fully materialise. While the programme aimed to promote private investment and participation, weak regulatory and policy frameworks created barriers for meaningful involvement. This led to missed opportunities for developing competitive and sustainable value chains. In addition, potential environmental and social risks associated with private investments were not adequately addressed due to the absence of clear rules and cost-benefit assessments.

Therefore, the Ministry should strengthen the regulatory framework for private sector development and Public Private Partnership (PPP) to ensure active engagement with the private sector to drive enterprise development, create employment, and channel private resources into the agriculture sector.

C: For strengthening institutional capacities

4.8. The MoAL should strengthen extension services by fully staffing the extension offices and integrating digital tools in field monitoring.

The audit identified critical weaknesses in extension services at the Gewog level, largely due to insufficient staffing and prolonged vacancies. Many offices lacked extension supervisors, and some were tasked with overseeing multiple Gewogs. These gaps have resulted in inadequate monitoring of activities, leading to inactive farmers groups, underutilised infrastructure and equipment, and ineffective agricultural project initiatives. Overstretched staff have struggled to provide regular technical support, further contributing to these inefficiencies.

To remedy these challenges,

i) The Ministry should prioritise the retention of extension personnel, ensuring that each gewog has at least one dedicated person responsible for providing ongoing support to local farmers and their groups.
ii) In addition, the Ministry should explore embracing digital technology as a complementary tool for delivering extension services and allowing farmers to access technical advice even in remote locations. In this regard, training extension officials in the use of these digital tools is essential to maximise their effectiveness.

4.9. The MoAL should strengthen the administration and monitoring of training intervention.

Under the programme, a range of training interventions were provided to farmers and implementing agencies. These included training on vegetable production, post-harvest management, cattle health and rearing, clean milk production, farm record keeping, and study tours. In addition, several staff from implementing agencies participated in both in-country and ex-country trainings to strengthen their capacity to implement programme activities and to ensure that the knowledge and skills gained could be sustained for future capacity-building efforts. However, the RAA noted gaps in the monitoring and evaluation of training impacts.

To address this, the Ministry should,

i) Establish systems to track how farmers and implementing agency staff apply the skills and knowledge gained through training.
ii) Implement regular evaluation of training outcomes, measuring tangible impacts such as improvements in crop or livestock productivity, adoption of recommended practices, and enhanced operational efficiency within implementing agencies.
iii) Maintain comprehensive records of training activities, participants, and results to support evidence-based decision-making, inform future interventions, and preserve institutional memory.

4.10. The MoAL should institute a mechanism to track the performance of lead farmers.

Lead farmers were selected to extend their skills to other farmers in the community and to assist Gewog Extension Offices in building farmers' capacity. At present, it is unclear whether this objective has been achieved through the training of 142 lead farmers. Although two survey reports exist, they only document the lead farmers' success in applying knowledge and increasing their own production. The RAA's visits to a sample of lead farmers revealed a mix of active and inactive participants, with many focusing primarily on their own enterprises rather than sharing knowledge with others.

The Ministry should therefore establish performance monitoring mechanisms for lead farmers to track their activities, assess their outreach in terms of knowledge transfer, and ensure their contributions are sustained within the local community.

4.11. The MoAL should strengthen data quality for evidence-based monitoring and evaluation.

The RAA noted issues related to data quality as a result of inconsistencies and inaccuracies in the data maintained in the programme. This includes limited records related to the distribution of equipment, the construction of infrastructure, and records of supervision by extension offices. These posed challenges to OPM to track the progress in timely manner, and adapt and respond to emerging challenges based on the inputs from the field.

To improve the reliability of data collection and management in future projects, the Ministry should,

i) Establish a clear framework that outlines standardised processes, tools, and formats to reduce inconsistencies and ensure that all stakeholders follow a uniform approach.
ii) Institute a robust data quality assurance mechanism to ensure data quality through automatic or systematic validation, cross-checking, and triangulation of data from multiple sources.
iii) Leverage technology, such as digital data collection tools, dashboards, and management information systems, which can significantly minimise human error.

4.12. The MoAL should institutionalise robust hand-taking procedures during staff transitions to ensure business continuity.

It was explicitly highlighted in the PIM (2016) that M&E officer of OPM should maintain an updated database of progress activities regularly to generate cumulative progress of the programme as deemed necessary and for institutional memory in the event of unforeseen Human Resource changes.

However, the RAA has observed that one of the root causes of inadequate documentation and unreliable data within implementing agencies is the absence of proper handing and taking over of responsibilities during staff transitions. In many cases, when a new staff member assumes the role of an outgoing officer, there is no structured process in place for the transfer of project-

related information, including updates on progress, pending activities, and relevant background. This lack of a robust handover procedure has led to the loss of critical information and has weakened institutional memory across programme cycles.

