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Annual Report 2019-2020

Department of Livestock

Ministry of Agriculture and Forests
Thimphu: Bhutan

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Content

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ROYAL GOVERNMENT OF BHUTAN
Ministry of Agriculture and Forests
Department of Livestock
Thimphu

Foreword

The sixth issue of the Department of Livestock (DoL)'s Annual Progress Report (2019-2020) September 2020 is a tribute to the tireless efforts and dedicated service rendered by the livestock staff in the country. It highlights the activities carried out successfully in the areas of livestock development, production, health, conservation and research in the fiscal year (2019-2020). Congratulations to everyone for the successful completion of the 2nd year of the 12th Five Year Plan.

The Department is also pleased to come out with the *Annual Livestock Statistics 2019* document, which contains both qualitative and quantitative data collected at the household level and validated to assist in work planning and necessary interventions. This document is uploaded on the Ministry's website (www.moaf.gov.bt) as well as the Department's website (www.dol.gov.bt).

The Department believes that the Annual Progress Report along with the *Annual Livestock Statistics 2019* will provide necessary and useful information which will supplement and inform the formulation of Annual Performance Agreement (APA) and provide documented evidence for assessing the Department's annual performance. The Evaluation Report of APA (2019-2020) by the Ministry indicated that the Department has performed exceptionally well with a score of 98.2%.

I take this opportunity to thank Hon'ble Lyonpo Yeshey Penjor and Secretary, Dasho Rinzin Dorji for the constant guidance and support to the Department as well as Departments/Agencies under MoAF and other allied organizations/development partners for their support and cooperation. I would also like to convey my sincere appreciation and gratitude to my livestock colleagues working in the Dzongkhags, Livestock Farms, Central Programs, Gewogs and at the Headquarters for the inspired and dedicated service to the *tsa wa sum*.

Lastly, I would like to congratulate the Information Management Section of the Department for producing the Annual Progress Report in a timely manner despite the challenges through strong determination and effective coordination.

TASHI DELEK!

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EXECUTIVE SUMMARY

During the Fiscal Year 2019-2020 concerted efforts have been made to ensure that our rural development approaches are in consistent with national goals and objectives.

The total GDP contribution from livestock sector in 2018, by-Economic activity at current price stands at Nu: **7463.7** million which accounts to **4.46%**.

Against the Departments goal to "***achieve livestock product self-sufficiency for a prosperous and self-reliant society living in harmony with nature"***, the Department during the fiscal year (2019-2020) has achieved Dairy Self-sufficiency (93%), Meat Self-sufficiency (44.95%), Egg self-sufficiency (100%) wet Fish Self-sufficiency (24%). In order to realize the intended outcomes and outputs, the Department has developed and provided appropriate policy directives, strategies and implementation guidelines to help the end-users.

In the year 2019, the total milk production was 57,546 MT which is 1,639 MT increased over 2018 figure. Similarly, egg production was recorded at 141 million and Honey at 66 MT. In meat sector, 1926 MT of Chicken, 209 MT of fresh Fish, 1113 MT of Pork and 280 MT of Chevon was produced. Besides, 1,100 MT of fresh milk was exported to the neighboring towns of Assam, India during the year.

In order to achieve the production targets for the year 2019-2020, 6205 AI were performed with 1866 progenies born having a success rate of 30.1% (812 Male and 1054 Female). In the piggery sector, 4000 piglets were produced from Government Nucleus farms and 5000 from contract breeding farms and in total 9000 piglets were distributed to the farmers for pork production in the potential Dzongkhags. Similarly, in the Poultry and fishery sectors, 230,507 -layer Day Old Chick (DOC) and 712,390 Broiler DOC, 18, 31,667 high quality warm water fingerlings were distributed respectively to the farming communities in the country to enhance meat production.

To strengthen the production efficiency and productivity of the animals, 23 number of research activities were conducted under various livestock disciplinary areas. To provide quality Animal Health and diagnostic services, 12,790 tests were performed from 6,312 samples collected from the field. Procured 7,680,540 doses of livestock and poultry vaccines and produced 10730 doses of vaccines locally (9,530 doses of Classical Swine Fever vaccine and 1,200 doses of Anthrax vaccine). Animal health services has achieved 83.55 % in terms of client stratification rate in clinical services and reduced the incidences of zoonotic diseases to 28 zoonotic and 21 non-zoonotic notifiable animal diseases in the country against target of 31 and 61, respectively. For better accessibility and quality fodder to ruminants, Animal Nutrition sector has developed 1,480 acres of improved pasture which makes the total to 20,889 acres across the country till date. The sector has produced 29.62 MT of temperate and sub-tropical pasture seeds, 114.20 MT of oats, 45 MT of fodder maize and 7.42 MT of Tall Fescue.

Besides 1,042 bio-gas plants were established to promote green livestock farming practices to mitigate climate change.

During the fiscal year, the Government has provided a total of **Nu. 804.359 million**. From this the total expenditure incurred stands at **Nu. 757.47 Million** With the financial achievement to **94%**.

The Department is committed and shall strive to fulfil the Government's aspiration to achieve greater self-sufficiency in livestock products in the country in the midst of emerging and re-emerging issues and challenges.

II. Overview of the Achievements for the financial year (2019-2020)

Introduction

Department of livestock's is an important component of Renewable Natural Resources (RNR) sector and its goal is to "***achieve livestock product self-sufficiency for a prosperous and self-reliant society living in harmony with nature"***, with the mandate to;

- Increase domestic production of livestock products (milk, meat, egg, honey) and boost the rural economy.
- Ensure quality input supply of breeding stocks such as breeding bulls, piglets, pullets, DOCs, fingerlings, fodder seeds etc.
- Enhance livestock production and productivity through prompt and efficient delivery of appropriate technologies, animal health services, private sector and youth engagement
- Promote niche product enterprise development based on organic, climate smart and low input farming principles and focus on product diversification and value addition
- Transform existing livestock production systems into a value added industry by integrating processing and retailing functions

Budget outlay for the financial year 2019-2020

The budget for Fiscal year 2019-2020 for the programs are based on the detailed activities planned against each output indicators and broad program activities. Since the activities will be implemented by different agencies under the Department, consultation was done to avoid overlap and duplication of activities among the agencies to minimize budget escalation and easy coordination.

Budget provision for each program

Sl/No	Program	Total capital Budget Outlay (12 FYP in millions)	Budget Utilization (in millions)	
			2018-2019	2019-2020
MoAF/1	Food and Nutrition Security Program	637.418	171.999	137.590
MoAF/2	RNR Value Chain & Enterprise Development Program	54.550	0.174	14.289
MoAF/4	Highland Development Program	41.168	8.224	45.613
MoAF/5	Research and Extension Services Program	84.150	7.410	8.157
MoAF/6	Climate Smart and Disaster Resilient Development Program	87.314	19.447	23.745
Total Budget (Nu. in millions)		**904.600**	**207.254**	**229.394**

MoAF/1: Food and Nutrition Security Program

Results Level	Indicators (KPI)	Indicator Unit	Baseline (2016)	Plan Target (2022-23)	Target (2019-2020)	Achievement (2019-2020)
Outcome 1: National Food Self-sufficiency Enhanced	Meat self-sufficiency*	%	37	47	40	44.95
	Egg self-sufficiency	%	100	100	100	100
	Fish Self-Sufficiency	%	12.9	18	15	16
	Dairy Product self-sufficiency^	%	88	91	89	93
Output 001: Meat Production Enhanced	Pork production	MT	740	1204	914	1113
	Chicken production	MT	1209	1926	1478	1926
	Fish production	MT	187	468	292	209
	Chevon production	MT	191	234.4	207	281
Output 002: Egg Production Enhanced	Egg production	Million	105	125	112.5	141
Output 003: Dairy Production Enhanced	Milk production	MT	47270	56300	50656	57546
	Butter production	MT	1709	1881	1774	2126
	Cheese production	MT	3664	4324	3911.5	4090
Output 004: Livestock Input Production Enhanced	Milking cattle	No	83404	83404	83404	93351
	Layers (DOC)	No	255000	463000	333000	171358
	Broilers (DOC)	No	213350	1006000	510594	90525
	Piglets	No	3153	15000	7596	2579
	Fingerlings	No	750000	936000	819750	1831667
Output 005: Animal Nutrition Services Enhanced	Area under Legume Fodder	Acres	468	1414	822	850
	Conserved Forage availability	MT	8838	43556	21855	260339
	Feed Quality Test Parameters	No	6	12	8	2
Output 006: Animal Health Services Enhanced	Disease outbreaks	No	65	55	61	21
	Client Satisfaction Rate (Clinical services)	%	80	95	86	83.55
	Zoonotic diseases	No	35	25	31	28
Outcome 2: Organic farming for sustainable development enhanced	Certified organic products	Nos	NA	-	-	
Output 001: Organic Livestock Farming Promoted	Certified Organic Livestock products	Nos	0	3	1	

MoAF/2: Value Chain and Enterprise Development Program

Results Level (Outcome)	Indicators (KPI)	Indicator Unit	Baseline (2016)	Plan Target (2022-23)	Target (2019-2020)	Achievement (2019-2020)
Output 001: Formal Livestock Value Chain established	Formal Dairy Value Chains	No	0	9	2	-
	Formal Egg Value Chain	No	0	4	0	-
	Formal Meat Value Chain	No	0	6	2	-
	Formal Honey Value Chain	No	0	2	1	-
Output 002: Commercial Livestock Enterprise established	Dairy Enterprise	No	0	1	0	1
	Poultry Enterprise	No	0	1		-
	Chevon Enterprise	No	0	1	0	-
	Piggery Enterprise	No	0	1	1	-
	Fishery Enterprise	No	0	1	0	-
	Honey Enterprise	No	0	1	0	-
	Forage Enterprise	No	0	1	1	1
Output 003: Livestock based Employment Increased	Livestock based Employment	No	0	821	350	743

MoAF/4: Climate Smart and Disaster Resilient Development Program

Results Level (Outcome)	Indicators (KPI)	Indicator Unit	Baseline (2016)	Plan Target (2022-2023)	Target (2019-2020)	Achievement (2019-2020)
Outcome: 001 : Enhanced Climate Smart and Disaster Resilient Development	*Climate resilient technologies released and adopted*	Nos	16	122	53	-
	Area brought under improved pasture and winter fodder development	Acres	N/A	26614	22007	25678.45
Output 001: Climate Resilient Livestock Farming Promoted	Households adopting stall feeding	Nos	N/A	10000	2000	-
	Biogas plant established	Nos	3500	4400	880	1042
	Winter fodder	Acres	N/A	3468	2000	4709.47
	Improved Pasture	Acres	18507	23146	20007	20969
	Native Poultry Population	Nos	123146	157169	135768	134137
	Native Pig Population	Nos	5487	7002	6049	4602
	Native Cattle population	Nos	203194	259332	224021	193313
Output 007: Livelihood Choices for Marginalized Farmers Enhanced	Vulnerable Households covered under pro-poor livestock scheme	HH	N/A	689	300	-
	Climate resilient honey producing households	HH	N/A	1356	700	1103
	Capture fishery	No	4	13	8	

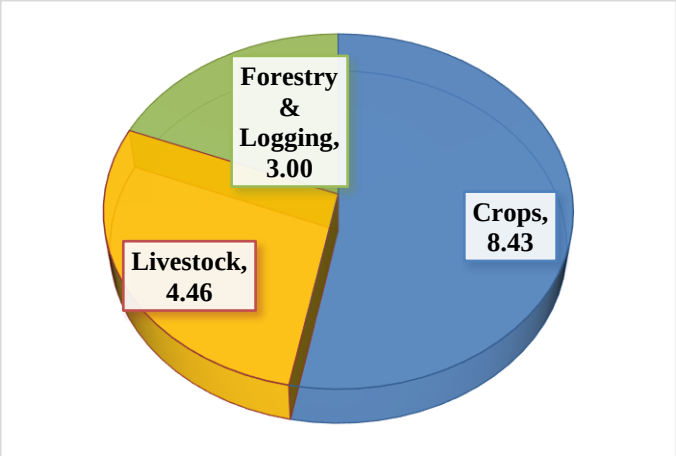
MoAF/5: Research and Extension Services Program

Results Level (Outcome)	Indicators (KPI)	Indicator Unit	Baseline (2016)	Plan Target (2022-2023)	Target (2019-2020)	Achievement (2019-2020)
Outcome 001: RNR Research and extension strengthened	Policy Research on RNR sector conducted	Nos	0	10	2	-
	RNR technologies adopted	Nos	0	25	5	-
	RNR research conducted	Nos	0	100	20	-
Output 001: Livestock production research strengthened	Livestock Production Research	Nos	0	55	11	11
Output 002: Animal nutrition research strengthened	Animal Nutrition Research	Nos	0	15	3	2
Output 003: Animal health research strengthened	Animal Health Research	Nos	0	15	3	3
Output 004: Post production and market research strengthened	Post production and market research	Nos	0	5	1	1
Output 005: Socio-economic research strengthened	Socio-economic research	Nos	0	10	2	2
Output 006: Climate smart and disaster resilient livestock farming research strengthened	Climate smart and disaster resilient related livestock research	Nos	0	10	2	-
Output 007: Livestock extension services enhanced	Livestock technology dissemination	Nos	0	25	5	5

MoAF/6: Highland Development Program

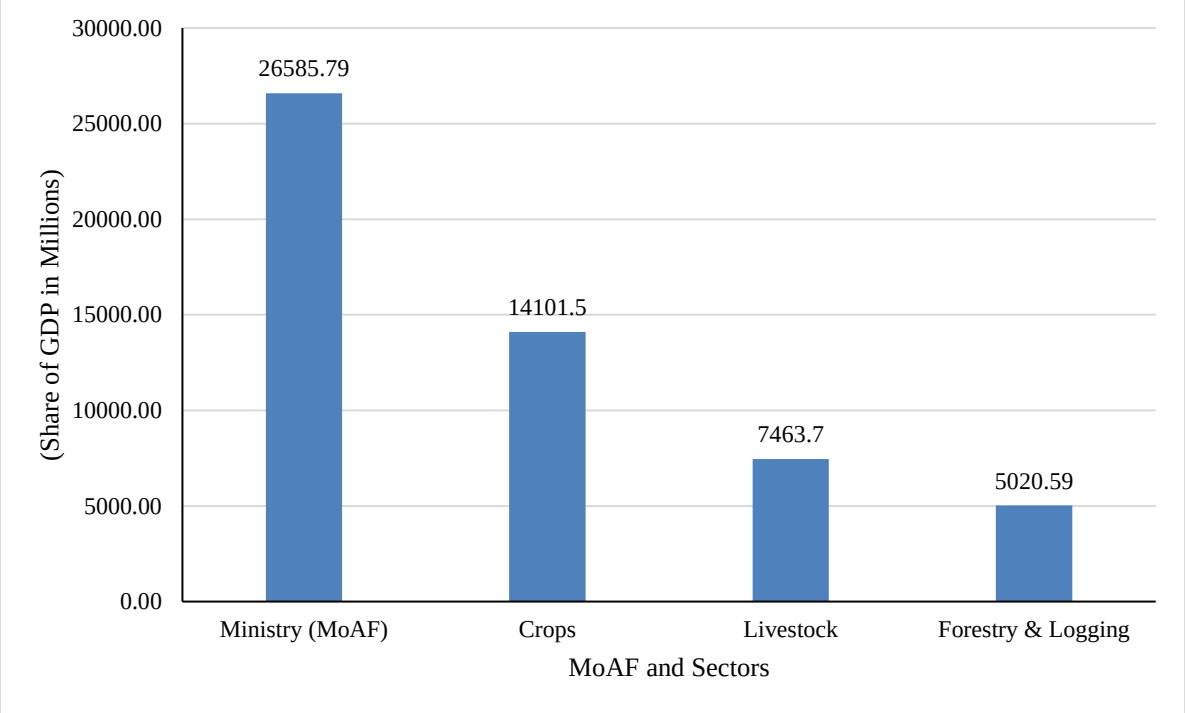
Results Level (Outcome)	Indicators (KPI)	Indicator Unit	Baseline (2016)	Plan Target (2022-2023)	Target (2019-2020)	Achievement (2019-2020)
Outcome 001: Livelihoods of highlanders improved and sustained	Yak Herders Household	No	1157	1157	1157	1062
	Yak population	No	40438	40438	40438	41918
	Highland Enterprise established	No	0	5	2	2
Output 001: Highland livestock farming sustained	Sheep population maintained	No	11277	11277	11277	11466
	Horse population maintained	No	11093	11093	11093	16792
Output 002: Highland livestock enterprise promoted	Yak based enterprise	No	0	2	1	1
	Sheep based enterprise	No	0	3	1	1

GDP Livestock Sector

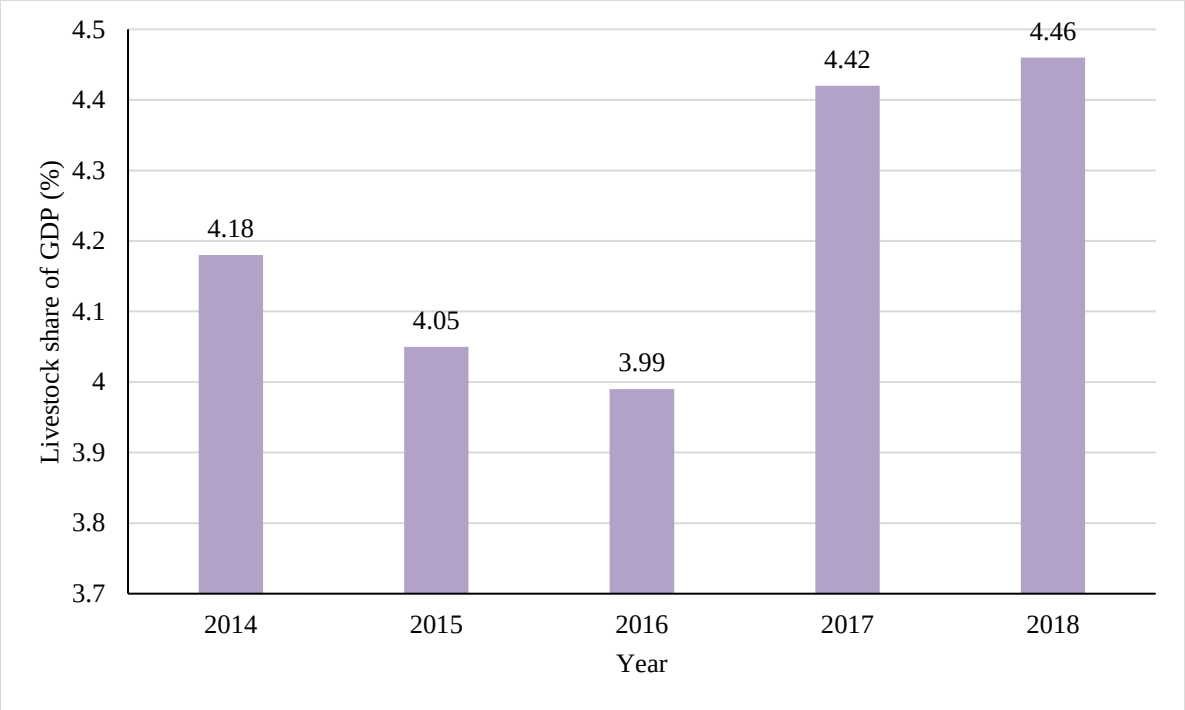


Ministry (MoAF)	15.89
Crops	8.43
Livestock	4.46
Forestry & Logging	3.00

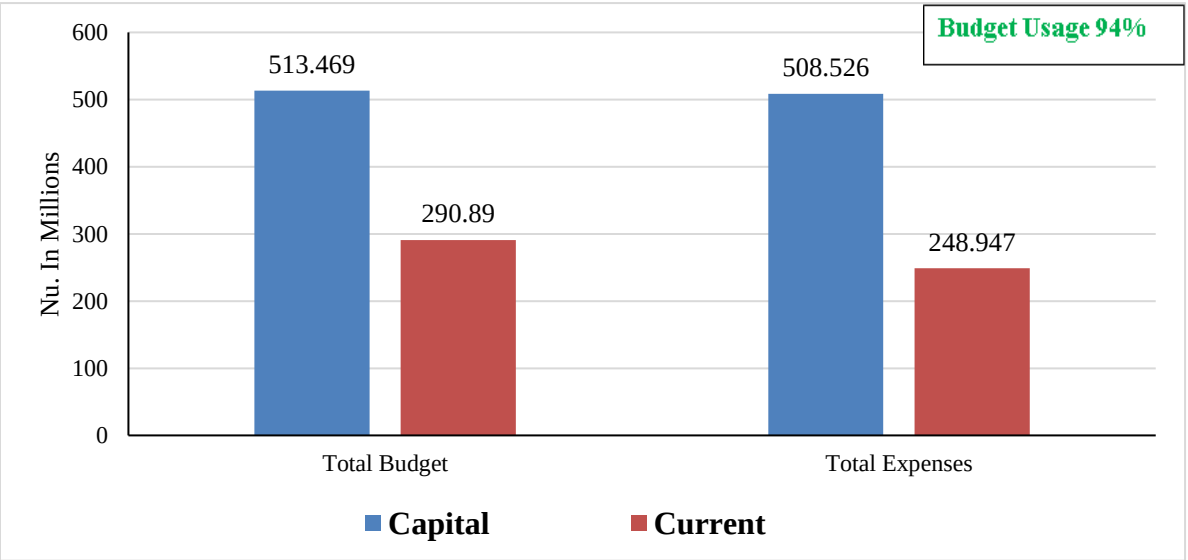
Percentage share of Livestock GDP by-Economic activity at current price (2018)



Livestock GDP by-Economic activity at current price Nu. in Millions (2018)



Percentage share of Livestock for GDP by-Economic activity at current price (2014-2018)



Budget Releases and Expenditure (2019-2020) in Nu. Millions

Livestock product Consumption 2019 & SSR(%)

Products	Imports 2019(MT) (A)	Domestic Production 2019(MT) (B)	Consumption 2019 (MT) (D)	SSR (Percent) (B/Dx100)
Fresh Milk	16.33	57546.00	57562.33	100%
Milk Powder	523.48	0.00	523.48	0%
Tetra Pack	3042.20	0.00	3042.20	0%
Condensed Milk	16.40	0.00	16.40	0%
Butter	337.20	2126.00	2463.20	86%
Cheese	1142.37	4090.00	5232.37	78%
Dairy	**5077.98**	**63762.00**	**68839.98**	93%
Pork	1681.88	1113.00	2794.88	40%
Chicken	1631.55	1926.00	3557.55	54%
Chevon	27.90	281.00	308.90	91%
Fish (Fresh)	679.15	209.00	888.15	24%
Fish Dry and Fillets	371.97	0.00	371.97	0%
Meat	**4392.44**	**3529.00**	**7549.48**	47%
Eggs (Nos)		**141381171.00**	**141381171.00**	100%
Honey (MT)	**42.24**	**66.00**	**108.24**	61%

Note*: Egg is in numbers*

1. National Dairy Research & Development Centre, Yusipang

Major Achievements during 2019-2020:

Input production Research Sector:

Liquid Nitrogen (LN_2) plant unit:

The Liquid Nitrogen Plant Unit operates a Sterling Cryogenic LN_2 plant with a production capacity of 10 litres per hour. The LN_2 plant at Yusipang meets the scheduled supply of AI Centres in the Western, West Central and East Central regions while the LN_2 Plant at Kanglung, Trashigang caters to the distribution of LN_2 for six Eastern Dzongkhags. A total of 33217 litres of LN2 was produced during FY. The details of LN2 produced and distributed are presented below (**Table 1**). The LN_2 production as well as distribution schedule was greatly hampered due to the major break down of the LN_2 Plant in Yusipang since March, 2020. Due to the Covid-19 pandemic the center could not bring Service Engineers from India to repair the Plant. However as a coping mechanism, the RLDC's procured LN2 from Pasakha plant and distributed to all AI Centers.

Table 1: Liquid Nitrogen produced &distributed

Sl #	Activities	Quantity (Litres)
1	LN2 Production	33217
2	LN2 Distribution	22944
3	LN2 for Semen Bank refilling	9695
4	LN2 for Semen Processing & freezing	3472
5	LN2 Evaporation losses	1521.4

Frozen semen processing laboratory unit:

The laboratory unit produces frozen semen from three cattle breeds (Jersey, Mithun and Nublang) and distributes to all AI Centres in the country. During the fiscal year, a total of 17651 doses of frozen semen were produced from different donor bulls and 5095 doses were distributed to various Dzongkhags (**Table 2)**. Around 25.8% of the semen produced was distributed to Dzongkhags through RLDCs during the fiscal year.

Table 2: Locally Produced Frozen Semen & Stock Balance (doses)

Species	Opening balance	Production	Distribution	Balance
Jersey	88422	17651	4555	101518
Mithun	18478	0	540	17738
Nublang	29053	0	0	29,053
Brown Swiss Cross	1772	0	0	1772
Total (doses)	**137725**	**17651**	**5095**	**150281**

The production of frozen semen was greatly hampered due to shortage of LN_2 for semen processing and cryopreservation due to major breakdown of the LN_2 Plant.

The Centre also imports progeny tested / Genomic selected semen for maintaining quality of animals at Government farms and Contract breeders in the country.

The centre imported 11059 doses of Progeny tested / Genomic selected frozen bovine semen of different breeds. The details of imported frozen semen is presented in (**Tables 3**). A total of 5530 doses of semen were distributed to Dzongkhags and nucleus farms as per their demand.

Table 3: Detail of imported Progeny tested Bovine Frozen Semen (doses)

Species	Opening Balance	Imported	Distribution	Balance
Jersey Conventional	4076	4300	3459	4917
Jersey (Sex sorted)	3665	5240	1071	7834
Brown Swiss	440	0	127	313
Black Angus	350	0	0	350
Tropical Holstein Friesian	1388	0	160	1228
Holstein Friesian (Conventional)	1902	950	705	2147
Holstein Friesian (Sex sorted)	0	100	0	100
Karan Fries	300	0	0	300
Scottish Highland Cattle	100	0	3	97
Buffalo Nilli Ravi	220	0	5	215
Buffalo (Murrah)	0	0	0	0
Total (doses)	**12441**	**11090**	**5530**	**17501**

A total 5350 doses of sexed and conventional frozen semen to be imported from UK got disrupted due to COVID -19 pandemic.

Fodder development unit:

Fodder unit besides managing pastures at NDRDC, provides technical supports on pasture development to Royal Dairy Herd in Ramtokto and Royal Horse Farm at Taba. The detail is elaborated and given in (**Table 4)**.

Table 4: Detail of pasture development

Unit	New pasture established (Acre)	Existing pasture renovated (Acres)	Conserved winter fodder (Metric tons)	Cultivation of fodder maize (Acres)
NDRDC Yusipang	0.5	25	118	8
Royal Cattle herd Ramtokto	0	4	65	12
Royal Horse Farm, Taba	8	3	0	0

Farm & ET research unit:

The farm section maintains elite semen donor bulls and Embryo Transfer donor cows (Thrabum & Jersey cross) cattle. There are 42 animals in the farm which is given in (**Table 5)**.

Table 5: Detail of cattle maintained in the farm

Cattle Type	Numbers	Cattle Type	Numbers
Semen Donor bulls	***13***	**Young / future donors**	**29**
Jersey pure	7	Nublang/Jersey cross calves	6
Nublang	3	Mithun	2
Mithun	3	ET Donors (Thrabum)	8
Brown Swiss cross	0	ET Donors (Jersey Cross)	8
		Thrabum Heifer	5

DAIRY PRODUCTION RESEARCH SECTOR

Production research unit:

Dairy Farmers Groups and Cooperatives

The formation of formal Dairy Farmers' Group (DFG) in village and geog level began in 2006, and dairy cooperative at Dzongkhag level in 2010. As of June 2020, there are 221 DFGs (**Figure 1**) with 6060 members (**Figure 1**).spread across 20 Dzongkhags and 10 dairy cooperatives with 438 members. During the financial year 2019-20, DFGs has increased by 25 groups and 576 members across 20 Dzongkhags, four more Dairy Cooperatives formed.

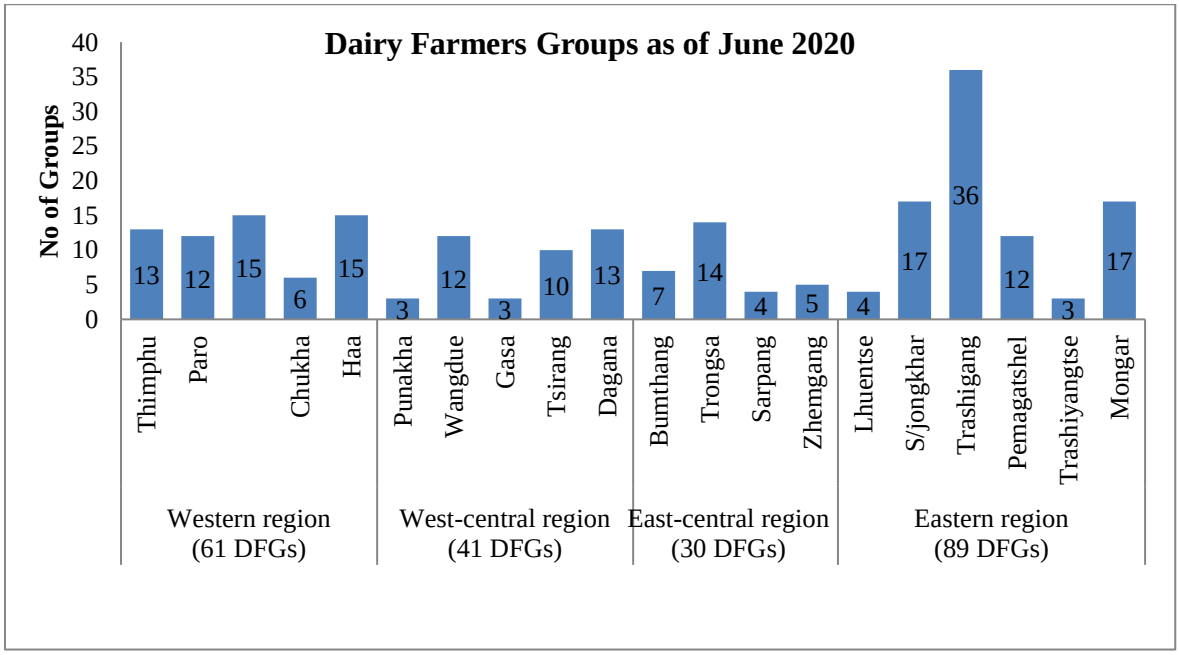


Figure 1: Dairy farmers' group by Dzongkhag and Region

Breeding research unit:

Artificial insemination performance and progeny born record

During the current year, seven additional AI centres were opened, which make a total of 120 AI centres in the country. As of March 2020, a total of 6205 AI were performed and recorded 1866 progenies (812 male and 1054 female) marking AI success rate of 30.1% (**Table 6**). The cumulative AI report as of March 2020 (from 1987) is 179,180 and total progeny record is 57,284.

Table 6: Summary of AI and Progeny record (till March 2020)

Region	Total AI (nos)	Progeny Record (nos)			Average success rate (%)
		Male	*Female*	*Total*	
West	1908	215	290	505	26.5
West- central	1408	218	253	471	35.5
East-central	1008	115	181	296	29.4
East	1881	264	330	594	31.6
Total	**6205**	**812**	**1054**	**1886**	**30.1**

DAIRY POST-PRODUCTION RESEARCH SECTOR

Product standard development and value addition unit:

Training on Good Hygiene Practices and Good Manufacturing Practices

As a follow up to the findings, the sector in collaboration with the Dzongkhag Livestock Sector, Sarpang conducted 3 days training on Clean Milk Production for 101 group members of the Gelephu Om Detshen and interested non group members. Participants were trained on production of clean milk, health of animal, shed cleanliness, milking environment, milking procedures, cleanliness of milking utensils and basic milk quality tests.

Product Diversification Training for Sarpang & Haa Dzongkhags

For production of new diversified products, the sector conducted three days trial production and training on Quarg cheese to the Dzongkhag Extension staffs from 12 Geogs and two plant workers of the Louten Om Detshen (LOD) Yoghurt plant, Sarpang.

Furthermore, the sector in collaboration with Haa Dzongkhag livestock sector conducted 3 day training on dairy product diversification to 115 dairy farmers and milk processors of Bjee Gewog, Haa with the financial support from GEF LDCF project.

Quality assessment and assurance unit:

Establishment of Research cum local standard laboratory

Establishment of Dairy products laboratory within the premises of the NDRDC office is completed. This laboratory will serve as a research laboratory to assist in investigation of samples for setting of local standards and for quality assurance of local dairy products.

Compositional Analysis of Market Milk, Butter & Datshi

The sector completed compositional analysis of market milk from five dzongkhags (Bajo (Wangduephodrang), Kuruthang (Punakha), Darla (Chukha), Sarpang and Haa. Preliminary

findings indicate consistent adulteration of milk with water. Similarly, butter and cheese samples from Tsirang, Trongsa, Dagana and Chukha has been collected and analyzed for moisture and microbial composition at the NFTL, BAFRA, Yusipang. Preliminary findings indicate inconsistent moisture composition and poor microbial composition of the samples.

DAIRY RESEARCH COMMUNICATION SECTOR

Training and skill development unit:

The NDRDC in collaboration with the Regional Livestock Development Centre (RLDC), Wangdue conducted "**Capacity Enhancement on Dairy Post Production Technologies to** the 20 extension agents of GEF project areas. The training provided the participants with theoretical and practical knowledge with hands on training on production of set yogurt, flavored yogurt, flavored drinking yogurt, paneer, rasgulla and mozzarella.

Three AI Refresher course and One CAIT training were carried out during the year. A total of 55 AI Technician were trained as a refresher course on Artificial Insemination (AI) and Reproductive Biotechnology. The course was for 14 days. The refresher course was jointly organized by respective RLDC, Dzongkhags and the technical support from NDRDC Yusipang. The course was organized to refine skills, update / advance knowledge and keep abreast with latest techniques in cattle reproductive biotechnologies for the field staff. The course provided opportunity for field staff to get hands on training on latest insemination procedures, proper semen handling and thawing, proper AI gun loading, application of right techniques for AI, proper care / handling of Liquid Nitrogen and resolve field issues related to cattle breed improvement. The detail of the training is presented in (**Table 7**).

Table 7: Capacity Enhancement on Dairy Post Production & Bio technologies

Sl. #	Region	Total trained (nos)	Date	Funding	Organised by
1	West Central	20 Dzongkhag staff	28th Oct. – 1st Nov. 2019	GEF project	RLDC Wangdue
2	Eastern	19 AI Technician	25th Oct – 7 Nov 2019	CARLEP Project	RLDC Kanglung
3	ECR	16 AI Tech	18th to 31st Dec 2019	RDCCRP Project	NDRDC Yusipang
4	ECR	20 AI Technician	10 to 23 February 2020	RDCCRP	RLDC Zhemgang
5	Eastern	23 CAIT trained	July 2019	CARLEP	RLDC Kanglung

Technology packaging and knowledge management unit:

Publication of booklets on:

A total of three report/booklets were published during the fiscal year and are the following:

- ✓ Annual Centre Report for 2018 – 2019
- ✓ Guidelines for the Establishment of Contract Heifer & Bull Production Program
- ✓ Guidelines for the use of Sexed/Conventional Semen and Implementation Modalities for Heifer Production using Sexed Semen Technology
- ✓ Guideline for training & deployment of Community Artificial Insemination and Establishment & Operation of new Artificial Insemination Centre
- ✓ Standard Operating Procedures for Bovine Artificial Insemination in Bhutan.

Five Research articles published in Bhutan Journal of Animal Science Volume 4.

Effect of body condition, season of estrous induction and fixed time artificial insemination on calving rate of local Thrabam cattle in Bhutan
NAR B TAMANG, DHAN B RAI AND ABI N KOIRALA

Assess milk production of cattle breeds in different agro-ecological zones of western Bhutan
DEKI CHODEN, LOKEY THAPA AND NB TAMANG

Breed improvement, milk production and socio-economic benefit of contract heifer and bull production program in west and west-central region of Bhutan
DHAN B RAI, NAR B TAMANG, LOKAY THAPA AND ABI N KOIRALA

Assessment of milk production and income from traditional and improved management system of small dairy farmers in Bhutan
LOKEY THAPA, DEKI CHODEN AND NAR B TAMANG

Compositional analysis of market milk in Thimphu & Paro districts
PHUNTSHO T NORBU, KINLEY CHOKI AND SONAM YANGCHEN

SEXED SEMEN TECHNOLOGY & PACKAGE OF GOOD PRACTICES AND RECCOMENDATIONS LAUNCHED

His Excellency Minister, Ministry of Agriculture & Forests released Sexed Semen Technology on 3rd July 2020 along with user guidelines and its implementation modalities to intensify heifer production program. This technology was validated since 2014 through applied research conducted on-station (Govt. farms) and on-farm at Dzongkhags which resulted in 89.6% female birth (168 females out of 187 progenies born) under Bhutanese farming environment. Thus, release of this technology is very timely in view of growing demand of heifers and need for such technology to accelerate dairy heifer production across the country.

The Centre has attempted to produce the Package of Good Practices from the research carried out by the Centre for the last three years.The salient findings of 13 research papers published in Bhutan Journal of Animals Science and other International Journals is synthesized as "**Package of Good Practices and Recommendations**" for use by Extension staff. This knowledge dissemination mechanism to translate research findings into extension messages is expected to improve dairy farming practices in Bhutan.

2. National Piggery Research & Development Centre (NPiRDC), Gelegphu

Major Achievements 2019-2020:

NPiRDC, Gelephu is the nodal agency for piggery development in the country. The main mandate of the centre is to conduct research activities related to piggery development and to coordinate input supply (piglet production). The domestic pork production has increased to 1113.40 MT (Livestock Statistics, DoL, 2019) from 972.77 MT in 2018. The progress made by the three government breeding farms (NPiRDC Gelephu, NNPBC Yusipang and RPPBC Ligmithang) during the fiscal year 2019-2020 is presented in (**Table 8**).

Table 8: Key technical parameter and its achievement during 2019-2020

Parameters	Unit	NPiRDC, Gelephu	NNPBC, Yusipang	RPPBC, Lingmethang
Avg. productive sow maintained	Nos.	161	187 (GGP/GP/PS)	93
Avg. litter size at birth (born live)	Nos.	9.05	8.89	8.4
Avg. litter size at wean	Nos.	8.26	7.76	7.96
Total piglet production	Nos.	2871	1255	1403
Litter index	ratio	1.82	-	-
Total piglet supply	Nos.	2282	697	1201
Piglet mortality	%	15.96	-	-
Pork production (culled pigs)	Kgs.	9935	15189	2570
Revenue generation	Nu. (M)	5.37	3.05	2.63

The total piglet production from the three government breeding farms was 5529. Out of 5529 piglets, 4180 were supplied to piggery farmers across the country. Likewise the total pork produced by culling the old stocks from three government farms was 27.70 MT

The total revenue generated by three government farms during fiscal year 2019-2020 was about Nu. 11.05 Million through sale of piglets, gilts, boars, unproductive pigs, gunny bags, manure, fruits and tender document, etc.

1.1. Out-Sourcing of piglets

In order to supplement the government farms, piglets were outsourced from Contract Piglet Breeders (CPBs) of Sarpang and Tsirang Dzongkhag from April 2020 to June 2020. A total of 1208 numbers of piglets were outsourced from CPBs of Sarpang (639 piglets), Dagana (8 piglets) and Tsirang (561 piglets) Dzongkhags by paying the piglet price support subsidy of Nu. 1500/piglet. During the fiscal year 2019-2020, Nu. 1.81 Million was incurred for outsourcing 1208 numbers of piglets from the CPBs.

Figure 2: Outsourcing of piglets from CPBs

1.2. Piglet supply across the country (Dzongkhag wise)

Out of 5529 piglets produced by three government breeding farms, 4180 numbers of piglets was supplied to the piggery farmers across the country as shown in the **Figure 2**.

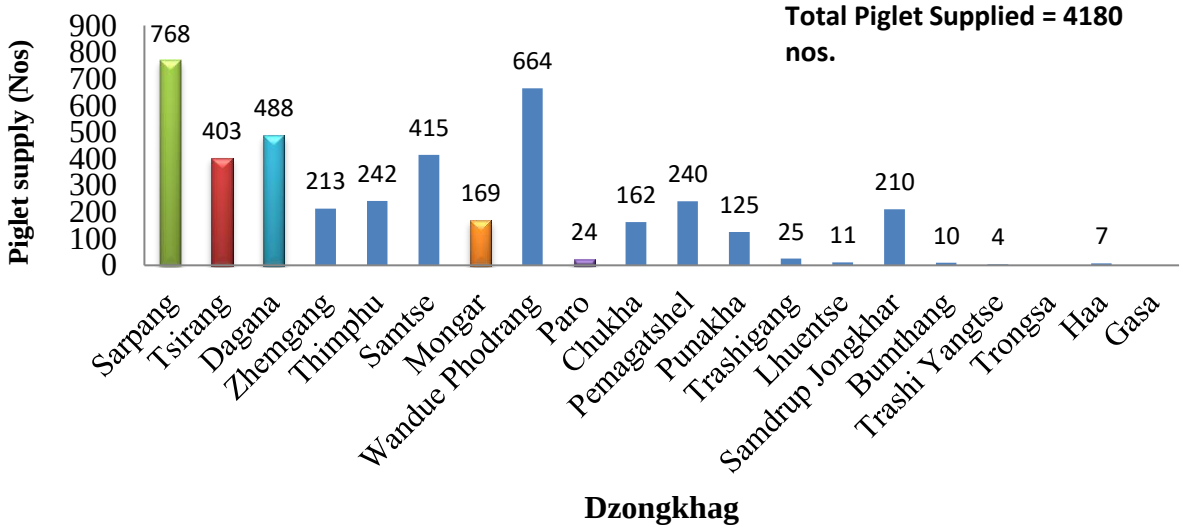


Figure 3: Piglet supplied by NPiRDC to different Dzongkhags

2. Infrastructure Development

The following infrastructure development works were executed during the FY 2019-2020.

2.1 Gilt/Young Boar Shed

Due to the limited numbers of shed, NPiRDC could not rear/accommodate more numbers of pigs for breeding purpose. Hence, to meet the demand of breeding gilt/boar from the farmers and farm, NPiRDC had constructed Gilt/Young Boar Shed with budget of Nu. 3.16 Million.

Figure 4: Gilt/Young Boar shed

2.2 Semen Processing Laboratory

In order to reduce the cost of production for rearing boar by CPB farmers, NPiRDC felt the importance of AI services and thus to provide mobile AI facility to piggery farmers, Semen Processing Laboratory was constructed with budget of Nu. 2.65 Million. Free pig AI services will be provided to feasible CPBs once the semen processing lab is operational.

Figure 5: Semen Processing Laboratory

2.3 Native Pig Shed

To conduct research activity and for the conservation of local pigs, Native Pig shed was constructed with a budget of Nu. 1.8 Million. Four sheds were constructed along with the chain-link fencing to accommodate 15 breeding sows & replacement stocks. Pure Native breeding boars shall be sourced from Udzoorong, Samthang Rukha and Zhemgang to fully operationalize the structure.

Figure 6: Native pig shed

2.4 Medicine Store

As per the recommendation of Drug Regulatory Authority (DRA) to relocate the medicine store away from the pig sheds, NPiRDC had constructed Medicine Store adjacent to office with budget of Nu. 0.85 Million. It has separate stores for medicines & medical equipment.

Figure 7: Medicine store

2.5 Construction of biogas plant in NNPBC Yusipang

To reduce the foul odor in farm premises and also to reduce the cost of electrical charges for brooding purpose during winter season, NNPBC had constructed a biogas plant with capacity of 75 CC with budget of 0.8 Million during 2019-2020. The BioGas generated will be mostly use for shed heating purpose for young pigs.

Figure 8: Construction of biogas plant

2.6 Office Beautification at NPiRDC

On 2nd June, 2020 NPiRDC joined the nation in celebrating the Social Forestry Day and Coronation Day of 4th Druk Gyalpo to keep the surrounding clean and green. Around 200 numbers of seedlings (areca nut, mango, litchi, jack fruit, etc) were planted in an area of 1 acre.

Figure 9: Plantation of saplings

3. Research Activity

The Research Unit under NPiRDC had carried out only one research activity during 2019-2020 (***Effect of Feeding Regime and Castration Timing in Performance of Fattener Pigs***). The research finding indicated that;

- Although there is a slight variation, there was no significant difference in growth/performance of pigs by feeding types (One time feeding and two times feeding). The study recommends that the fatteners on commercial diets can feed one time in a day to reduce the time usage of labour instead of feeding twice a day. But water should be supply throughout the day.
- There was no significant difference in growth/performance of pigs by different castration timing (14 days/30 days/60 days)

3. National Poultry Research and Development Centre (NPRDC), Sarpang

Major Achievements during 2019-2020:

Layer Unit:

In the FY 2019-2020, Layer unit imported 2600 and 375 numbers of female and male layer breeders, respectively with budget support from Rural Development and Climate Change Response Program (RDCCRP).

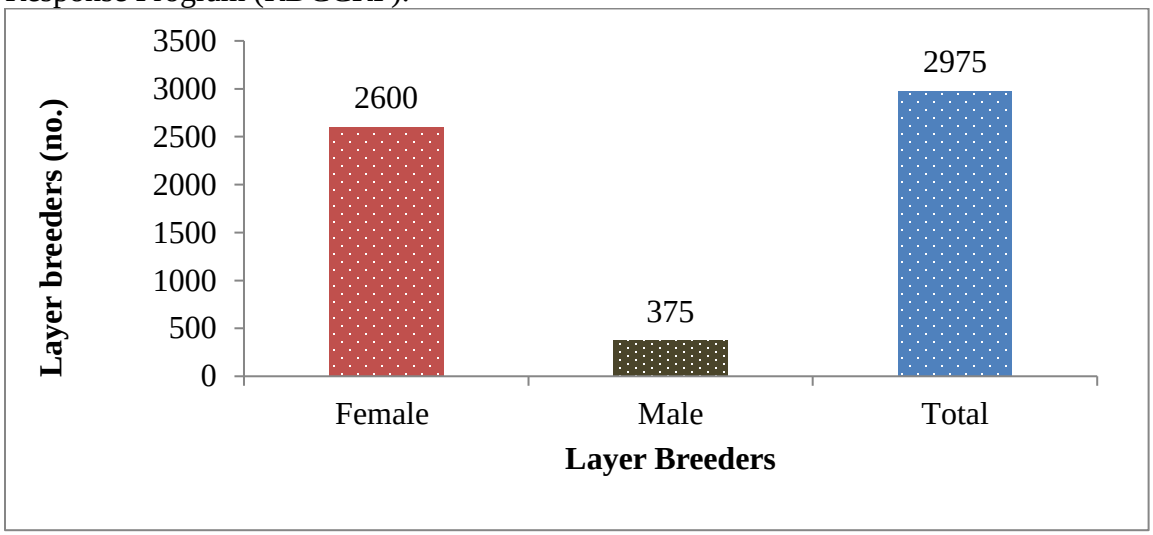


Figure 10: Layer parent breeder imported during FY 2019-2020

The layer unit under NPRDC produced a total of 763,507 numbers of eggs with 61 % laying percentage. The eggs are graded and segregated as hatching and second class eggs. During the FY 2019-2020, from the total of 763,507 eggs, 718,722 eggs were graded as hatching eggs while 45,254 numbers were graded and sold as second class eggs.