To address this issue, the Ministry should institutionalise clear and standardised hand-taking procedures in future programmes and projects. These should include comprehensive documentation of ongoing activities, status updates, and key contact information, supported by structured handover meetings to ensure that incoming staff are well informed of their responsibilities and have complete historical records of the project activities. Addressing this gap will help preserve institutional memory by maintaining accessible records, capturing lessons learned, and safeguarding operational knowledge. This, in turn, will enable more effective policy development, improve programme continuity, and support long-term learning within the agricultural sector.

D: For facilitating the exit strategy of the programme

4.13. The OPM should update a comprehensive list of assets created under CARLEP.

The RAA observed that the current record of infrastructure established under CARLEP is neither up to date nor comprehensive enough to capture all necessary details. This gap may hinder proper exit planning and affect the sustainability of the assets.

Therefore, the OPM, in collaboration with other implementing agencies, should immediately develop a comprehensive inventory of long-term assets, including MCCs and MPUs, irrigation schemes, ALDs, heavy machinery, and other facilities. This inventory should form part of the exit strategy and may be handed over to the MoAL and the respective local governments to retain as an institutional memory and to facilitate future operation and maintenance.

In addition, the OPM should develop a clear asset management plan, defining responsibilities for repair and replacement of machinery, and establish financial mechanisms such as a dedicated maintenance fund to ensure sustainability.

CHAPTER 5: CONCLUSION

While assessing the effectiveness of CARLEP in achieving its intended outputs and targets, the RAA noted that the programme implemented several transformative activities across agricultural infrastructure, production systems, and farming practices in the eastern Dzongkhags, which benefitted the farmers in these Dzonkhags. Key initiatives included the development of approximately 1,410 acres of land, distribution of 1,182 greenhouses, upgrades to irrigation and water harvesting facilities, promotion of climate-resilient technologies, improvements in livestock breeds and clean milk production, and distribution of over 6,000 units of fodder seeds. Complementary interventions, such as beekeeping and poultry farming, further supported livelihood diversification and income generation. Collectively, these actions represent meaningful contributions to demonstrate CARLEP's potential in enhancing smallholder agriculture and rural livelihoods.

However, the RAA identified that the programme has not fully established the systems and mechanisms necessary to sustain these interventions beyond its operational period. Gaps were also noted in the value-chain development and establishing market linkages. Many activities remain reliant on external support and input subsidies. Additional challenges, including declining participation, youth migration, an ageing farming population, limited technical support, and underdeveloped seed self-production systems, constrain the consolidation of benefits at the community level. As a result, while CARLEP has laid important groundwork, its capacity to achieve a self-sustaining and commercially viable agricultural system over the long term remains uncertain.

The audit emphasises that future programmes should prioritise the empowerment of farmer groups and cooperatives, alongside market-oriented value chain development. Strengthening farmer organisations to manage production, processing, and marketing, while building capacity in climate-resilient technologies, engaging the private sector, and promoting youth participation, is essential to sustain and scale the gains achieved. To support this transformation, the audit provided **13** recommendations designed to guide policymakers in building institutional capacity, ensuring sustainability, and advancing market-oriented development through empowered farmer organisations and robust value chains.

Appendix A: Management Action Plan Template

Recom. No.	Recommendation in brief	Action Plans[1] (action taken or to be taken)	Estimated Implementation Timeframe	
			Estimated implementation start date	Estimated completion date
4.1	The MoAL should ensure strengthening existing farmers groups and cooperatives for greater sustainability.			
4.2	The MoAL should prioritise the formation of farmers' groups based on geographic cohesion rather than shared interest alone.			
4.3	The MoAL should prioritise developing targeted programmes to sustain the agricultural workforce and ensure arable land remains under cultivation.			
4.4	The MoAL should establish local technical skilling and maintenance support systems.			
4.5	The MoAL should develop strategies to continuously support the marginal farmers.			
4.6	The MoAL should improve the value chain and market to incentivise production.			
4.7	The MoAL should also foster partnerships with local non-governmental organisations and private sector service providers to broaden the network of technical support available.			
4.8	The MoAL should strengthen extension services by fully staffing the extension offices and integrating digital tools in field monitoring.			
4.9	The MoAL should strengthen the administration and monitoring of training intervention.			
4.10	The MoAL should institute a mechanism to track the performance of lead farmers.			

[1] A recommendation may include one or more action plans, all of which should be detailed in this column. If any actions have already been implemented, they must be supported by appropriate evidence.

4.11	The MoAL should strengthen data quality for evidence-based monitoring and evaluation.			
4.12	The MoAL should institutionalise robust hand-taking procedures during staff transitions to ensure business continuity.			
4.13	The OPM should update a comprehensive list of assets created under CARLEP.			

Agreed and endorsed by the head of the agency:

Signature :

Name :
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