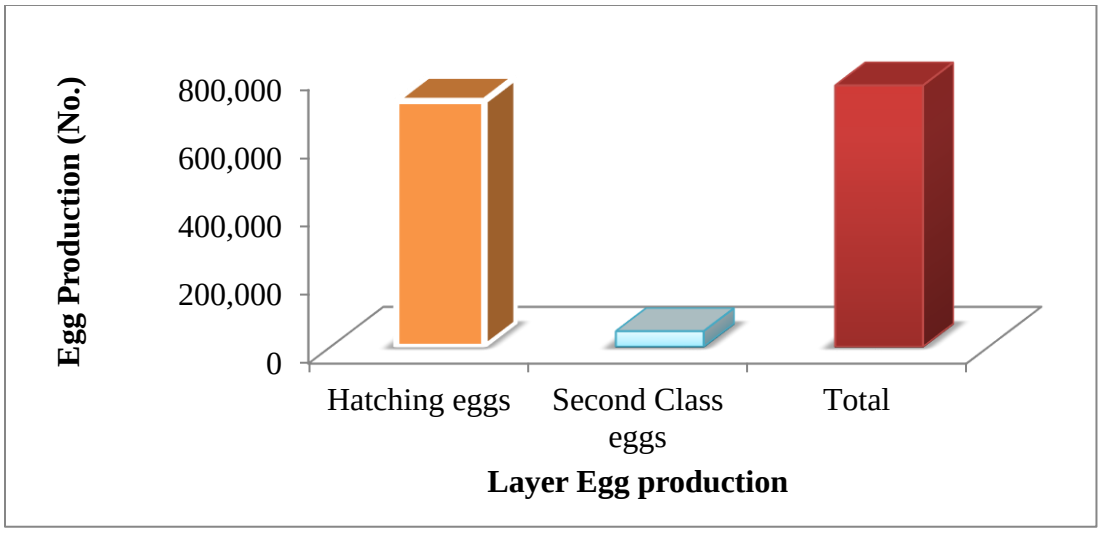


Figure 11: Layer Egg Production (2019-2020)

The unit also auctioned 1243 numbers of layer spent birds contributing about 1.8 MT of chicken in the market.

Broiler Unit:

During the FY 2019-2020, broiler unit of NPRDC has imported 3600 and 540 number of female and male broiler parent breeders, respectively. Due to the COVID 19 pandemic in the world, the unit could not import one batch of broiler parent breeders. The two batches broiler breeders were imported from Aviagen India located at Tamil Nadu, India with budget support from RDCCRP.

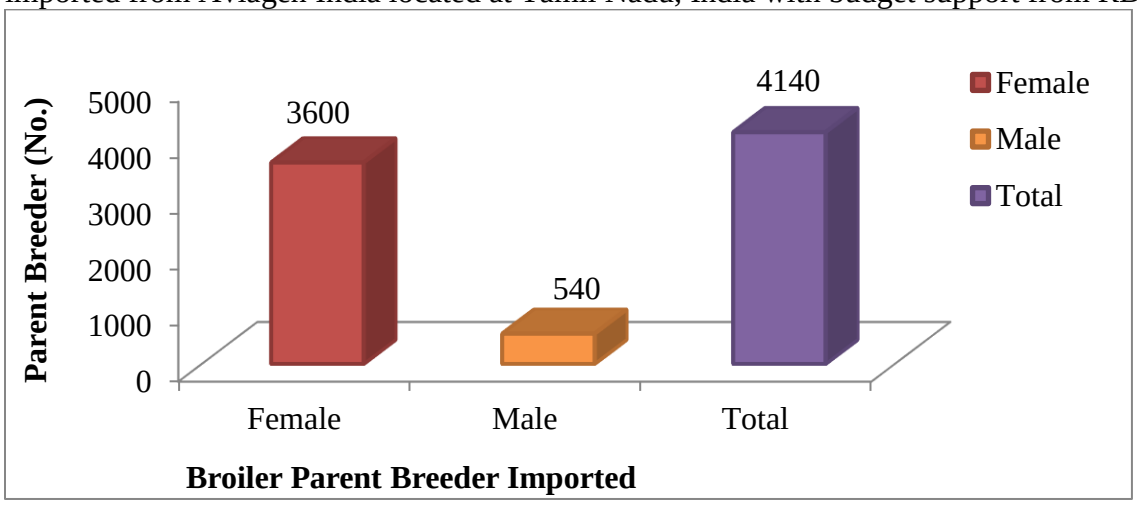


Figure 12: Broiler parent breeder imported in 2019-2020

The broiler parent breeders produced 249,051 numbers of eggs. From the total egg production, 214,005 were graded as settable and 35,046 were segregated as second class eggs.

To enhance Private Public Partnership, the Centre supplies broiler hatching eggs to private and cooperative hatcheries for DoC production. The broiler unit of the NPRDC also auctioned 2119 numbers of spent birds that produced approximately about 7.2 MT of chicken.

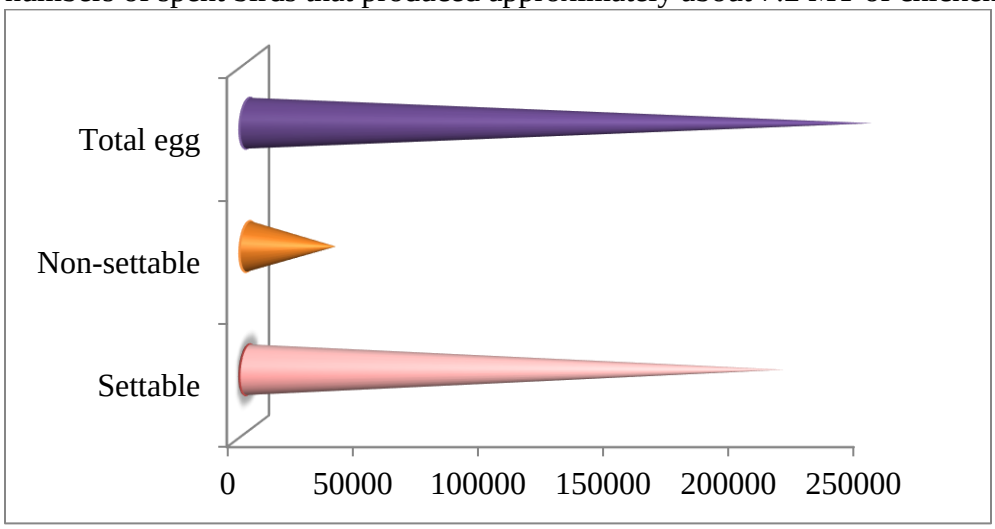


Figure 13: Broiler Egg production (2019-2020)

Distribution of Commercial Layer DoC:

During the FY 2018-2019, hatchery unit of NPRDC produced and distributed 230,507 number of layer DoCs with two percent transit mortality. During the FY 2019-2020, hatchery unit of the NPRDC supplied 63% of layer DoC production to Sarpang Dzongkhag, followed by Tsirang and Punakha Dzongkhag with 14 % and 7 %, respectively. Similarly, broiler commercial DoC was supplied highest to Sarpang and Tsirang with 47 % and 35 % followed by Dagana Dzongkhag. The unit supplied broiler DoC to seven Dzongkhags in FY 2019-2020. The distribution is based on annual Dzongkhag indents.

Production of Commercial Broiler DoC:

Through Public Private Partnership (PPP), the hatching eggs of broiler were supplied to private hatchery of Samtenling geog under Sarpang and farmers' cooperative, Norbugang geog under Samste Dzongkhag to produce commercial broiler DoC. From two hatcheries, a total of 182,364 commercial broilers DoCs were produced, against the annual target of producing 200,000.

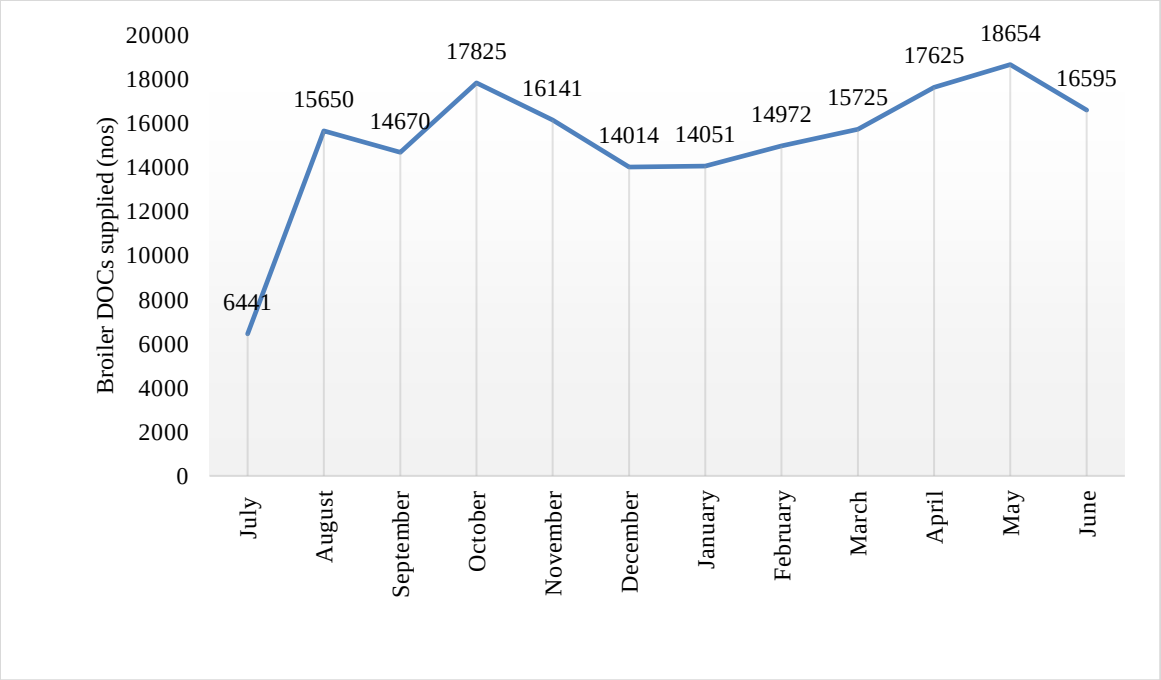


Figure 14: Broiler DoC Production by NPRDC (2019-2020)

The NPRDC achieved 91 % of the annual target during the FY 2019-2020. The nine percent deficit could be attributed to, among others, non-hatching in two calendar months (Dawa Dangpa and Zhipa). During these two auspicious months, setting of hatching eggs by two private hatcheries is zero with no DoC demand from farmers.

Facilitation of Private Suppliers:

Since the NPRDC in Sarpang has very limited space (sheds) to stock more broiler parent breeders, the Centre is constraints in keeping fixed number of parent breeders. Moreover, during the fiscal year 2019-2020, the NPRDC undertook a major renovation of broiler sheds with fund support from EU-RDCCRP. This hampered the stocking of broiler parent breeders in the centre. However, hatchery unit of the Centre facilitated private suppliers to import quality commercial broiler DoC from the recognized company in accordance with the relevant policies. This was mainly to achieve the national target of producing 500,000 numbers of commercial broilers DoC. Consequently, private suppliers imported and distributed about 530,566 numbers of commercial broilers to Samste, Chukha, Sarpang and Tsirang Dzongkhags.

In total about 712,390 numbers of commercial broilers were distributed to broiler poultry farmers across the country. It has been recorded that Samtse Dzongkhag alone imported 351,466 during the FY 2019-2020. The hatchery unit facilitated and achieved 142 % of national target to distribute 500,000 numbers of commercial broilers DoC. Further, it was observed that there was 181 % increase in terms of commercial broiler DoC import indicating higher demand for commercial broiler DoC.

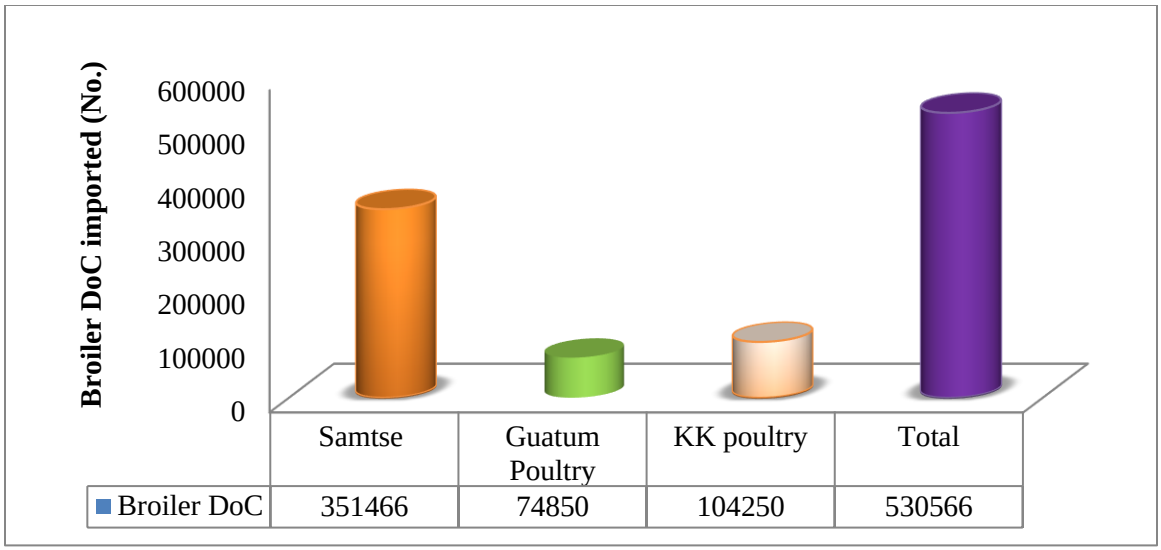


Figure 15: Import of commercial broiler DoC by private individuals in FY 2019-2020

Dissemination program of Research technologies:

As mandated since 2016, the NPRDC carried out multiple researches on poultry commodity over the years and few of it has been published in Bhutan Journal of Animal Science. The researches were carried both on-farm and at station to obtain the best results. However with limited budget, the technology dissemination to farmers could not be performed over the years.

During the FY 2019-2020, in collaboration with Dzongkhag Livestock Sectors of Chukha, Samste, Sarpang and Tsirang, NPRDC could able to transfer the research technologies to poultry farmers in the month of October to December, 2019. These Dzongkhags were purposively selected for the dissemination as they have highest number of poultry population compared to other Dzongkhags.

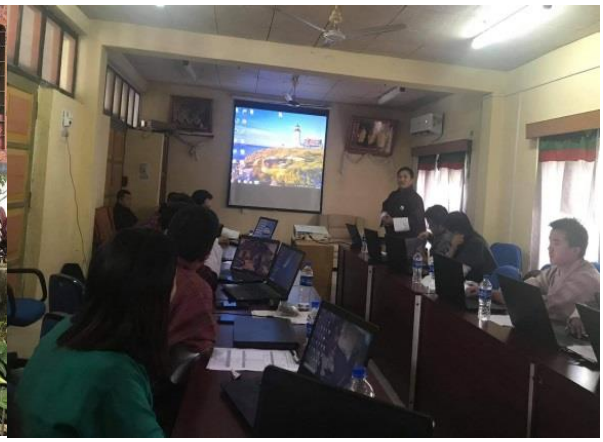
The research technology dissemination program for the poultry farmers of Norbugang and Gomtu under Samtse Dzongkhag was held from 13th to 16th October 2019.

Similar dissemination program was conducted at Samphelling Gewog under Chukha Dzongkhag from 17th to 18th October 2019. Sampheling Gewog is considered as poultry populated area compared to other Gewogs. The program was basically aimed to facilitate farmers to adopt research technologies to enhance the domestic chicken production through efficient utilization of available feed and broiler breed.

In Tsirang Dzongkhag, the program was conducted from 27th to 30th October 2019 at Dunglagang Gewog Centre. A total of 40 interested poultry farmers participated for dissemination program. Such program was also coordinated at Sarpang Dzongkhag from 4th and 5th November 2019.

Training Workshop on Research Methodology and Statistical Tools:


The training workshop was basically aimed to enhance the research method and Statistical Package for Social Science (SPSS) based knowledge. The two days training workshop was conducted from 22nd to 23rd of June 2020 at Agriculture Research and Development Centre, Samtenling under Sarpang Dzongkhag with fund support from Poultry and Piggery commodity Centres. The 27 participants from three Research and Development Centres (Poultry, Piggery and Fishery) took part in the training. The participants were briefed about the general tips to scientific writing and RNR research methodologies by the Program Director of NPRDC which both theory and practical session.

4. National Research & Development Centre for Aquaculture (NR&DCA), Gelephu

Major Achievements during 2019-2020:

1. Fingerling Supply

National Research & Development Centre for Aquaculture (NR&DCA), Gelephu is the hub of government aquaculture that produces six species of quality fingerlings. For FY 2019-2020, NR&DCA supplied a total of **1,831,667** numbers of live inputs out of which 1,728,067 numbers are ordinary fingerlings and 103,600 numbers stunted fingerlings to ten fish farming Dzongkhags.

Figure 16: Live inputs segregation, packaging and distribution from carp hatchery.

The Centre earned consolidated revenue of Nu. **977,283/-** (Nine Nine Hundred Seventy Seven Thousand Two Hundred Eighty Three) during the year. (**Table 9)** provides the details of fingerlings production and distribution;

Table 9: Fingerlings produced and Distributed to Fish Farming Dzongkhags (nos)

Dzongkhag(s)	CC	GC	SC	Rohu	Mrigal	Catla	Total
Dagana	19,000	1,84,335	0	3100	2100	3000	2,11,535
Sarpang	1,85,200	2,48,000	10500	23600	22,700	22,700	5,12,700
Zhemgang	8125	1125	1000	1500	1500	2250	15500
Tsirang	60511	126160	500	4200	4400	1700	197471
Samtse	1,63,000	94,850	2000	34000	34000	34000	3,61,850
Wangdue	24770	350	0	100	250	500	25970
Punakha	1000	1000	0	2200	2450	2350	9000
Chhukha	12600	54616	0	13000	6000	4500	90716
S/Jongkhar	31000	31000	15400	83000	78000	76000	314400
P/Gatshel	14000	1000	100	1500	700	225	17525
NR&DCA	49000	0	0	10500	10250	5250	75000
Total (nos)	**5,68,206**	**7,42,436**	**29500**	**176700**	**162350**	**152475**	**18,31,667**

2. Fish Tsethar:

As part of Birth Anniversary of Gyalsey, Crown Prince His Royal Highness Jigme Namgyel Wangchuck on 5th February, the NR&DCA, Gelephu had privilege to continue Fish Tsethar programme during FY 2019-2020. Similarly, this year the NR&DCA has been entrusted with another series of Fish Tsethar programme specially dedicated to His Majesty the King, Jigme Khesar Namgyel Wangchuck. The occasion was graced by venerable Lam Neten, Dasho Dzongdag and other executives of Gelephu and Sarpang region. Details of Fish Tsethar information is provided in the (**Table 10)**;

Table 10: Details on Fish Tsethar Programme implemented by NR&DCA.

Agency	**Date**	**Water body**	**No. of Fish**	**Fish species/ Fish sex**
NR&DCA, Gelephu	05.02.20 09.03.20 05.06.20 30.06.20	Rongrichhu & Bhurchhu	2500	Indian Major Carps (M/F)

Figure 17: Fish Tsethar programme in Sarpang Dzongkhag.

3. Research

NR&DCA, Gelephu is a nodal agency mandated to undertake warm water aquaculture research. From 2017, the NR&DCA has been striving to create scientific baseline references through the conduct of both on-station and on farm researches. Two applied researches were initiated and completed during the fiscal year as follows (**Table 11**);

Table 11: Aquaculture Research conducted at NR&DCA for FY 19-20.

FY	Type of Research	Research Title	Lead Author	Initiation & Termination Date
19-20	Applied Research	To evaluate performance of Jayanti Rohu under Bhutanese conditions	Pema Thinley	30.10.20 & 15.04.20
19-20	Applied Research	To evaluate breeding performance of Golden mahseer to determine hatchlings to fingerlings survival	Renchen Lhamo	30.10.20 & 15.04.20

Broodstock Replacement:

The main mandate of NR&DCA is to produce both quality and quantity of fingerling of six exotic fishes. To fulfill the mandate, the centre has to safe-keep pure line genetic material of all carp species to ensure supply of live inputs with faster growth rate. The centre implement 15% broodstock replacement plan every year on sustainable basis. The procurement of broodstock is an important and prioritized activity. During the year 1354 kg of new broodstock worth of Nu. 1.50 million was procured and replenished (**Table 12**);

Table 12: Details of Brookstock Replacement and Funding Source.

Project	Total Fund (m)	Quantity procured (Kg)	Utilized
GoI, DoL	0.500	816	100%
RDCCRP	0.550	538	100%

4. Carp's Breeding:

Unlike in the past, the centre has set unprecedented record in carp's propagation in the wake of COVID-19. Due to pandemic issue, RGoB has accelerated different livestock commodity productions through release of subsidy to support farmers across different Dzongkhags. This has resulted in significant change in carp breeding's statistics and subsequently on the numbers of live inputs distributed (**Table 13**);

Table 13: Propagation of Carp species.

Sl. No.	Species	No. of Set(s)	Estimated Fry Record (No.)
1	Common carp	72	799960
2	Grass carp	298	816112
3	Rohu	13	246646
4	Mrigal	18	355740
5	Catla	11	24394
6	Silver carp	5	13800

5. Ornamental Fish & other Native Fish Breeding

Through conceptualization of conservation centre for Golden Mahseer and other important subtropical native fish species, the centre has mastered the art of propagating trending ornamental fishes. More than 106 sets of ornamental fishes were bred with estimated fry record of 1685 numbers. Similarly, four sets of Golden mahseer were also bred with estimated fry record of 550 numbers. The centre initiated such activities in accordance with the growing interest of aquarium ornamental fish **(Table 14)**.

Table 14: Propagation of Ornamental Fish at the Centre.

Sl. No.	Species	Type	No. of Set(s)	Estimated Fry Record (No.)
1	Gold fish	Ornamental	94	1020
2	Koi carp	Ornamental	12	600
3	Molly	Ornamental	30	65
3	Golden mahseer	Native	4	550

6. Installation of Borewell for Carp Hatchery:

The hatchery unit encounters water issues both in terms of quality and quantity during peak breeding season for the Carps. On the other hand, with the increased numbers of fish farmers throughout the country, the demand of fingerling has been increased significantly. Thus, to accelerate the production of fish seeds, the centre installed borewell ideally to supply clean water to enhance and accelerate seed production. The borewell installation has positively contributed in;

i. Supplying clean and un-interrupted water supply during the breeding season.
ii. Supplying clean water for the scientific researches.
iii. Supplying clean water to the early and important fish stages.

The installation of the borewell was completed in July, 2019 and carp hatchery has utilized the water for propagation when the water from Mao River becomes turbid.

Aquaculture Subsidy Support:

Large scale aquaculture support subsidy supports were extended to three Dzongkhags viz Sarpang, Samdrupjongkhar and Pemagatshel. The supports are in the form of cash and kind. Fish farmers of Samdrupjongkhar and Pemagatshel were provided cash for pond excavation whereas HDPE pipe for irrigation was supported to Sarpang fish farmer. Moreover technical support was provided during the construction of Urigang commercial fish farm under Pemagatshel Dzongkhag.

Figure 18: Field Implementation of Aquaculture Subsidy Support (Irrigation support).

7. Land User Certificate (LUC) Youth's Training

Two Land User Certificate (LUC) groups from Dorangthang LUC located under Samdrupcholing Drungkhag and Jangsa-LUC located under Jomotshangkha Drungkhag of Samdrupjongkhar Dzongkhag successfully completed weeklong hands-on training organized by the centre from 2-6th September, 2019. LUC training was unprecedented in the history of centre as we have created first-time record by training 19 participants (8 LUC members and 11 fish farmers). The centre coordinated the training with technical expertise while the funs was mobilized by the Dzongkhag concerned.

8. Internship

This year, the centre also created external institutional linkage with Dr. M.G.R Fisheries College and Research Institute, Ponneri-Tamil Nadu: India to facilitate two to undergo Experiential Learning Program (ELP) at the centre. The staff had an opportunity to undergo two months training on ELP in aquaculture.

9. Pond Repair

Unlike in the past, major fish pond maintenance and repairing at the centre was implemented with machinery support from Central Machinery Unit (CMU) of Department of Agriculture (DoA). The centre had successfully coordinated the major repair of 20 numbers fishponds worth Nu.0.289 Million.

10. Staff Quarter Repair

The staff quarter constructed during 1980's required major renovation. The centre renovated two staff quarter through RDCCRP project.

Figure 19: Major maintenance of staff quarters.

11. Table Fish Production

Table fish production of 1500 Kg (1.5 MT) is one of the secondary mandate of the centre. The centre provided 1.523MT of wet fish and sold in the local market during the year.

12. Financial Progress

The budget and expenditure for the FY 2019-2020 and the revenue report from 1st July 2019 to 29th June, 2020 are as follows;

✓ Our overall fund utilization percentage irrespective of the funding sources is 99.99%.
✓ Revenue earned during the year, 1st July 2019 to 29th June, 2020 stands at Nu. 1,006,955/- (Ngultrum one million six thousand nine hundred fifty five).

5. National Research and Development Centre for Riverine and Lake Fisheries (NRDVR&LF), Haa

Major achievements 2019-2020

The National Research Center for Riverine and Lake Fisheries (NRCR&LF) has three sections and three farms /research sub-stations under it. The achievements of NRCR&LF are mentioned as achievements of its sections and farms as follows:

1. Fishery Resource Management Section (FRM)

1.1 Community based fishery program

The section has successfully completed the drafting of management plan for community-based fishery program for Pangkhar and Goshing communities in Zhemgang.

1.2 Fish biodiversity study

The Bhutan Trust Fund for Environment Conservation (BTFEC) funded project on fish biodiversity study has been successfully completed. The three years' project, which included the study of fishes in rivers of eastern Bhutan resulted in the production of one scientific paper and a field guide book.

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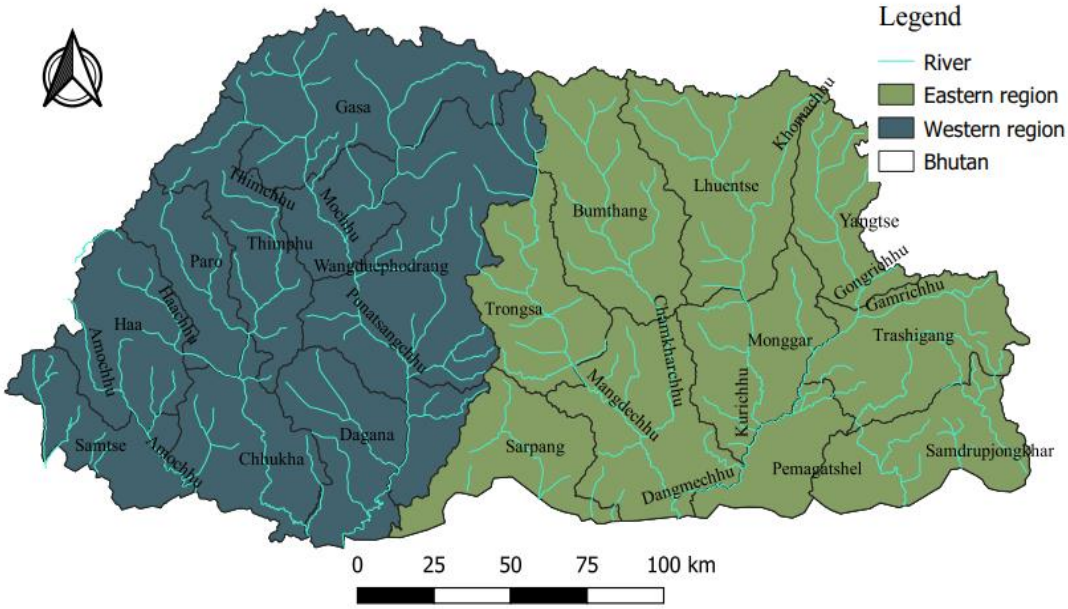


Figure 20: River system of Bhutan.

2. Fisheries Ecology and Environment Unit (FEE)

The FEE unit has completed two important fisheries research, which were initiated two years ago, and their findings are published in Bhutan Journal of Animal Science, Volume 4 as;

a. Effectiveness of fishways at Kurichhu dam in Bhutan
b. Exploring of alien fish species diversity in Amochhu.

3. Input Unit

There are three farms/research sub-stations under the input unit.

3.1 Trout Breeding Center (TBC)

The achievements of TBC are as follows.

a) Produce high quality rainbow trout fingerling at Trout Breeding Centre

TBC procured 200000 eyed eggs from Denmark. Unlike previous batches, the survival rate of eyed ova is very high. There was overall 60% of the survivability rate. Therefore, the stock stand as of June 2019 is 130000 nos (weighing average 10 gram) and they are reared under controlled condition.

b) Strengthening of fish rearing system

Four ponds were re-modified and renovated to strengthen the capacity of the fish rearing unit. This was done through fund support from EU-RDCRRP.

c) National Organic Flagship Program (NOFP)

Under National Organic Flagship Program, to enhance the efficiency of nursery rearing system, one out-door pond has been re-modified and converted to semi-indoor facility for nursery rearing of fish.

The NOFP also provided fund support to one private trout farm at Damthang, Haa. With this fund support, the farm was able to re-modify its ponds to enhance the farm's production capacity.

d) Private trout farm

The centre initiated development of one private commercial trout farm in Paro.

3.2 Fish Conservation Unit (FCU), Targay Thang, Punakha

a) Strengthening of FCU

The ponds were renovated and remodified to enhance their capacity and efficiency. Similarly, engineer's design and estimate for renovation and re-modification of water supply system has been completed. Deployed one technical staff for FCU.

Figure 21: Re-modification work on fish pond

3.3 Mahseer Conservation and Fish Monitoring Centre (MC&FMC), Harachhu, Wangdue

The construction of all major infrastructures was completed. Provisional handing and taking over of the infrastructure were also done. To initiate the work, staffs have been deployed.

Figure 22: Fish Monitoring Centre (MC&FMC), Harachhu, Wangdue

6. National Highland Research and Development Center (NHRDC), Bumthang

Major Achievements during 2019-2020

Support to the Highland Communities

Traditional Yak herding has been a time immemorial livestock activity for the highland communities. Yak herding was the only income for the sustenance of the highland household livelihood in the past when the communities were less exposed to modern developmental technologies. Highland communities rearing yak and sheep have been dwelling in the harsh environment and climatic conditions playing a crucial role in safeguarding the territorial integrity of the nation.

Thus, the centre felt importance to address some of the critical issues through promotion of various activities which will enhance the livelihood of the highland communities through yak herding and thereby encourage them to retain back in highlands.
Therefore, the centre pursued the intervention with the following objectives:

- Encourage Highland communities to retain back in the highlands
- Enhance the Livelihoods of the Highland communities
- Promote and preserve the socio-cultural traditions of the highlanders.
- Supply sufficient amount of fodder for summer as well as winter
- Enhance production and reproductive potentials of animals
- Reduce the calf mortality that associates with fodder shortage

Table 15: Supply of CGI sheet and Dairy product processing equipment

Sl No	Dzongkhag	Items	Quantity	Remarks
1	Bumthang	CGI sheet	920 pcs	
		Ridging	230 pcs	
		Roof screw	120 kgs	
		Flat washer	110 kgs	
		Bitumen washer	140 kgs	
		Milk can	2 nos	
		Refrigerator	2 nos	
		Lactometer	4 nos	
		Manual cheese press	2 nos	
2	Paro	Butter churner	40 nos	
		Milk can	7 nos	
		Milking bucket	10 nos	
		Chauff cutter	1 no	
		Lactometer	4 nos	
		Refrigerator	1 nos	
		Display refrigerator	1 nos	
3	Thimphu	Display refrigerator	1 no	
		Refrigerator	1 no	
		Chauff cutter	2 nos	
		Lactometer	4 nos	
		Milk measuring jug	1 no	
		Milk can	3 nos	
4	Haa	Refrigerator	2 nos	
		Display refrigerator	1 no	
		Cream separator	2 nos	Yak farm
		Milk can	2 nos	
		Butter churner	1 no	

Table 16: Pasture development

Dzongkhag	Fodder grass species (acre)			Fodder trees (nos)
	Grass mixture	Oat	Fodder maize	Willow
Haa	81	75	0	0
Paro	0	127.5	32.5	0
Thimphu	826	100	90	0
Wangdue	17.4	0	0	2000
Gasa	0	4.8	0	0
Lhuentse	20	0	0	0
Total	**944.4 acres**	**307.3 acres**	**122.5 Acres**	**2000 Nos**

Capacity Development

Five days refresher training on research analytical methods using SPSS (Statistical Package for Social Science) was conducted from 18th May-22nd May, 2020. With the new staff joining in, the center felt very crucial to equip the staff with the research knowledge and understanding the research methods. The training was conducted to familiarize the basic concept of research analytical methods using SPSS software

The 5 days training covered the various topics on types of statistical data, importing data from excel to SPSS, p value, significant verses not significant which will be used day to day activity by the researchers in data interpretation.

National Apiculture Strategy and Action Plan

A lot of investment in terms of inputs supply and capacity development has been done over the past years to take beekeeping to the greater heights. With improvement in the management and from technical interventions, the honey production has doubled and more people are taking interest in this enterprise. With a bright prospect of honey production in Bhutan, it was felt imperative to have a guiding document to support beekeepers in Bhutan to have productive, sustainable, productive and profitable honey production. The National apiculture strategy and action plan was developed in collaboration with key stakeholders' from national and regional level.

Figure 23: Bee keeping research at NHRDC, Jakar

After the formal endorsement from the Department the document is being printed and will be launched at the Department in the FY 2020-21. This strategy document will guide implementers and planners at all levels in the processing of implementing the apiculture program.

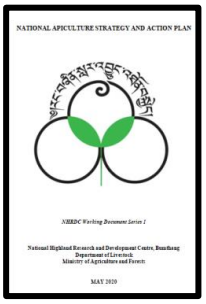


Figure 24 & 25: Apiculture Strategy Document and Honey packaging

The Apiculture unit has carried out a comparative study of local bee honey production from traditional and moveable frame hive in five dzongkhags; Chukha, Samtse, Sarpang, Dagana and Tsirang that will serve as baseline information for future managed beekeeping development in Bhutan.

Integrated Yak Service Center, Chala Dophu, Haa.
Report on Pasture seeds procurement, distribution and establishment.

The Yak Farm, Haa was initially established as an integrated yak service center in 2014 at Chala Dophu with an aim to improve yak breed and conserve yak farming in the country. The farm is mandated to implement yak farming as rural economic enterprise linking with yak eco-tourism for the benefits of the highlanders. The farm was fully operationalized in 2018 after the completion of the office infrastructure and other essential facilities.

Figure 26: Pasture development activities was focused at the Yak Farm, Chonaphu

Table 17: Activities undertaken by Integrated Yak Service Center.

Sl No.	Activity	Physical Achievement (2019-2020)			Financial Achievement (2019-2020)		Remarks
		Unit	Target	Achive.	App. Budget (M)	Exp. (M)	
1	Procurement and distribution of Pasture seeds (Acres)	Acres	20	20	0.163	0.162	Completed
2	Construction of ESP quarter Yak Farm, Chonaphu, Haa. (N0.)	1	1	0	3	0	As spill over 2020-2021
3	Construction of Retaining wall at the New Yak Farm office Chonaphu, Haa (No.)	1	1	1	1.5	1.2	Completed
4	Establishment of new water supply at the Newly constructed Yak Farm Office adjacent to JKSNR Office (No.)	1	1	1	1	0.89	Completed

The which has an area of 630 acres of which 14 acres were of natural open grassland which the center has developed a total of 5 acres of barbed fenced pasture field as renovation activity.

The other areas include the pasture fields of the yak herders of the Haa primary Cooperatives 50 members at the low land areas where the centre initiated the distribution of the seeds. The total area of 15 acres will be proposed during the next season by conducting a random field visit in collaboration with the geog livestock officials for assistance and guidance. The total area of improves pasture established during this activity is 20 acres.

Conservation and Breeding of Bhutanese Mastiff

National Mastiff Breeding and Conservation Farm was established through the financial assistance from BTFEC (Bhutan Trust Fund for Environment Conservation) project at Jasthangkha under Khatoe geog of Gasa Dzongkhag in 2018. The farm was established with the objectives to conserve Bhutanese Mastiff breed and to increase the number and improve breed quality. At present, the farm has eight mastiff of which six are male and two are bitch. The farm is currently undertaking the sourcing of quality mastiff for the conservation of pure line Bhutanese through selective breeding.

Sourcing and Stocking good mastiff dogs

The Farm is currently undertaking sourcing of good quality breed mastiffs from Highland gewogs of Lingshi, Nubri, Laya, Merak and Sakten in collaboration with gewog extensions and local herders. The farm has procured eight dogs in the current financial year (five from Nubri, two from Laya and one from Haa)

Infrastructure development

In the financial year 2019-2020, under the financial support from Department of Livestock, two units of staff quarter is under construction with 90% of the works completed. The construction works was carried out with the technical support from the Dzongkhag Administration Gasa

National Highland Development Program

Highland Development Program approved by the Government in the 12th Five Year Plan is mandated to deliver a holistic set of targeted interventions to improve the livelihoods of highland communities in highland Dzongkhags. The program implementation is being carried out by the NHRDC under the directive of the Program Coordination Unit (PMU), Research and Extension Division (RED), Department of Livestock (DoL).

The activities that were implemented in FY 2019-20 are:

- Assist PMU in formation of yak federation to preserve, promote and protect yak in the country.
- Initiation in product mapping and product diversification.
- Completion of Gid surveillance aimed for Gid elimination program

7. National Centre for Animal Health, Serbithang

Major Achievements during 2019-2020

1. Establishment and strengthening of laboratory diagnostic capacity

1.1 Proficiency testing

- National external quality assurance system (NEQAS) coordinated and conducted proficiency testing in four RLDCs for *Brucella* RBT.

1.2 Introduction of new diagnostic technology

a) Serological tests
   - Introduction of ELISA for CCHF
   - Introduction of RAPINA test for Rabies

b) Cell culture facilities established; Acquired CO_2 incubator

c) Bacterial techniques
   - Isolation, identification & Antimicrobial sensitivity testing of *Streptococcus agalactiae*;
   - SOP developed for isolation, identification & Antimicrobial sensitivity testing of *Campylobacter* and *Enterococci*.

d) Parasitological techniques: Tick identification

1.3 Samples analysis

- A total of 6,312 samples were referred or collected by the Centre and performed 12,790 tests to confirm various animal diseases.

1.4 Samples referred to international reference laboratories

- One anthrax soil sample was referred to NIID, Japan. About 35 samples are pending to be referred due to travel restrictions.

1.5 Assistance in the establishment of Molecular diagnostic centre for COVID-19

- Two laboratory personnel; Ms Puspa M Sharma and Ms Kelzang Lhamo were deployed with the equipment to establish the COVID-19 diagnostic centre at the Regional Referral Hospital, Monggar.

1.6 Laboratory Information Management System(LIMS)

Laboratory Information Management System (LIMS) was officially launched on the website. The main aim of the LIMS is to manage information generated for all veterinary laboratory activities in the country.

The main features of the system include entering sample details, track the status of sample submitted, view test results, diagnosis and generate reports as per the requirement.

The system also reduces the usage of the paper and provide fast communication of results as it is online-based.

1.7 Important diseases diagnosed

- Bovine: Fascioliasis, Ascariasis, Streptococcal Mastitis. FMD, Brucella,
- Goats: CCHF
- Swine: Classical swine fever (CSF), Erysipelas
- Equine: Strangles
- Avian: NCD, ALC, Salmonellosis, Mycoplasmosis, IBD, PPMV in pigeon
- Canine: CD, Rabies, Zygomycosis, Dermatophytosis
- Wildlife: PPR in Takin, Pasteurellosis in Takin
- Cheese: *Clostridium* spp.

2. Strengthened Disease Prevention and Control Programme in the country

2.1 Development and/or revision of National Disease Control Plans

The Centre, in coordination with other stakeholders, developed and also revised the following national disease prevention and control plans to guide disease prevention, control, and elimination programme in the country:

- Developed and endorsed the "National Peste des Petits Ruminants Prevention, Control, and Eradication plan (NPPR-PCEP) 2020";
- Revised and developed the "National Influenza Pandemic Preparedness Plan and Standard Operating Procedures (NIPPP & SOPs) 2020";
- Revised, developed, and endorsed new edition of the "National Foot and Mouth Disease Prevention and Control Plan (NFMDPCP) 2020";
- Developed and finalized the animal health's part of the "Strategic Plan for the elimination of dog-mediated human rabies and rabies freedom by 2030";
- Developed and finalized the "National Contingency Plan for African Swine Fever (NCPASF) 2020";
- Developed and finalized the "Generic Animal Disease Outbreak Management System of Bhutan".

2.2 Coordination of major disease outbreak investigations and containment

In coordination with other stakeholders, the Centre responded to rapid containment of following animal disease outbreaks in the country:

- Anthrax
- Brucellosis
- Rabies
- Foot and Mouth Disease
- Infectious Bursal Disease
- Black Quarter
- Classical Swine Fever
- Haemorrhagic Septicemia
- Newcastle Disease
- Strangles

2.3 Strengthened animal disease information system

- Carried out TAD*info*-based data validation of notifiable animal disease outbreaks in the country, and submitted a six-monthly and annual report to the World Organization for Animal Health (OIE) through WAHIS interface;
- Carried out a real-time update of notifiable animal disease outbreaks in the country, on Centre's web page;
- Initiated fortnightly animal disease information sharing in the name of "Fortnightly e-Bulletin: Animal Disease Information of Bhutan, starting from January 2020.
- Following validation and analysis of notifiable diseases reported, the Centre published the "Status of notifiable animal diseases in Bhutan, 2019";
- Management and monitoring of animal health information -- maintained into the Veterinary Information System (VIS) database system - carried out regularly.

2.4 Reduction of incidences of zoonotic and notifiable diseases

There were reported outbreaks of 28 zoonotic and 21 non-zoonotic notifiable animal diseases in the country against the excellent Annual Performance Agreement (APA) target of 31 and 61, respectively, for the FY 2019 – 2020; the Centre was able to achieve the excellent score as per the APA target set for the FY 2019 – 2020, in reducing the number of zoonotic and notifiable disease outbreaks in the country.

3. Strengthened vaccine procurement and distribution

For disease prevention and control programme in the country, the Centre:

- Procured 7,680,540 doses of livestock and poultry vaccines of worth BTN 5.5 M;
- Produced 10730 doses of vaccines locally: 9,530 doses of Classical Swine Fever vaccine (in four batches) and 1,200 doses of Anthrax vaccine.

4. Strengthened Veterinary medicine and equipment procurement and distribution system

- Veterinary medicines of worth BTN 24.47 M was procured for the FY 2019-2020, BTN 3.37 M more than the approved budget; the additional amount was secured by the unit from the Ministry and NDPM flagship Programme;
- Veterinary medicines of worth BTN 24.97M were distributed to Dzongkhags, Central Farms/Agencies and other non-departmental agencies and Projects during the FY 2019-2020;
- Veterinary equipment and non-drug items of worth BTN 1.3M was distributed to Dzongkhags and Central agencies during the FY 2019-2020;
- A comprehensive assessment and verification of the existing stock situation of medicines in LCS, Phuentsholing was carried out;
- Conducted workshop to review and revise strategies for the management of EVDP, and a day later, 12th National Veterinary Medicine Committee (NVMC) Meeting was held to discuss on the follow-up actions to the 11th NVMC meeting and to endorse the revised strategies developed during the technical workshop;
- Fast-tracked tendering for medicines and vaccines for FY 2020-2021 and completed during the FY 2019-2020;
- A sum of BTN 2.98 M was secured through Country Grant Fleming Fund Project to train all the animal health staffs in the country on the use of G2C database.

5. National Dog Population Management and Rabies Control Project (NDPM and RCP)

- During the fiscal year 2019-2020, a total of 8,870 surgeries were carried out both in dogs and cats in the field clinics;
- Through mass dog vaccination programmes, a total of 7,914 dogs (stray and owned) were vaccinated against rabies during the FY 2019 – 2020;
- The Centre, in collaboration with the RLDCs and Dzongkhags, observed the 13th World Rabies Day with the theme "Rabies: Vaccinate to Eliminate "through mass dog vaccination campaigns and advocacy programmes. Events were organized in seven different districts of Bhutan, mainly focusing on rabies-endemic southern and eastern Dzongkhags: Samtse, Chhukha, Dagana, Sarpang, Trongsa, Trashigang, and Samdrup Jongkhar;

- Except for one human rabies case in 2016, no dog-mediated human rabies cases were reported since 2013. Therefore, Bhutan is well-on-track for achieving the global target of Zero-by-30, that is, freedom from canine-mediated human rabies by 2030.

6. Disease surveillance and animal health researches

- A retrospective study on mortality of pigs at the Regional Pig Breeding Centre (RPBC), Yusipang
- Health Screening of Animals at National Jersey Breeding Centre with urine parameters
- Laboratory analysis of Dog faecal samples & Scats from Yak rearing areas
- Survey on Yak health and management practices in highland Dzongkhags
- Disease screening of yak bulls to be exported to Nepal and Sikkim

7. One Health activities

The Centre coordinated several one-health activities in the country:

- Participated in response to COVID-19 pandemic in Bhutan through collaborative one-health approach;
- Coordinated development and incorporation of the public health part of National Influenza Pandemic Preparedness Plan and Standard Operation Procedures;
- Coordinated development of Strategic Plan for the elimination of dog-mediated human rabies by 2030.

8. Capacity building

The Centre conducted some training/workshops to enhance the skills and expertise of the laboratory and animal health staffs in the country during the FY 2019-2020:

- Training of Trainers on Dog Population Management and Mass Dog Vaccination Apps and Community Engagement;
- Training-workshop on tick identification using morphological keys;
- Master Trainer's Training on the use of G2C database;
- Refresher Training on Laboratory Biosafety & Biosecurity.

9. Infrastructure development

Besides routine activities, the Centre carried out:

- Construction and Installation of Reverse Osmosis Water Plant through Fleming Fund Country Grant
- Construction of retaining wall at RO Water Plant site
- Construction of two numbers of biological and non-biological pits
- Procurement of two numbers of double-layered water tank (5000 Litres)

10. Financial achievement

The Centre utilized 98.85 per cent (40.07M) of the total approved budget of 40.538M during the FY 2019-2020.

8. National Research and Development Centre for Animal Nutrition, Bumthang (NRDCAN)

Major Achievements (2019-2020)

Fodder germplasm production

Inputs such as fodder seeds, slips and seedlings are crucial for pasture and forage development for livestock. In 2019-2020, the NRDCAN produced 29.62 MT of pasture seeds (temperate and subtropical), 114.20 MT of oats, 45 tons of fodder maize and 7.43 tons of Tall fescue (**Table 18**). The fodder seeds were produced by the farmers (fodder seed growers) of Bumthang, Mongar, Pemagatshel, Samtse and Sarpang. About **325 farmers** are involved in fodder seed production and they earned about **Nu. 9.86 M in** 2019-2020 from the sale of fodder seeds.

Table 18. Fodder seeds produced, supplied and income generated

Activity	Achievement	Remarks (Income)
Fodder seed production (temperate and subtropical)	29.62 MT	Nu. 4.26 M
Oats (winter fodder)	114.20 MT	Nu.3.08 M
Fodder Maize (winter fodder)	45 MT	Nu.1.04 M
Tall Fescue (Lawn grass)	7.42 MT	Nu. 1.48 M
Income generation by farmers through seed production	***196.24 MT***	***Nu. 9.86 M***

1. Fodder germplasm development at Saleng, Mongar

Apart from developing pasture and fodder through seeds, forage is also developed through plantations of slips and seedlings. This is the one of the fastest methods of fodder propagation. Fodder germplasm banks are essential to supply fodder slips and cuttings. In 2019-2020, the NRDCAN developed 6.2 acres of fodder germplasm at Saleng, Mongar. The species of fodder planted were Napier (Pakchong), Glyricidia, Paspalum, and Ruzi.

Figure 27: Paspalum field at Sarpang and Animal Nutrition laboratory, NRDCAN, Bumthang

The germplasm bank shall produce and maintain the above species for fodder development among the livestock farmers in the east. The farmer would also make a good income from the sale of

fodder. The plantation was funded by Global Environment Fund for the Least Development Countries Facility (GEF-LDCF).

2. Assessment of Feed Quality

The animal nutrition laboratory plays a crucial role in providing laboratory services by testing the feeds and forage for nutrients and other parameters related to animal nutrition. This is essential for formulating different rations for livestock and poultry and maintaining the quality of animal feeds for optimum production. In 2019-2020, about of 446 feed samples were tested for different parameters related to feed quality. More than 58 feed samples were sent to TUV South Asia laboratory in India to test for essential amino acids namely Lysine and Methionine that determines the quality of pig, poultry and turkey feeds. Besides, on-call sampling of animal feeds were also done for testing of mycotoxin in the feed.

3. Improved pasture development and fodder plantations

Ensuring year round availability of quality feed and forage is the key to successful livestock production. Pasture development and fodder plantations were some of the major activities promoted by the Bumthang in collaboration with the RLDCs and Dzongkhags. In 2019-2020, the centre supported development of 1480 acres of improved pasture (**Table 19**)

Table 19. Details of improved pasture development

Sl #	Pasture type	Area (Acres)	Species
1	Temperate	520	GM
2	Subtropical	795.17	Ruzi
3	Subtropical	154	Paspalum
4	Subtropical	10.83	Molases
	Total	**1480**	

The total improved pasture stands at 20889 acres

Figure 28: Pasture field at Jambaylhakhang, and Wobthang, Tang, Bumthang

4. Fodder tree plantation at Langthel, Nubi, Trongsa and Phobjikha, Wangdue

Fodder trees are good source of forage for cattle in the lean season. They can be preserved as silage or dried and powdered for storage. In 2019-2020, the centre in collaboration with Dzongkhag Livestock sectors of Trongsa and Wangdue carried out Willow *(Salix babylonica)* plantations at Bemjee, Simphu, lower Nubi (Trongsa) and Phobjikha (Wangdue). The plantation covered more than 56.5 acres of private land. Further about 14 acres of Ficus were also planted at Namthar, Langthel, Trongsa. The activity was funded by GEF-LDCF.

Figure 29: Willow and Ficus seedling distribution, Nubi and Langthel, Trongsa

5. Legume forage plantation and pasture development at Shingkhar, Zhemgang

The activity was implemented jointly by the centre, Bumthang and the RLDC, Zhemgang at Thrisa, Shingkhar and Wamling in Zhemgang. The activities included plantation of *Glyricidia and Luceana* fodder trees and *Ruzi, paspalum*

and Stylo pastures in 28.4 acres of private land. The beneficiaries had formed a youth group in 2018-2019 and had started dairy farming at individual levels. Other activities included trainings on legume forage production and supply of fencing materials. The plantation was expected to increase the forage resources for livestock to boost milk production. The activity was funded by GEF-LDCF.

Figure 30: Glyricidia (legume fodder tree) plantation

6. Pasture development and pasture fencing at Chumey, Tang, Ura (Bumthang) and Menbi, Lhuentse

The centre supported development of three (3) acres of subtropical pasture (Ruzi) for a dairy farm at Phagidung, Menbi, Lhuentse. Further, the centre also supported fencing of 18 acres of improved pasture through GEF-LDCF in the same gewog. This has increased the forage availability for the farm and the farmers for enhanced milk production. Again under GEF-LDCF funding, the centre developed about 113 acres of improved pasture at Tang and Ura and supported 105 acres of E-fencing of pasture.

The centre through GEF-LDCF had been able to bring about 242.3 acres of land under improved pasture, fodder and fodder trees plantations in 2019-2020. The activities were implemented with the support from RLDCs and Dzongkhags. Some activities were cost-shared between the project and the beneficiaries. The NRDCAN acknowledges the support of the project management and the implementing partners in the field.

7. Pasture development at Ramthangka, Paro

About 3.4 acres of temperate pasture were developed through Rural Development and Climate Change Response Project (EU-RDCCRP) at Ramthangka, Paro. The improved pasture was meant for the native cattle farm. The fencing of the pasture was co-funded by GEF-LDCF.

Figure 31: Land preparation, seed sowing and fencing of pasture, Ramthangka

8. Winter fodder development

Figure 32: Oat field at Bapzur, Tang, Bumthang

Livestock in high altitude areas experience feed shortage from mid-February to mid-April. However, livestock farmers had been promoting annual fodder crops such as fodder maize and oats for feeding their livestock in winter. There is an increased cultivation of oats and maize for feeding the livestock in winter. In 2019-2020, NRDCAN had supported about 1,279 acres of maize and 3,240 acres of oat as winter feed for livestock. Oats are cultivated as green forage while maize is ensiled. In Government livestock farms, oats and forage maize are ensiled for winter feeding. All (20) Dzongkhags had cultivated oats while 10 Dzongkhags had also produced forage maize for feeding their livestock in winter.

9. Fodder conservation

Figure 33: Organic barley field, Phomrong, Bumthang

Fodder conservation is crucial for feeding the livestock in winter. Forages are popularly conserved in form of Hay and silage while crop residue enrichment (straw and stover) is widely practiced in the six eastern dzongkhags. Excess grass is made into hay while silage is made of green grass, maize, oats and willow. The details fodder conservation activities in 2019-2020 are given the (**Table 20).** About 2,972 MT of hay and 6,849 MT of silage were produced. However, more

than 260,339 MT of crop residue (stover and straw enrichment) were produced for feeding the livestock during winter.

Table 20. Details of fodder conservation in 2019-2020

Institution	Hay (MT)	Silage (MT)	Crop Residue enrichment (MT)
Government farms	700	1860	40
Private farms and farmers	2272	4989	260299
Total	**2972**	**6849**	**260339**

Organic feed production

The centre had been entrusted the responsibility of organic feed production for livestock particularly (organic trout feed). Organic feed production requires organic raw materials (ingredients) and for trout feed wheat, barley and soya bean are three major ingredients. Therefore, the centre had initiated 35 acres of organic barley production at Chumey and Tang, 14 acres of Soybean at Samcholing (Trongsa) and Sisty, Gakidling (Sarpang) in consultation with the farmers. The barley and soybean grains will be used for producing organic fish (trout) and other livestock (cattle and poultry) feeds.

10. Establishment of Feed Mill at Chokhor, Bumthnag

Figure 34: Feed mill at Thangbi, Chokhor, Bumthang

A medium scale feed plant was established at the livestock extension centre, Thangbi, Choekhor in Bumthang. The feed mill (3-4 ton per hour) was setup by the centre with the fund from Small Development Project GoI. The activity was the initiated by the Dzongkhag Livestock Sector, Bumthang. The feed mill shall produce cattle and poultry feed (mash) and is expected to enhance the livestock productivity. This shall also encourage domestic production of raw materials (cereal grains – maize and barley; legumes –soybean, stylo, Glyricidia; others - willow leaf meal).
Since the feed plant has the capacity of producing more than 32 tons of feed, it can supply the animal feeds to other Dzongkhags.

11. Lucerne and willow supplement meal production

The centre had initiated several forage enterprises which helped farmers earn income. Currently, there are seven (7) farmers groups consisting of 325 households producing fodder seeds and one forage producers' group (Yangchenphu, Sarpang) taking up commercial green forage production. In 2019-2020, the centre successfully processed Lucerne meal or supplement (crumbs/powder) and subsequently a feeding trial was

Figure 35: Hon'ble Lyonpo's visit to NRDCAN, Jakar

Figure 36: Different types of leaf meals

Conducted to access the at the milk production. The findings indicated increased milk production among the milking cows on supplementation of these meals. Similarly, willow leaf meal or supplements was also processed at Bumthang while Glyricidia and Stylo forage meals were produced in Sarpang. These will be promoted as forage enterprises and they will be used as protein source in manufacturing cattle feed, TMR (Total Mixed Ration) and in feeding the animals directly.

12. Commercial Green Forage production

Since its inception in 2015, Yangchenphu Forage production group in Dekiling Sarpang had been producing green forages for sale outside Sarpang. The group annually produces more than 180 MT green silage from forage maize, Napier (Pakchong) and Paspalum. They have also initiated the production of legume forage supplement meal from Glyricidia and Stylo. The group had conducted Glyricidia plantation and set up a drying and processing shed at Yangchenphu, Dekiling, Sarpang.

Figure 37: Napier silage production at Yangchenphu, Sarpang

3. Regional Livestock Development Centre (RLDC's)

3.1 Regional Livestock Development Centre Tsimasham, Chhukha

Major achievements 2019-2020

Animal Health Section:

Status of notifiable animal disease outbreaks in the western region:

A total of 24 notifiable animal disease outbreaks were reported from July 2019 to June 2020 in the five western region Dzongkhags (Chhukha, Paro, Samtse, Haa and Thimphu). About 12 rabies outbreaks were reported in Chhukha and Samtse Dzongkhag. In every outbreaks 2-3 canine cases with spillover cases in bovine due to exposure to rabid dogs. Four FMD outbreaks were reported, three in Samste and one in Paro Dzongkhags. An average of ten animals was infected in single FMD outbreaks. From December 2019 to March 2020, four separate strangles outbreaks were reported in equine. Strangles outbreaks in Paro has recorded the highest number of cases, about 200 sick horse with two mortality. A suspected black quarter in bovine was reported from Bjabcho Chhukha Dzongkhag and two suspected classical swine fever cases reported from Samtse and Chhukha Dzongkhags. An anthrax case was reported in youth farm at Kana under Eusu *Gewog*, Haa.

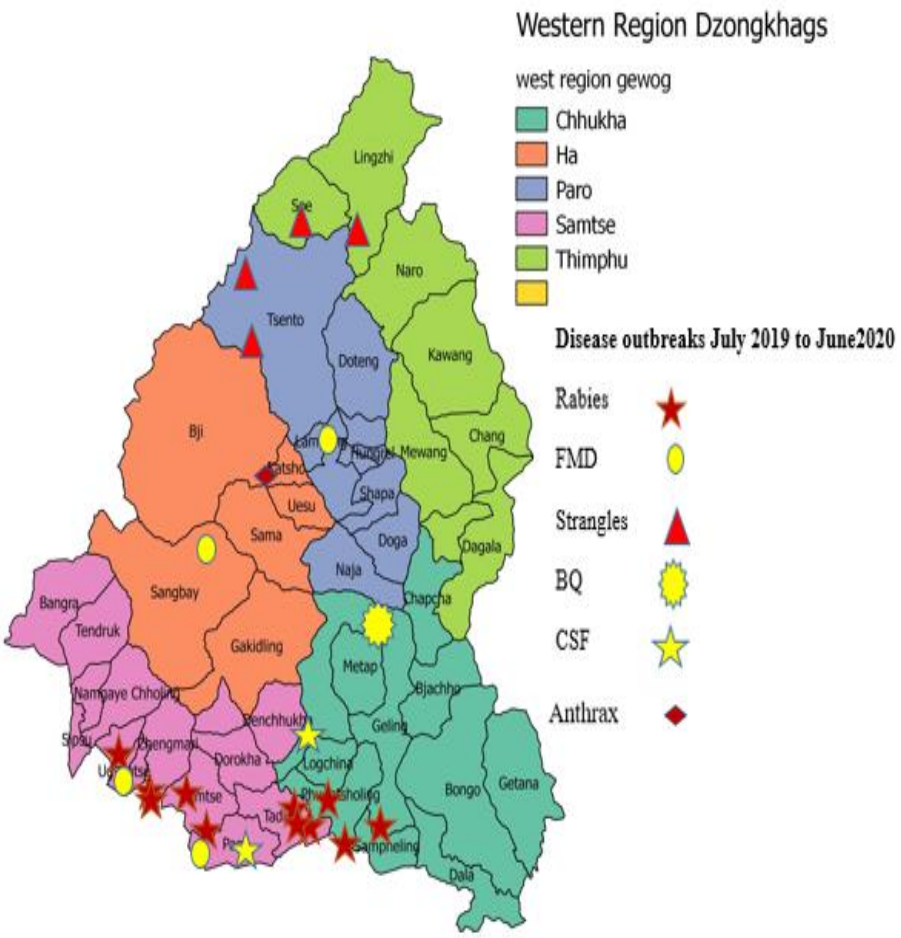


Figure 38: Disease outbreaks were reported from July 2019 to June 2020

Foot and Mouth Disease Prevention and Control in the Western Region

A total of 40323 animals were vaccinated against FMD in western Dzongkhags. This includes both local and crossbreeds of cattle, goat, pig and sheep species. The coverage percentage is less than 80% in the region as per the animal population. This is due to the fact that biannual FMD vaccination was not coordinated towards interior villages like Getena, Mitekha under Chhukha and in few other Dzongkhags. The biannual FMD vaccination was coordinated in all the high-risk zones. FMD biannual vaccination coverage is less than the previous year.

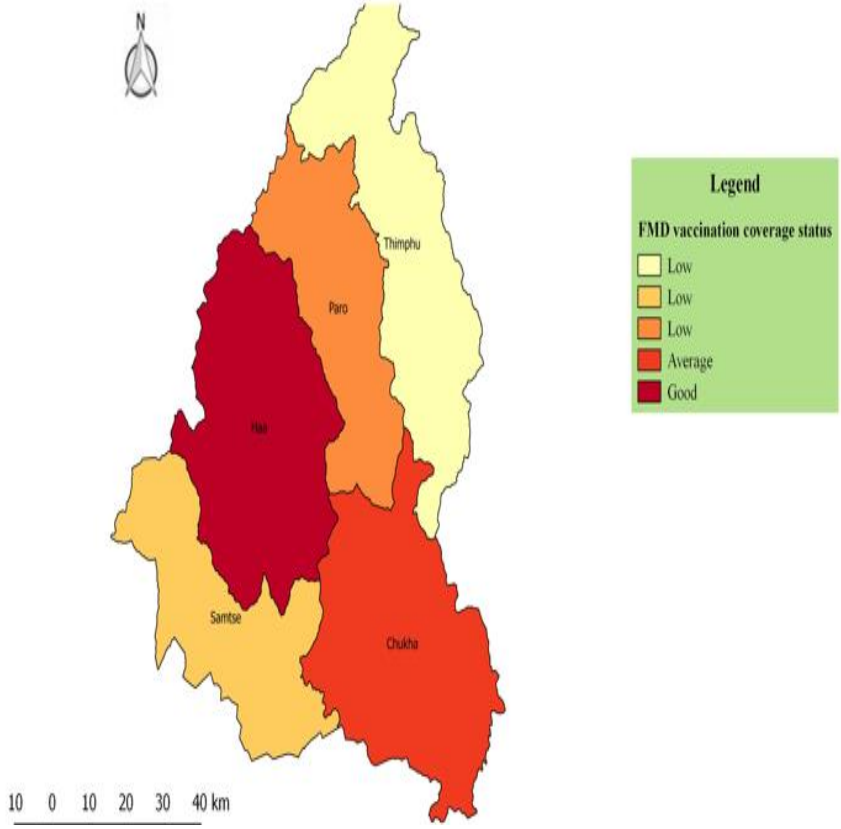


Figure 39: FMD vaccination coverage status

Rabies Prevention and Control in the Western Region

The 13th World Rabies Day was observed in Samtse and Chhukha Dzongkhags in the western region. A total of 1023 dogs were vaccinated in Chhukha (205) and Samtse (818). About 500 students/parents have attended the talk on rabies in Samtse. The talk and video on rabies were organised during the schools' culture show at Samtse Higher Secondary School. Five anti-rabies vaccination points were designated in Phuentsholing & Pasakha and 16 vaccination points in Samtse. The 13th World Rabies Day was jointly organized by RLDC Tsimasham and Dzognkhag livestock sector Chhukha and Samtse.

Following the major rabies outbreaks in stray dogs and cattle in Phuentsholing and Samphelling Gewog, Chhukha Dzongkhag, the mass anti-rabies vaccination was coordinated in all high-risk villages to created immunity belt. A total of four confirmed sporadic rabies cases were reported and about 105 peoples were directly and indirectly exposed to rabid animals. All control measures are successfully implemented as per national rabies prevention control plan 2017. Mass rabies vaccination is part of preventive measures to carryout zoom-in vaccination towards outbreak areas from the periphery. A total of 1216 dogs were vaccinated, out of which 592 dogs in Samphelling and 624 dogs in Phuentsholing. From 1216 dogs, about 539 dogs are male and 677 female. As per mass vaccination data, only 403 dogs were sterilized and 813 not sterilized. About 76 cats were also vaccinated. In 2019-20, about 2500 dogs including pet animals and stray dogs were vaccinated in Chhukha and Samtse Dzongkhags.

Essential Veterinary Drug Program in Western Region

The Centre monitors and effectively supports the essential veterinary medicine programs in all 57 animal health centres in western regional Dzongkhags including National centres, regional, Thromde, district veterinary hospitals, RNR-EC/, livestock extension centres and central farms. The Essential Veterinary Drug Program (EVDP) was initiated that the regular effort in making the availability of essential veterinary drugs at all times in the animal health centres (RNRs, LECs and DVHs) and farms. The availability of veterinary drugs/medicines and items in all animal health centres need to be managed to meet the basic requirement in line with the Drug Regulatory Authority and medicine act of Bhutan. The RLDC monitors and regulate at DVHs, farms and central agencies level whereas Dzongkhag EVDP focal person (veterinary officers) monitors the RNR-EC/LEC level. The centre has visited 18 animal health centres in 2019-20 including few random RNR-ECs. All the EVDP findings were shared for compliance centres for correction as per DRA standing rules and regulation.

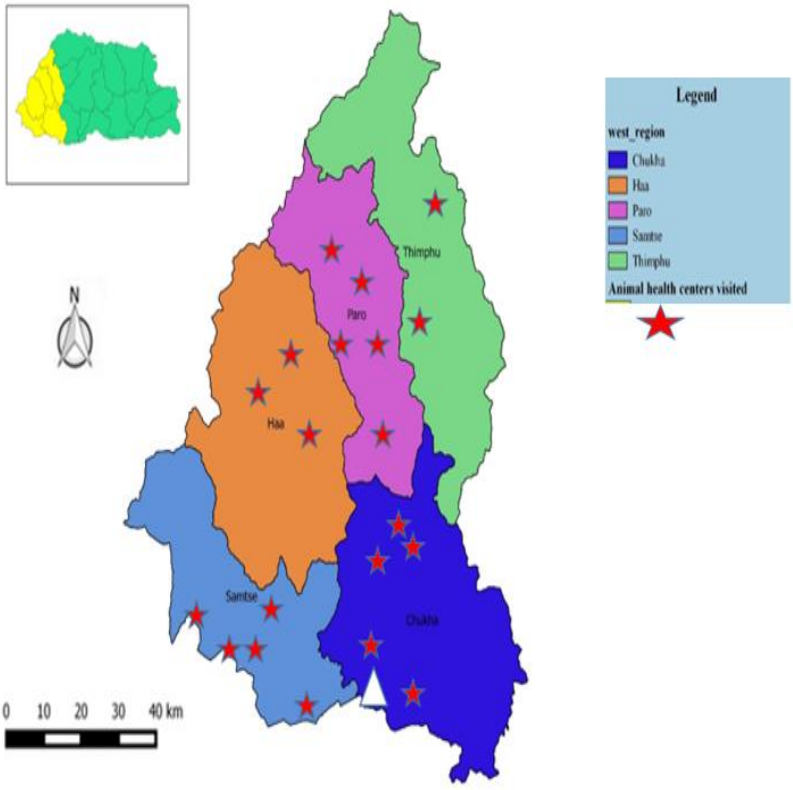


Figure 40: Animal Health Centers monitored

Dog Population Survey in Paro and Haa Dzongkhag

In Haa Dzongkhag, a total of 2236 dogs were sighted during the survey, 52% are un-owned and 48% are owned dogs. The past sterilization and vaccination coverage in Dzongkhag is only 46%. In Paro Dzongkhag, a total of 8218 dogs sighted during the survey out of which 49.2% dogs are owned and 50.8% are un-owned.

The detection probability is estimated by using capture-mark-recapture survey and indicated that 25% of dogs will be missed during the survey. 25% missing proportion is added to total sighted. Therefore, Haa Dzongkhag has an estimated size of 2795 dogs and Paro Dzongkhag with 10,272 dogs. This estimated size indicates dog to the human ratio of 1:4 and 1:1.05 for a dog: households, the density of dog sighted in both the Dzongkhag is high.

Sustainable Dog Population Management Program in Haa Dzongkhag

Table 21: Dog population management in Haa Dzongkhag

Gewog	Target (as nos. per survey)	Achievement (no.of dogs sterilized)	% coverage
Bji	339	328	96.75%
Katsho	353	331	93.77%
Eusu	292	247	84.59%
Samar	223	203	91.03%
Total	**1207**	**1109**	**92%**

A successful DPM model was implemented in Haa Dzongkhag with coverage of 92% in the upper four gewogs. The remaining 8% are lactating females, puppies and migrated dogs towards highland areas which will be covered by DVH Haa in July to August month. About 635 individual dogs adoption was promoted in four gewogs and Haa Dzongkhag is first to achieve the individual adoption more than 50% of sterilized dogs.

The sustainable dog population management program in Haa Dzongkhag will be observed as an event for coming up 6th Royal Bhutan Flower exhibition. The centre has led the program in collaboration with Dzongkhag and achieved 100% dog sterilization and 50% dog adoption. The campaign was supported by EURDCP and Stray Dog Flagship Program, DoL Thimphu.

Review of GID Prevalence in Western Region Dzongkhags

The centre has reviewed the GID prevalence and reviewed the highland activity with a questionnaire survey in Paro and Haa Dzongkhags on GID & its associated risk factors in 37 yak herders households in Nubri and Yaktsa, Tsento Gewog. The GID disease prevalence rate is 7% in Paro and Haa Dzongkhag. The associated risk factors for transmission of Gid disease were evaluated among yak herders.

Breeding Activities:

AI and LN2 Progresses in the Region

Supply of breeding inputs

The supply chain of the LN2 and other AI inputs have been consistent in the Western region, in every 45 days cyclic chain of supply. Along with the chain of events of the activities like checking the frozen straws, timely is the main task, RLDC, is carrying out.

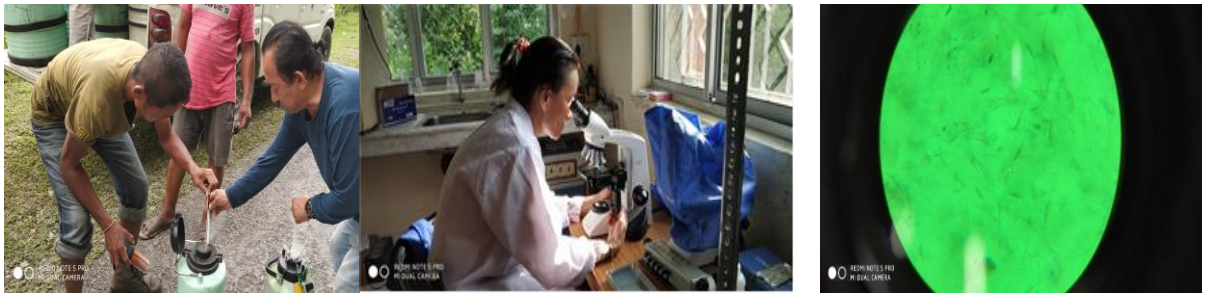
Table 22: Dzongkhag wise LN2 supplies

Dzongkhag	LN2 Supplied (Lts)	Sheath (nos)	Gloves (nos)	Local Semen (doses)	Imported Jersey Semen	Sex Sorted Semen (doses)	HF Semens (doses)
Chukha	2726	16	12	296	324	100	199
Samtse	4843	24	19	566	255	100	67
Haa	545	4	3	50	27	50	
Paro	2680	17	10	225	437	100	14
Thimphu	1676	14	16	60	160	100	
Total	**12470**	**75**	**60**	**1197**	**1203**	**450**	**280**

Table 23: AI performances (2018-20)

Dzongkhag	AI done (nos)	Progeny born (nos)	Repeat breeder (nos)	CR (%)	RB (%)
Haa	212	56	25	26.41509	11.79245
Paro	1326	434	29	32.73002	2.187029
Chukha	941	290	148	30.81828	15.72795
Thimphu	837	457	0	54.59976	0
Samste	1294	394	68	30.44822	5.255023
	4610	**1631**	**270**	**175.0114**	**34.96245**
Average CR%	35.37961				
Average RB%	5.856832972				

The performances of 41 AI centres in the western region has been fair, as some of the AI centres need to be closed or revived. In the study, it is found that the progeny born recording is the main obstacle that has brought down the conception rate in the field.



Transfer of semen in the field Examination of Frozen Semen Live semen in the slide

Figure 41: AI services provided

Post-Production:
Determine Cost of Production of Five Livestock Commodities in Western Region

Determination of cost of production for the five major livestock commodities (Milk, Egg, Chicken, Pork and Chevon) was undertaken by Post-Production and Marketing Section of centre during the

financial year 2019–2020 in the western Dzongkhags. The study was undertaken to determine the farm-level cost of production, identify underlying drivers of production cost, and to recommend strategies for reducing cost and promote competitiveness in the production of these commodities. The study was carried out in 19 gewogs of five dzongkhags (Chhukha, Haa, Paro, Samtse and Thimphu). Samples of different category of farms (backyard, semi-commercial and commercial) were selected in close consultation with dzongkhag and gewog livestock offices. Subsequently, samples were selected applying random sampling techniques from the target population in the respective areas. Primary data was collected executing well prepared and pre-tested questionnaire schedule of enquiry applying face to face interview technique with the farmers. Secondary data were collected/extracted from the data maintained by gewog livestock offices and farmers group. Data was analyzed in tabular form using micro-soft excel function and SPSS version 23.

Pork Production in Western Region

The data on pork production was collected through semi-structured household interviews in pork producing gewogs of Chukha Dzongkhag and data from the Livestock Statistics of the Department of Livestock for five western Dzongkhags. The findings indicate that Samtse is the highest pork-producing Dzongkhag in the region which produced 77.99 MT followed by Chukha 69.33 MT, Paro 34.39 MT, Thimphu 21.77 MT and Haa 4.68 MT respectively in 2018 the increased in pork produced attributed to timely supply of inputs and subsidy support by Dzongkhag and Geog livestock sector.

Adulteration of milk and milk products from local vendors along Thimphu-Phuntsholing highway

Milk is not only an essential commodity in daily life but also a good source of protein, calcium and riboflavin. It is the most commercially sold commodity both by local vendors as well as dairy sales outlets in the country. However, to increase the yield, certain adulterants are added which affects the nutritional quality of milk and dairy products. Hence, the present activity was carried out to assess the adulteration in milk and dairy products (cheese and butter) sold in dairy sales outlets in Phuntsholing town and by the roadside vendors along Thimphu-Phuntsholing high way. 21 milk samples were tested for the presence of adulterants such as urea, salt, sugar, formaldehyde, starch and detergent. 30 cheese and 26 butter samples were tested for the presence of starch compounds and vanaspati respectively. The study indicated that milk and cheese sold by the sales outlets and vendors were free of adulterants, however, the presence of adulterant in butter with vanaspati was 3.8%.

Animal Nutrition Section:

Testing of Total Mixed Ration for Acceptability, Palatability and Productivity under Farmers' Conditions

The Total Mixed Ration (TMR) is the most widely adopted method for feeding high producing, indoor-housed dairy cows to achieve maximum performance. It was first introduced in Bhutan in 2015 through the initiative of RLDC Tsimasham covering more than 1000 dairy farmers till 2019. The test results at Tsaluna with six farms and 18 milking cows showed that TMR was

highly acceptable and palatable (80%). The milk yields of six farms increased (2-125%) significantly during the TMR feeding as compared to pre TMR feeding with Karma Feeds. All paired (3 pairs) samples T-Test were strongly and positively correlated ($r = 0.883$, $p < 0.020$, ($r = 0.936$, $p < 0.006$, and $r = 0.854$, $p < 0.030$. An average difference between pairs were significant ($t6 = -3.000$, $p > 0.03$, $t6 = 5.482$, $p > 0.003$, and $t6 = -1.348$, $p > 0.236$). On average, TMR-Post TMR yields were 1.99 litres more than Pre TMR-TMR and PreTMR-PostTMR yields (95% CI [1.059, 2.93]). Findings of Wachirapakorn et al (1997) was also similar to the TMR test results as that of Tsaluna. On-farm testing of TMR for acceptability, palatability and productivity at Tsaluna was a success.

Economic Benefits of Manure from Livestock Rearing

The study on the monetary benefits of manure was based purely on desktop research. The rationale behind this study was that there was inadequate information documentation on livestock manure production and its economic benefits in terms of monetary value and its contribution to GDP in Bhutan. Therefore, the objectives of the study were tuned to understand the economic benefits of manure and document the findings more for the benefits of the planners and policymakers. The findings show that annual manure production from the total livestock population comprising of different species and poultry in 2018 was 2420,595MT. If converted in monetary term, from the sale of 2420,595MT of manure at the rate Nu 0.5/Kg, revenue worth of Nu 1210.3 million could be generated in 2018. Similarly, 2420,595MT of manure could have produced 14694.7MT of Nitrogen, 5245.1MT of Phosphorus and 12305.7MT of Potassium generating revenue worth of 1254.17 million. Manure contributes close to a percent of GDP growth to the livestock sector.

This study provides only the basic information as an eye-opener to planners and policy-makers with an emphasis that manure is an essential commodity with huge potential of contributing in millions comparable to any income-generating agricultural or livestock commodity, and should not be left out. Furthermore, this study also opens avenues for future researches to be undertaken under the Bhutanese context to authenticate existing findings and generate reliable data and information.

Thromde Veterinary Hospital and Satellite Laboratory Phuntsholing:

The financial year 2019 - 20 had been a successful and a busy year for Thromdey Veterinary Hospital & Satellite Laboratory (TVH & SL), Phuntsholing. The clinical section of the unit attended to 9926 OPD cases, did 3218 de-worming, 1201 vaccinations and sterilized 1143 dogs and cats as an initiative to combat the increasing population of dogs and cats. The laboratory section of TVH & SL collected 1714 numbers of samples and conducted 2002 tests in the FY 2019-2020. A total of 9 rabies suspected outbreaks were attended during the last one year period.

A total of 570 dogs and cats were sterilized and vaccinated in Jaigaon and Phuntsholing during a month-long Community Animal Birth Control (CABC) program. A total of 41.57% coverage was recorded from Jaigaon and 58.42 % coverage was recorded from Phuntsholing and periphery areas in this program. As per the indicator count method which was done after the end of the program to assess the success of the program, the overall coverage rate was shown at 74.34% indicating good coverage. Such campaigns will be organized annually; Thromde Veterinary Hospital will lead the program with the support from RLDC, Tsimasham.

A descriptive analysis was carried out to understand the demography of canine distemper affected dogs that were TVH & SL, Phuentsholing in the financial year 2019-2020. The diagnosis was based on the typical clinical signs exhibited by the dog presented to the clinic and by rapid CDV antigen test kit. In total, 148 dogs diagnosed by clinical signs or by field CDV rapid test were included in this study. This study shows that CD is prevalent across all the age groups of dogs and is equally reported in males and females. Besides, the study shows that vaccination remains the principal strategy for protection, and once clinical signs develop, treatment is limited to supportive care. This is also because 68.9 % of dogs affected were from the local dogs which could have been un-vaccinated.

Review on the animal health progress in the western region was carried out to provide an overview of the burden of clinical cases treatments during the year 2019-2020. The review also compares clinical caseload in different Dzongkhags by their nature.

For this review, clinical cases are instances/count of all animal treatments registered in the clinical treatment registers of geog centres entered as "Clinical Cases" in the reporting section of VIS.

The unit also conducted a study on the seasonal trend of ectoparasitic infection in dogs. For this, 221 dogs that lived in urban areas were inspected for ectoparasites during the usual outpatient department referral at TVH. The ectoparasite prevalence was 45.7% (N=221) and 3 types were identified: Sarcoptes, Psoroptes and 1 fungal infestation. On the other hand, ectoparasites were more frequently diagnosed in warm seasons (spring + summer) than in cold seasons (autumn + winter) although the difference with the cold seasons was not significant, the parasite frequency per dog tended also to increase in spring and summer.

3.2 Regional Livestock Development Centre,Wangdue

Major achievements 2019-2020

Table 24: Intervention under Animal Health Services

Programs	Activities	Outcomes
Laboratory and clinical services	Collection, processing, testing and dissemination of results to 5 Dzongkhags by Haematology, parasitology, bacteriology, serology and virology units.	Collected and tested 3070 samples from 5 Dzongkhags. Referred 165 samples to the national lab. Attended 81 referral cases.
Seroprevalence of *Babesiabigemina* in cattle in various agro-ecological zones of the region	Sampling of 445 indigenous and crossbred cattle. Serum antibodies against *B.bigemina* estimation using indirect ELISA	*Rhipicephalus (Boophilus) microplus* most common ixodid tick species in all AEZs. 86% of the cattle sero-positive for *B.bigemina*.

Detection and control of notifiable diseases.	Disease investigation, implementation of prevention and control measures Anthrax, BQ, CSF, Rabies, FMD and PPR	Investigated, detected and contained 8 outbreaks of 7 notifiable types of diseases.
Identification of ticks and production of pictorial keys to identification.	Tick sample collection, processing and identification from five AEZ of west central region.	Developed a pictorial key for identification of adult Ixodid ticks of cattle in the five agro-ecological zones of the west-central region.
SOPs for veterinary clinical services in the DVHs in the West-central region	Visit and assessment of implementation of SoPs in 5 DVHs in the region	Findings intimated to DoL/NVH.
Assessment of CAPA recommended by DRA, as prescribed in the Bhutan Medicine Rules and Regulation 2012	Visit and assessment of 14 livestock centres in Dagana and GasaDzongkhags. Supply of equipment to dzongkhags.	Supplied with21 signboards ;Dagana (n=15), Gasa (n=5) and PunakhaDzongkhags (n=1) All the livestock centres in the region now have centre signboard inscribed in both Dzongkha and English.
Vaccination against notifiable diseases in the region	Support to 15 geogs in the region for annual FMD vaccination.	On an average, the vaccination coverage in the geogs supported were 80%.
Assess cold chain for storage and transport of vaccines in the West-central region	Visit to 55 centres and their cold chain equipment and management assessment.	Set of findings and recommendations intimated to DoL/ DVEU
Clinical on-field trial on papillomatous warts on cattle in Wangdue	Clinical trial at WangdueDzongkhag	SOP on treatment of wart cases developed
Endoparasite survey in poultry birds/ wild birds/ water fowls in the region.	Faecal samples collection and analysis from 5 dzongkhags	Findings circulated to dzongkhags.

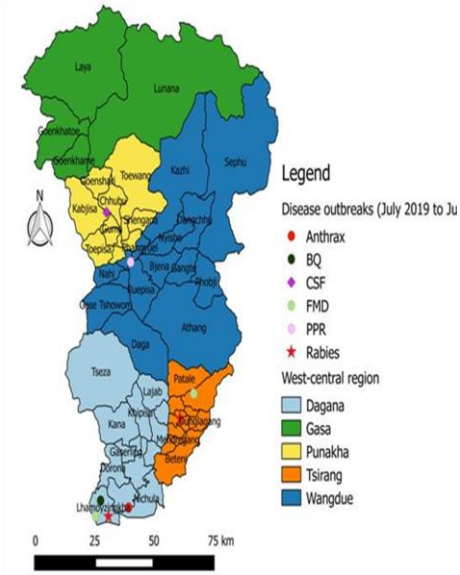


Figure 42: Disease outbreak in west-central region

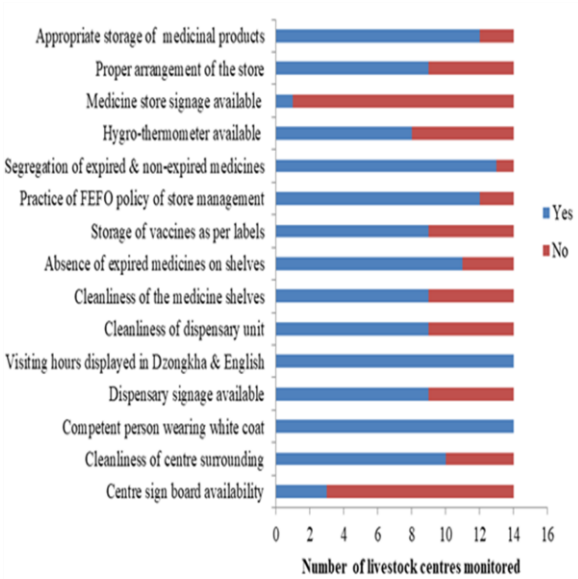


Figure 43: Findings from CAPA assessment

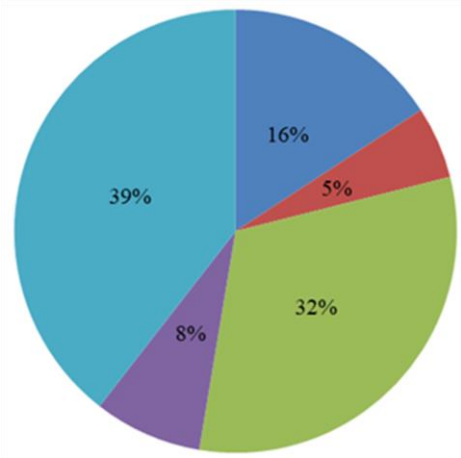


Figure 44: Dzongkhag wise percentage of WHO prequalified cold boxes and vaccine carriers

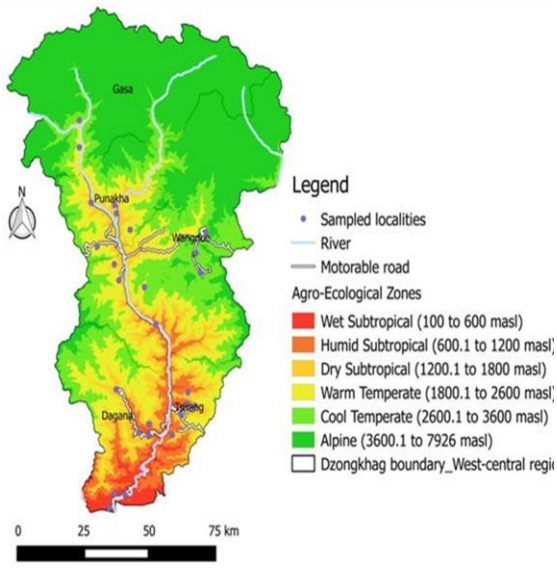


Figure 45: AEZs in the region for tick sampling localities

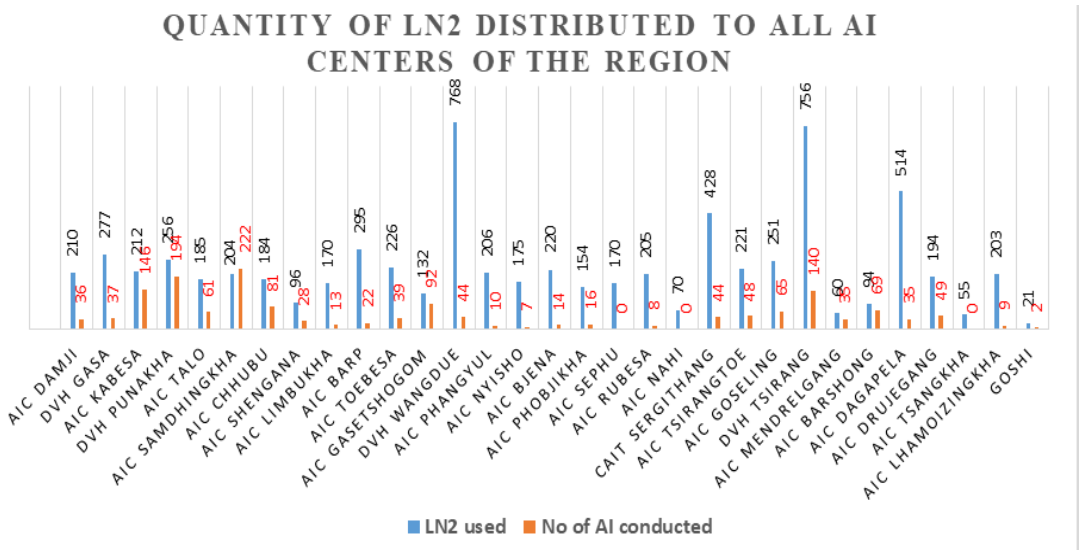


Figure 46: Quantity of LN2 distributed to AI centres of West central Region

LN_2 procurement and supply

Standard processing guidelines

Goat farming manual

Figure 47: Procurement and documents published

Table 25: Interventions under Animal Nutrition Services

Programs	Activities	Outcomes
Promotion and production of TMR	Training of DFG members.	67 DFG members trained on TMR.
	Facilitation for production of TMR for DFGs	3.5 MT TMR produced.
	Assessment of TMR as dairy feed.	TMR Feeding trial conducted on 7 milking cows.
Legume Forage Production	Establishment of 2 acres of lucerne production plot at Bjena.	1.96 MT lucerne forage produced from the two harvests.
	2 harvests.	
Multi location Azolla trial and promotion	Azolla trial at RLDC.	Azolla cultivation taken up by 41 farmers in the region.
	Awareness and sensitization on importance of Azolla to 95 farmers in 4 DFGs of Dagana, Punakha and Tsirang	
Feed block production for highlanders at ShaNgawang	Training on feed block production.	Produced 0.5 MT of feed blocks.
	Feed block ingredient procurement, processing and production at Kabje.	Supplied feed blocks to 53 farmers of Sephu and 10 farmers of Laya.
Biogas plant maintenance and monitoring	Visit, repair and identification faulty parts for supply in the gewogs.	Visited 38 plants in 4 dzongkhags.
		Repaired 2 plants
		Procured and supplied plant parts for 16 defunct plants.

Figure 48: Legume forage production and Azolla trial promotion

Azolla promotion at Punakha

TMR production at Tsirang

Figure 49: Azolla trial at Punakha and TMR production at Tsirang

Table 26: Intervention under Administrative and Support Services

Programs	**Activities**	**Outcomes**
Construction of LN_2 store.	Designing, estimation and construction of LN_2 storage house.	Two room, LN_2 store house completed at the cost of Nu. 1.2 M.
Development of database	Collection of data, designing and testing of databases for cold chain equipment and temperature monitoring log.	Two databases designed and launched -Temperature monitoring log -Cold chain repository.
Conduct of Animal Shows in 4th Royal Highland Festival	Coordination and conduct of animals shows. Production of judging booklets and	One customized judging manual produced Animal shows for 5 categories of animals conducted.
Resource for training highlanders on GIS	Designing and development of training manual customized to highlanders Resource for training.	Produced 45 copies of training manual. Trained 41 staff of 11 highland dzongkhags.

Switch Board of cold-chain repository database

Customized GIS training manual for highlanders

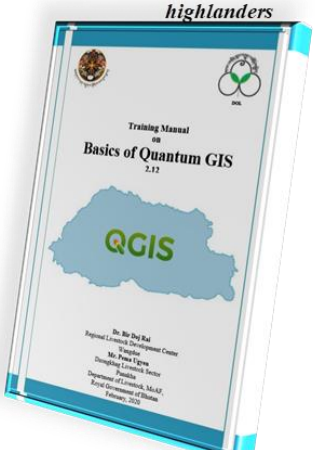
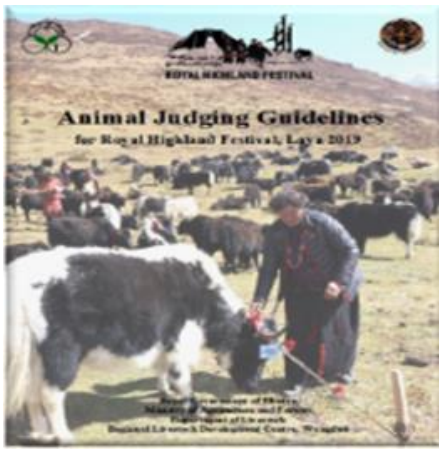


Figure 50: Database and Training manuals Developed

RHF Animal Shows guide



LN_2 Store

Figure 51: RHF animal Show Guide and LN2 store constructed

3.3 Regional Livestock Development Centre, Zhemgang

Key achievements 2019-2020

1. Progress and Achievements for FY 2019-2020

The overall achievements made by the centre during the FY 2019-20 are commendable and the key progresses realized are highlighted below:

1.1. Regional Targets and Achievements for FY 2019-20

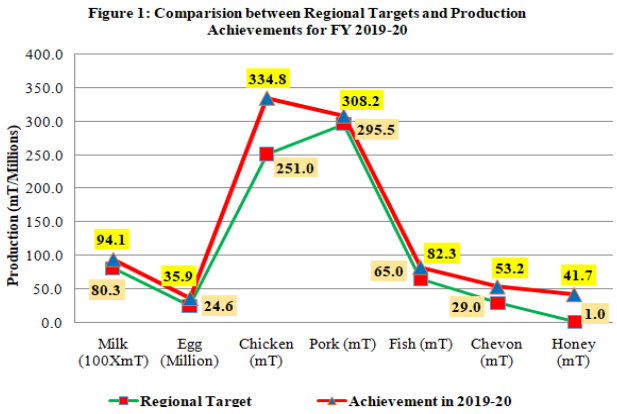


Figure 52: Achievement rate during the FY 2019-20

The annual regional targets set in APA 2019-20 for the centre was compared with the livestock commodities produced by the Dzongkhags. The comparison showed that all the targets for production of livestock commodities had been achieved as per the regional targets set in APA 2019-20 (**Figure 52**). The achievement rate during the FY 2019-20 was highest in honey by 97.6% followed by chevon 45.5%, egg 31.5%, chicken 25.0%, fish 21.0%, milk 14.7% and pork by 4.1% respectively.

1.2. Financial Achievements for FY 2019-20

In order to achieve the regional targets, several activities were planned and implemented by the centre. A total of Nu. 26.169 million was approved during the FY 2019-20 out of which, Nu. 26.150 million was spent with an overall budget utilization percentage of 99.9% (**Figure 53**).

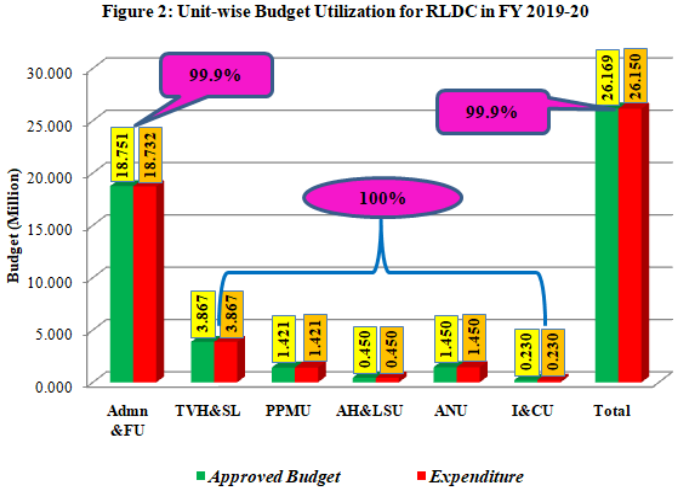


Figure 53: Centre Achievement during the FY 2019-20

1.3. Animal Health & Laboratory Services in RLDC and TVH&SL

1.3.1. Effective disease prevention and control through routine/referred laboratory diagnostic services

During the FY 2019-20, a total of 5823 laboratory samples were received by the centre and TVH&SL, Gelephu and a total of 12095 laboratory tests were conducted. Out of these, 51.1% of

Samples received and 45.2% of samples tested were by the centre and remaining were by TVH&SL, Gelephu.

The overall laboratory samples received/collected and tests conducted by the centre including TVH&SL during FY 2018-19 are given in (**Figure 54)**.

Out of 5823 samples, 56.9% were referred to parasitology section followed by 14.8% haematology, 11.7% bacteriology, 9.1% post-mortem carcass, 3.3% histo-pathology, 2.1% serology, 1.9% virology and 0.1% biochemistry.

Similarly, out of 12095 laboratory tests conducted, 70.9% were paratological tests followed by 16.0% complete blood count analysis, 6.8% bacterial culture and identification, 4.4% post-mortem examination, 0.9% serology and virology tests and 0.1% biochemistry tests.

The section-wise laboratory samples received and tests conducted by the centre including TVH&SL during the FY 2019-20 are given in (**Figure 55)**.

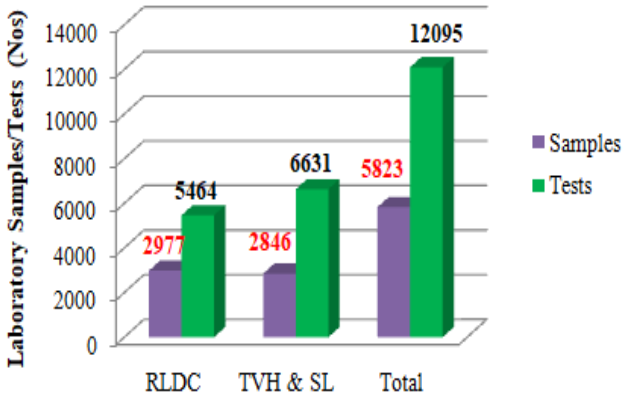


Figure 54: laboratory samples received/collected and tests

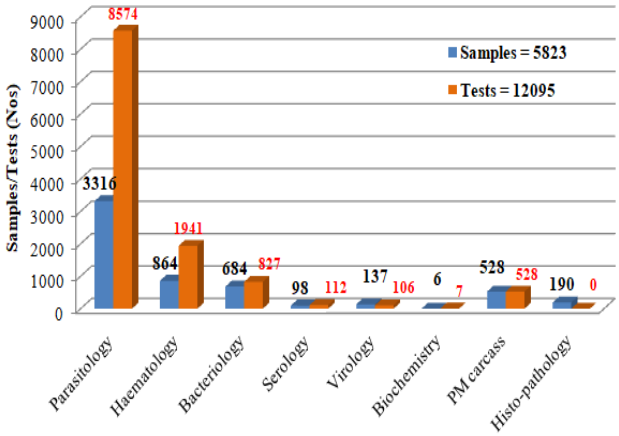


Figure 55: section-wise laboratory samples received and tests

1.3.2. Notifiable disease outbreaks, outbreak investigations and rapid containment

The FY 2019-20 recorded a total of 19 notifiable/zoonotic disease outbreaks (4 FMD, 5 rabies, 3 BQ, 1 IBD, 1 mareks disease, 1 canine distemper, 1 classical swine fever, 2 new castle disease and 1 HS) as compared to 15 outbreaks in FY 2018-19 and 9 outbreaks in FY 2017-18.

The three years comparison of notifiable disease outbreaks in the region is shown in **(Figure 56)**.

Depending on the severity of the outbreaks and technical capacities of the Dzongkhags, the centre attended 10 outbreaks and conducted

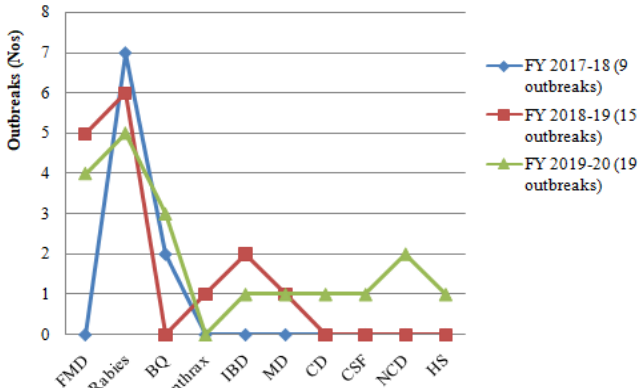


Figure 56: Trend of notifiable Diseases in East Central Region

Comprehensive investigations, made efforts to rapidly diagnose the disease and implemented prompt control and containment measures.

1.3.3. Emergency preparedness and response against African Swine Fever (ASF)

In the wake of severe ASF outbreaks in pigs reported from neighboring States of India, centre carried out emergency preparedness and response activities against ASF in Sarpang Dzongkhag from 7th – 31st May 2020. The regional emergency preparedness and response plan was developed for the region and the surveillance was carried out in 82 villages, 42 Chiwogs under 11 Gewogs and 1 thromde under Sarpang Dzongkhag.

Door-to-door awareness on ASF was done in 286 households and a total of 292 pig farms (184 backyard, 49 semi-commercial, 44 commercial, 14 free range and 1 tshethar farms) visited and bio-security inspections done (**Figure 57**)

Figure 57: Surveillance being conducted in commercial, semi-commercial, backyard and scavenging pig farms in

1.3.4. Proficiency testing on haematology tests

Laboratory proficiency testing is one of the key inputs in decision making to improve good laboratory practices among different levels of laboratories and their technicians. As such, three technicians from DVL, TVH&SVL, and RLDC were engaged in evaluating Complete Blood Count (CBC) parameters in 20 blinded blood samples of bovine species of different ages and conditions (**Figure 58**). The CBC includes Hb, PCV, TRBCC, TWBCC, DLC, MCV, MCH, and MCHC parameters

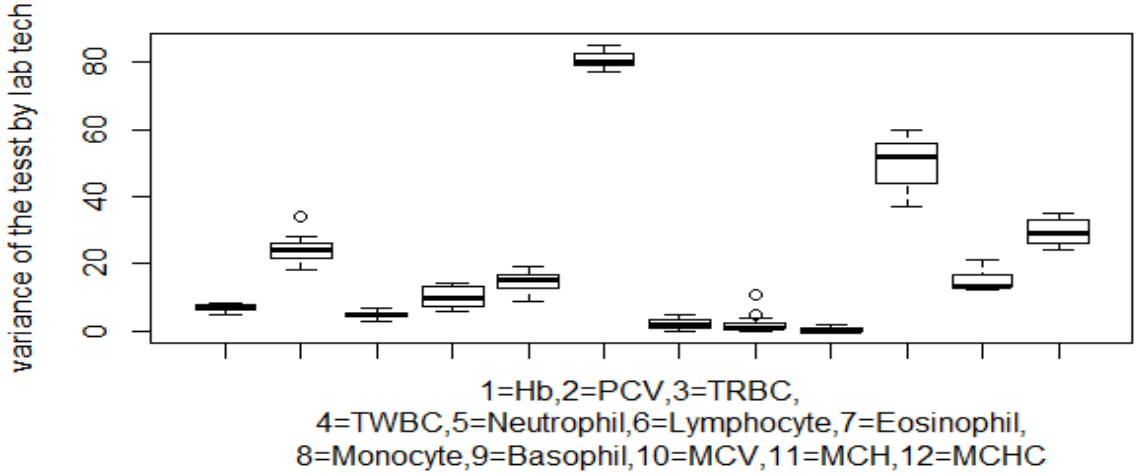


Figure 58: Variance in CBC tests among DVL, TVH&SL and RLDC

and the tests were done in TVH&SVL, Gelephu provided with same materials/laboratory reagents and as per existing SOPs of the hematology test.

The results showed total variations of 5% to 34% in the overall results (Figure 7). The variation was critical in Differential Leucocyte Counts (DLC), which was statistically significant (χ^2 = 21, *df* = 10, *p*-value = 0.02).

1.2. Enumeration of Microbial Contamination by Plate Count Agar Test in Meat Retail Shops in Gelephu

The centre conducted a study on enumeration of bacteria in meats (pork and chicken) from retail shops in Gelephu with the main objective to assess the microbial contamination in the meats. Pork and chicken samples were collected randomly from 10 meat retail shops in Gelephu. The samples were subjected to plate count agar test as per the standard protocol and microbial enumeration was done accordingly.

The mean CFU/g of chicken was 5.28X10^6 CFU/g with 33.3% of the samples (n=9) within the acceptable limit of < 5.00X10^6 CFU/g. Similarly, the mean CFU/g of pork was 5.20X10^6 CFU/g with 42.9% of the samples (n=7) within the acceptable limit of < 5.00X10^6 CFU/g. The study revealed that 7 meat retail shops were contaminated (n=10) suggesting the need to improve the hygiene in the study areas.

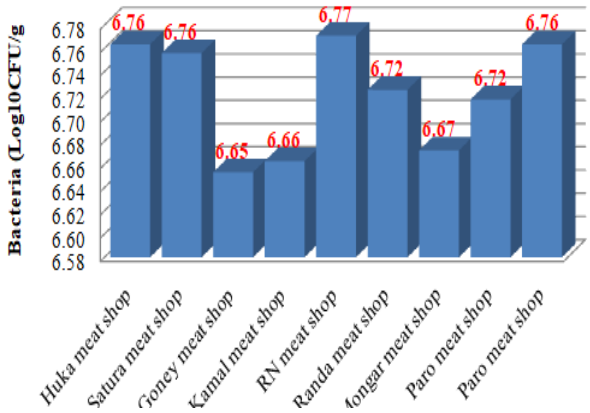


Figure 59: Microbial Enumeration in Chicken by plate count agar

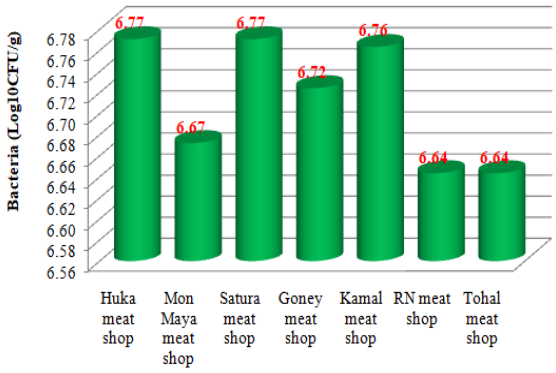


Figure 60: Microbial Enumeration in Pork by plate count agar

1.4. Post-Production and Marketing Programs

1.4.1. Artificial Insemination (AI) and Breed Intensification Program

A 14-days refresher course on AI and reproductive biotechnology was conducted in Zhemgang for field staff from Bumthang, Trongsa and Zhemgang Dzongkhags and in Samtenling Gewog, Sarpang for field staff from Sarpang and Dagana Dzongkhags. These were undertaken with the main objectives to train all field staff on AI techniques and update knowledge and skills on latest reproductive biotechnologies like estrus synchronization, electronic endoscopic AI technique, sex-sorted semen technology, mbryo transfer technology.

A total of 36 livestock extension staff (21 in Sarpang and 15 in Zhemgang) attended the courses; which were jointly organized and conducted by the centre, NDRC, Yusipang with fund supports from EU-RDCCRP and Sarpang Dzongkhag Livestock Sector budgets.

1.5. Animal Nutrition Services and Programs

1.5.1. Youth entrepreneurship on legume forage production

The centre implemented legume forage production in collaboration with NRDCAN, Jakar and DLS, Zhemgang with fund support from GEF-LDCF approved budget of NRDCAN. The project was carried out with main objectives to (a) develop pasture in degraded/barren private lands, (b) enhance and promote legume production, (c) enhance protein supplement in animal nutrition and (d) use protein supplement in adoption of TMR technology by farmer.

About 20 acres of private land developed for legume forage production involving 19 members (18 female and 1 male) from Thrisa, Wamling and Shingkhar Chiwogs. About 3580 kgs of barbed wire, 100 kgs of U-nail procured and distributed for fencing of land for legume forage production. 10 kgs *Ruzi*, 10 kgs *Paspalum*, 88 kgs *Stylo*, 70 kgs *Lucerne*, 6 kgs *Leucaena diversifolia* seed and 2000 numbers of *Gliricidia* slips were distributed.

Figure 61: Distribution of inputs and legume forage plantation in Shingkhar Gewog

Information & Communication Services

1.5.2. Hosting of ecRLDC Website for RLDC, Zhemgang

Figure 62: Launching of ecRLDC website

The ecRLDC Website was designed and hosted with the main objectives to (a) share prospective information on real time basis about the dailyprograms and activities happening in the region, (b) keep the viewers informed about the style and identity of RLDC, Zhemgang and (c) to align and keep the centre abreast with the farsighted vision of His Majesty the King about Big Data and Artificial Intelligence.The website was formally launched by the Director General, DoL on 12th January 2020.

3.4 Regional Livestock Development Centre, Kanglung

Key achievements 2019-2020

A. Animal health section:

1. Laboratory services

A total of 3654 samples were collected from different species of animals in the region and analyzed in the bacteriology, parasitology, hematology and serology sections under RLDC and SVLs in Dewathang and Nganglam. A total of 5877 tests were performed on these samples to detect specified diseases.

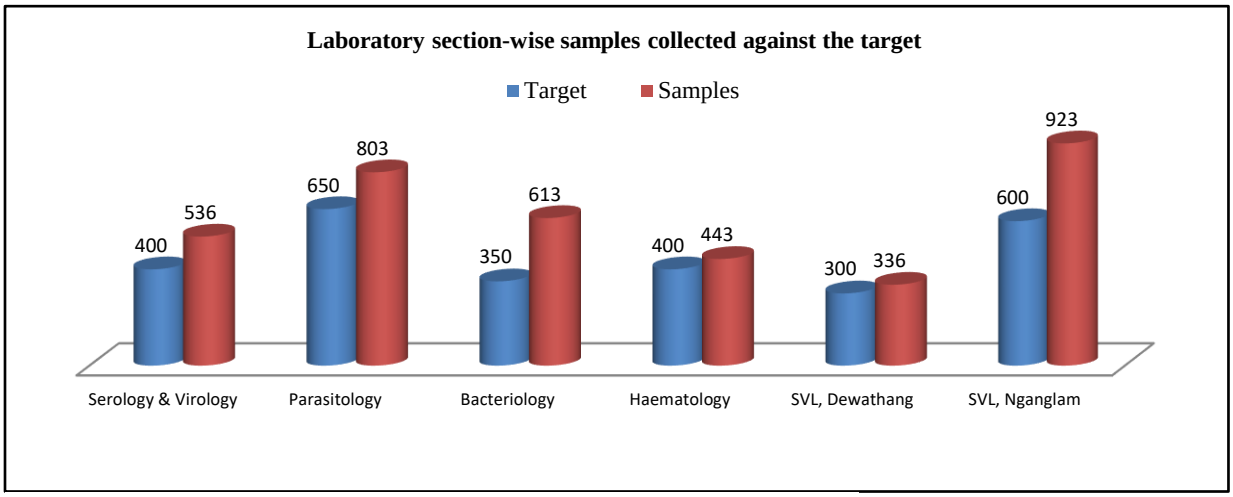


Figure 63: Laboratory section-wise samples collected against the target

2. World Rabies Day celebration

The theme for 2019 World Rabies Day was ***"Vaccinate to eliminate rabies".*** The day was celebrated in Sherubtse College in the presence of Hon'ble Director General, Chief and other officials from the Department. Importance of the WRD was delivered to the students along with presentations on prevention and control of rabies in the country.

Simultaneously, mass vaccination was conducted in Dewathang, Nganglam, Phuntshothang, Khaling and Kanglung areas. Awareness on rabies was provided to 440 participants.

Figure 64: World Rabies Day celebration at Sherubtse College

3. Rabies control program (CABC and Mass vaccination)

A total of 2493 canines were vaccinated against rabies in Tashigang, Tashi Yangtse and Samdrup Jongkhar to prevent rabies outbreaks in the region. In addition, a total of 405 dogs were neutered and vaccinated in Lhuentse dzongkhag.

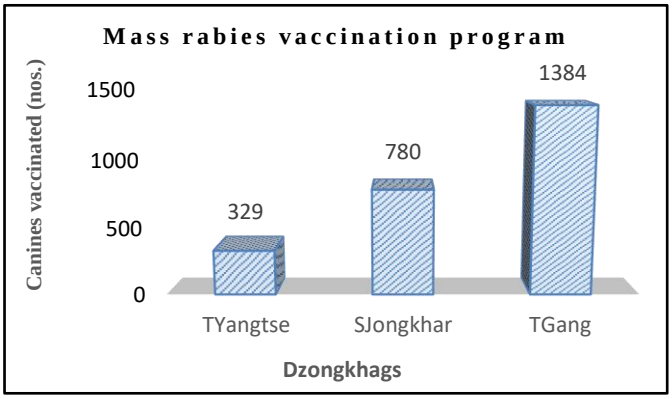


Figure 65: Rabies vaccination program

4. Notifiable disease outbreaks and investigations

Outbreaks of notifiable diseases such as FMD, rabies and anthrax occurred in the region. Investigations and control measures were provided in collaboration with the affected Dzongkhags.

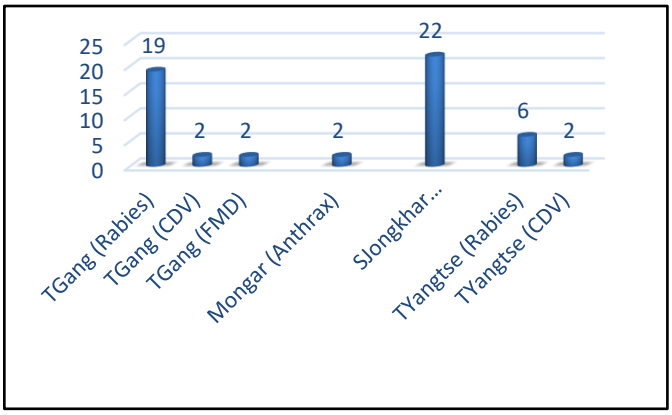


Figure 66: Notifiable disease outbreaks and investigations

5. Surveillance of notifiable and zoonotic diseases

a. Brucellosis sero-surveillance

A total of 412 serum samples were collected from 5 dzongkhags. The samples were tested using RBT and 6 samples were tested positive.

b. Bird flu (H5N1)

Clinical and laboratory surveillance were conducted at Radi (Trashigang) and Bangtar and Samrang (Samdrup Jongkhar). 87 samples were collected and analyzed – all samples were negative.

6. Referral cases attended

More than 30 referral cases were attended through calls, social media and in person. Around five cesarean sections were done under various villages in Tashingang.

7. Research and development

To meet the livestock products demand in the country, there have been increasing number of improved livestock breeds in the country. This has directly increased the use of antibiotics to curb number of diseases. Indiscriminate use of antibiotics can however speed up the resistance against available antibiotics which will adversely affect both human and animal health. To address this issue early on, a knowledge, attitude and practice study on antimicrobial usage and antimicrobial resistance in the country was initiated by the region.

8. Medicines and vaccines

Medicines and vaccines requisition for the region for the FY was indented. In total, 6500 doses of rabies vaccines and 20,000 doses of newcastle disease vaccines were mobilised to the six Eastern dzongkhags.

Livestock production and post-production section:

B. Breed improvement

9. Breeding bull distribution

Out of 60 bulls assessed from CHBPP areas, 29 bulls were selected for breeding purposes based on their semen quality, blood level percentage, age and color, and distributed in the six Eastern Dzongkhags.

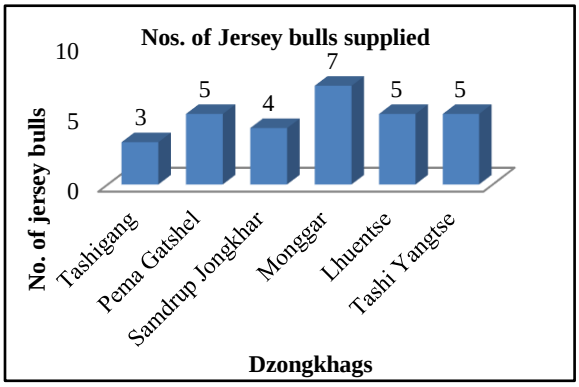


Figure 67: Jersey bulls supplied

10. Procurement and distribution of sex sorted frozen bovine semen.

To enhance dairy cows production in the region, 2000 doses of sex sorted semen was procured. With 487 doses already distributed in the CHBPP areas, the Centre is in the process of distributing the remaining doses.

11. Expansion of CHBPP

To register for CHBPP, bull mothers were assessed in Trashigang and Pemagatshel Dzongkhags. Based on set parameters such as blood level, colour, lactation and production, 207 and 206 bull mothers were selected from Rangshikar (Trashigang) and Nangkor and Bartseri (Pemagatshel) respectively.

12. Production and distribution of liquid nitrogen (LN2).

A total of 21950 litres of LN2 was produced and 18670 L was distributed to the AI centres in the six Eastern Dzongkhags while 3280 L was reserved for semen bank at the Centre.

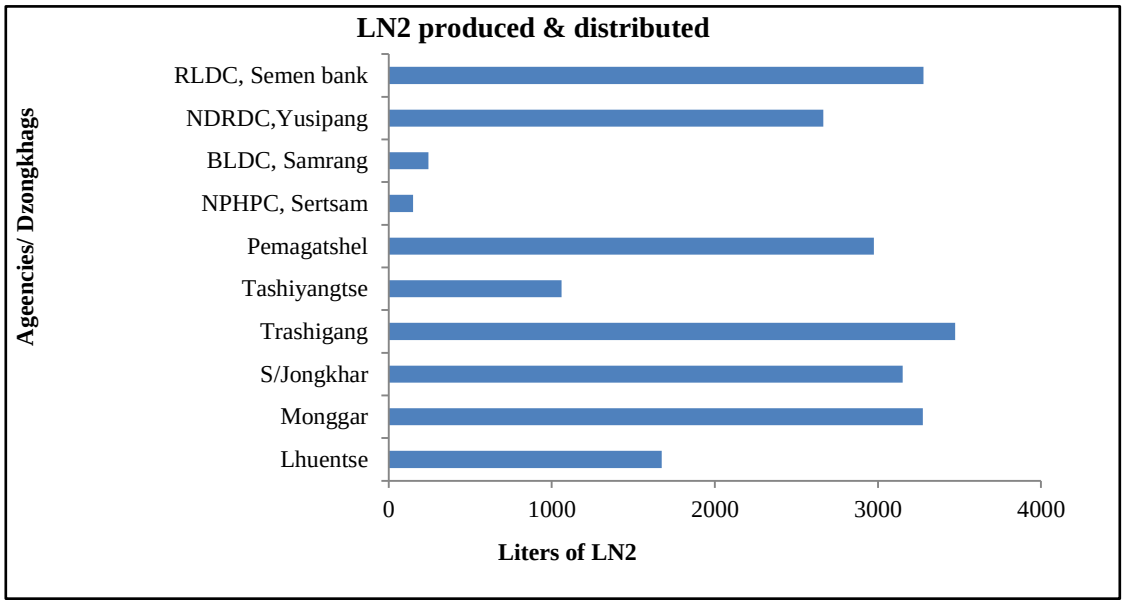


Figure 68: Production and distribution of liquid nitrogen (LN2)

13. Facilitation of semen (imported/ local jersey/ mithun/ HF) supply Supply of 4912 doses of semen from NDRDC, Yusipang was facilitated. The semens were then distributed to the AI centres in the six Dzongkhags as per their requirement.

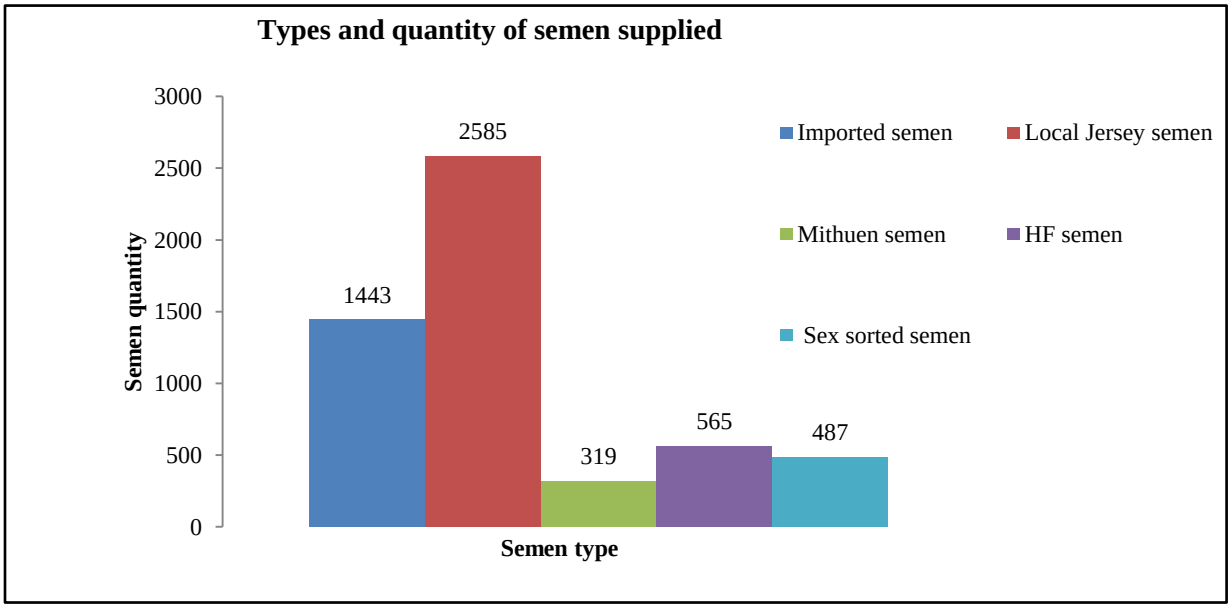


Figure 69: Types and quantity of semen supplied

14. Conduct AI refresher course for CAITs/ AITs

AI refresher training was conducted in colloboration with the technical expertise from NDRDC, Yusipang to 9 CAITs and 19 AITs for 14 days each at Thangrong geog under Monggar dzongkhag.

Figure 70: AI refresher training

15. Conduct in-country exchange visit for CAITs

An in-country exchange visit program was organized for 15 CAITs from Lhuntse, Monggar Pemagatshel, Trashigang and Trashiyangtse. The program was mainly aimed to enhance the knowledge of the participants through exposure to various livestock implementation activities in other parts of the country after visiting various agencies and commodity programs.

Figure 71: CAITs exchange program

Dairy development program

16. Monitoring of milk quality and bulk milk chillers in the chilling units

The microbial quantity of milk was assessed based on the total plate count. 29 bulk milk samples from the milk chillers of 8 dairy farmers' groups including farms in Trashigang were assessed. Simultaneously, these milk chillers were also monitored.

17. Facilitation of milk marketing

Meetings were conducted with the DFGs of Monggar (Ngatshang and Chaskhar) and Samdrup Jongkhar (Rekhey, Orong, Dewathang, Martang, Wooling, Gomdhar) for delivering milk to Kofuku International Limited (KIL) dairy plant at Chenary, Trashigang.

18. Conduct cross-sectional survey study of dairy management practices in the Eastern region

A cross-sectional study was carried out in the six Eastern Dzongkhags to assess the dairy management aspects in the region and to identify herd health problems of the dairy farms. Required data were collected from 90 dairy farmers and 554 cattle.

19. Conduct in-country exchange visit for CAITs

An in-country exchange visit program was organized for 19 livestock Extension agents, 17 dairy processors from the six Dzongkhags and 17 RLDC staffs. The program was mainly aimed to enhance the knowledge of the participants through exposure to various livestock implementation activities in other parts of the country after visiting various agencies and commodity programs.

Animal nutrition section:

20. Support for pasture development at commercial sites linked with TMR production

Fodder seeds (500 kgs each of stylo and ruzzi seeds) and technical backstopping were provided to 105 beneficiaries for the development of 70 acres of pasture in Phuntshothang and Pemathang (Samdrup Jongkhar). The green fodder will be sold to Bhutan Livestock Development Centre Limited (BLDCL) for the processing of Total Mixed Ration feed which will be sold back to the beneficiaries at nominal rates.

Figure 72: Support for pasture development

21. Development of indigenous fodder germplasm

Nurseries were developed for indigenous fodder germplasm in six sites in the region. 7735 indigenous fodder saplings including Kongnangshing, Chamagtangshing, Doromshing, Ratsheshing, Yetshisning, Shingchangloshing and Zangrushing were distributed to the beneficiaries for plantation. Essential materials required for development of nursery including green shed net, spade and pickaxe, water sprinkler, flexible water pipe and Poly pot to raise saplings were provided.

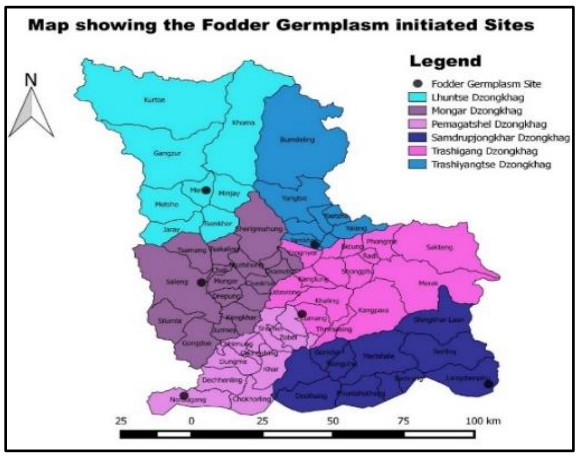


Figure 73: Fodder Germplasm initiated sites

22. Supporor fodder conservation and silage production to dairy group farmers

Technical backstopping was provided for the conservation of 48 MT of fodder as silage using green grasses including pakchung, napier, gautemala, ruzzi, grass mixture and hay using maize stover and paddy straws

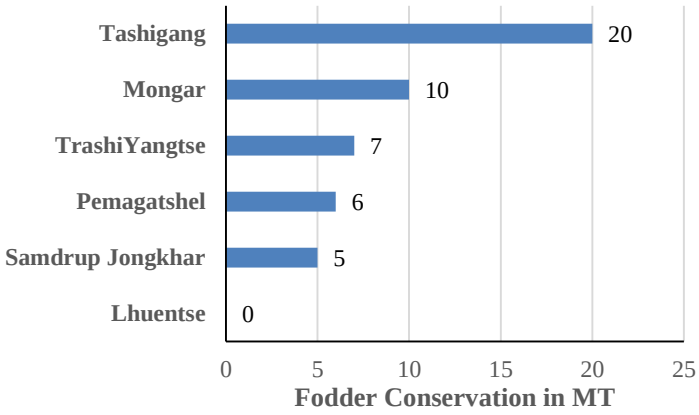


Figure 74: Fodder conservation in six Dzongkhags

Annexure 1. Livestock at a Glance (2019).

a) Livestock Population trend (2015-2019) in numbers.

Cattle Trend (Exotic and Local)

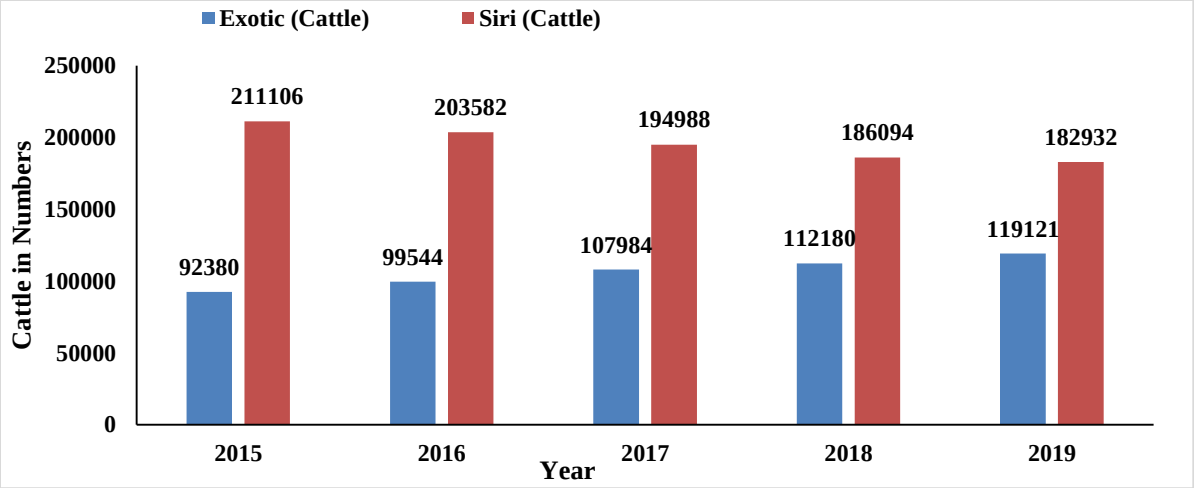


Figure 75: The above figure shows that out of the total cattle population 302,053 Nos. in 2019. The improved breed (Exotic) has increased from 92,380 Nos in 2015 to 119,121 in 2019 (29%) and the Local Cattle Siri decreased by (13%). Livestock Govt. Farm animals are not included in the above figure.

Poultry trend (Improved and Local) in numbers

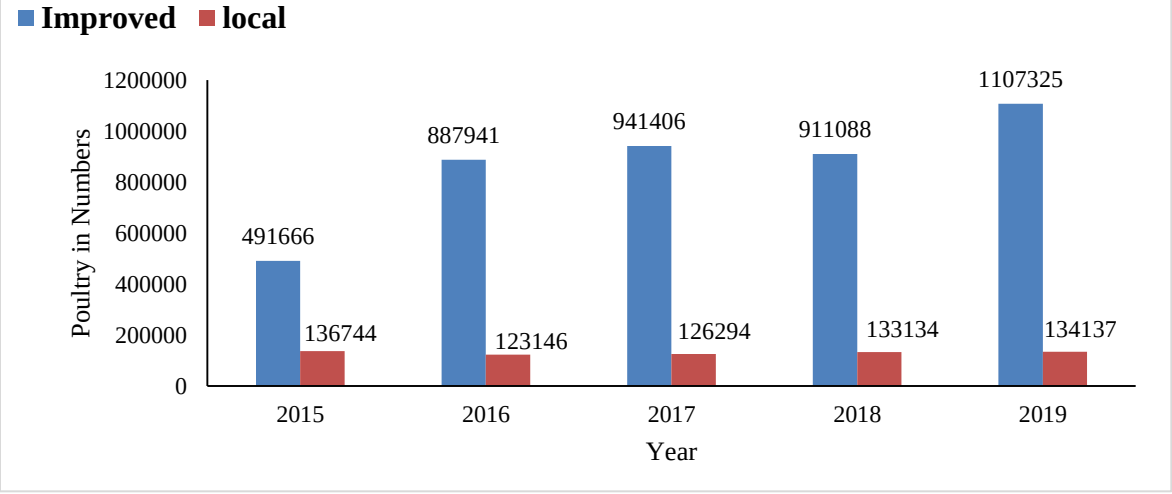


Figure 76: Shows the Poultry trend from 2015-2019. There has been an increases in the improved poultry which includes layers and Broilers by (125%) in 2019 compared to 2015 and decrease in the local poultry by (2%) in 2019 compared to 2015.

Pig trend (local and Improved) in numbers.

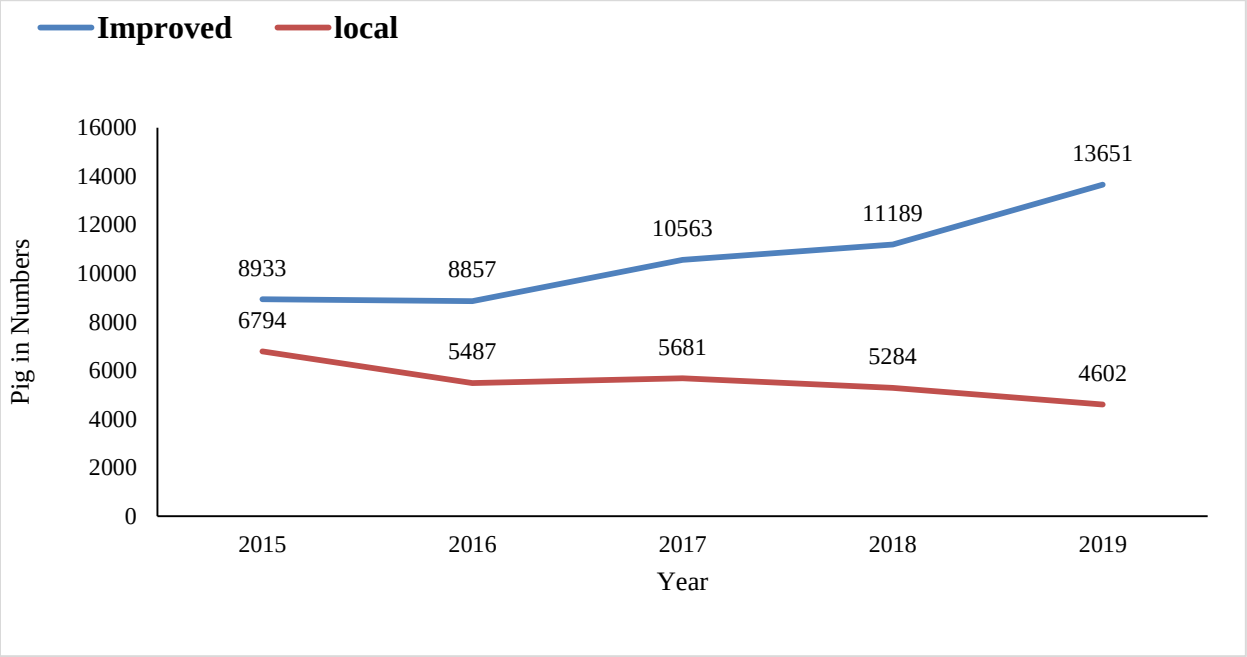


Figure 77: Shows the Pig trend from 2015-2019. There has been an increase in the pig population from 15,727 Nos. in 2015 to 18,253 Nos. in 2019. Improve pig increased by (53%) in 2019 compared to 2015 and local pig decreased by (32%) in 2019 compared to 2015.

Equine, Sheep and Goat trend (in numbers).

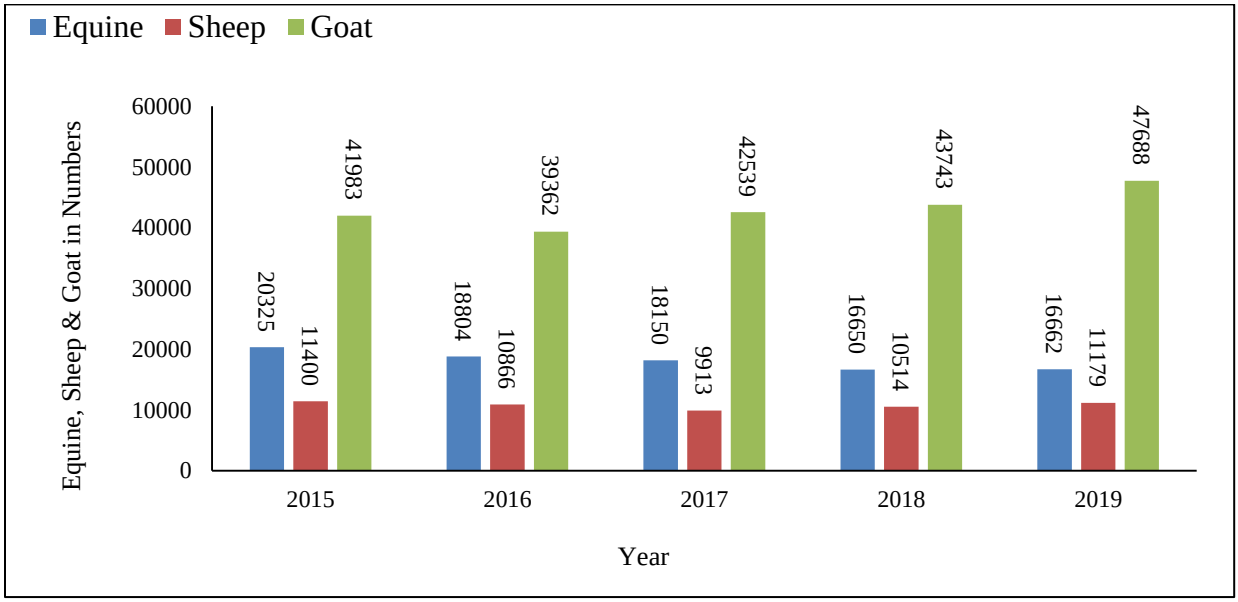


Figure 78: Equine population has declined from 20325 Nos. in 2015 to 16662 Nos. in 2019. The Goat population is 47, 688 Numbers in 2019 compared to 41983 in 2015. Sheep population has decreased by (2%) in 2019 compared to 2015.

Yak, Buffalo and Zo/Zom trend (in numbers).

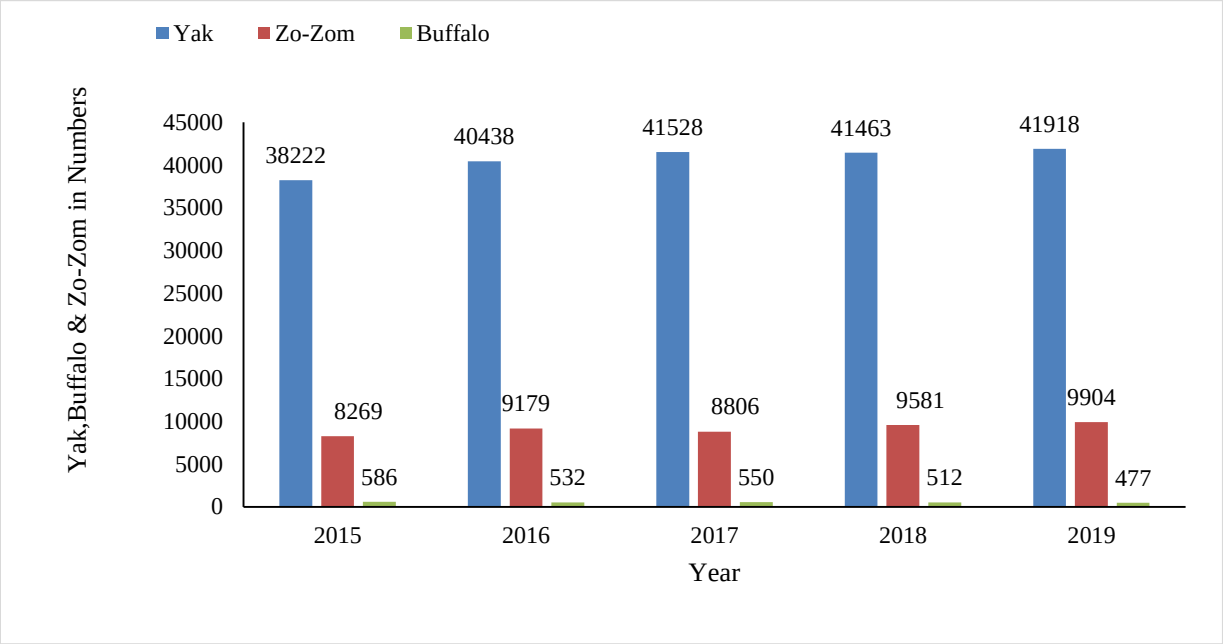


Figure 79: Shows the trend of Yak, Buffalo and Zo/Zom. The yak population has increased from 38222 in 2015 to 41918 nos. in 2019. There has been increase in Zo/zom population by (20%) in 2019 compared to 2015 and decline in the buffalo population 586 nos. in 2015 to 477 Nos. in 2019.

b) Livestock Production trend (2015-2019) in numbers.

Dairy production trend (in MT)

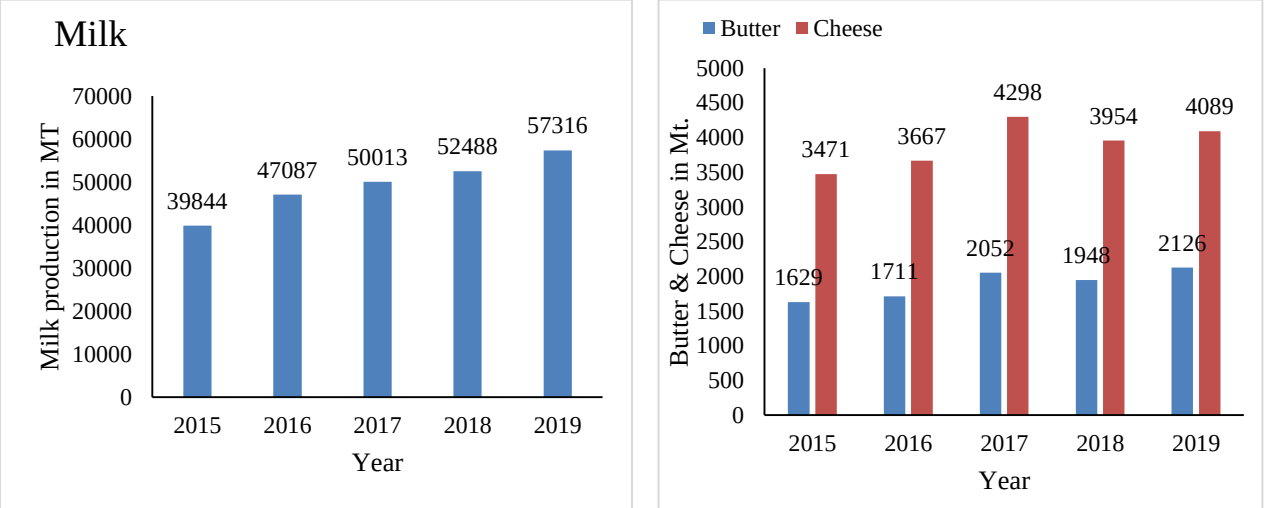


Figure 80: Milk has increase by (44%) in 2019 compared to 2015. Butter and cheese has maintained an average production, butter (1,893MT) and cheese (3,896 MT) over the years.

Poultry Production trend (Egg in millions& chicken in MT.)

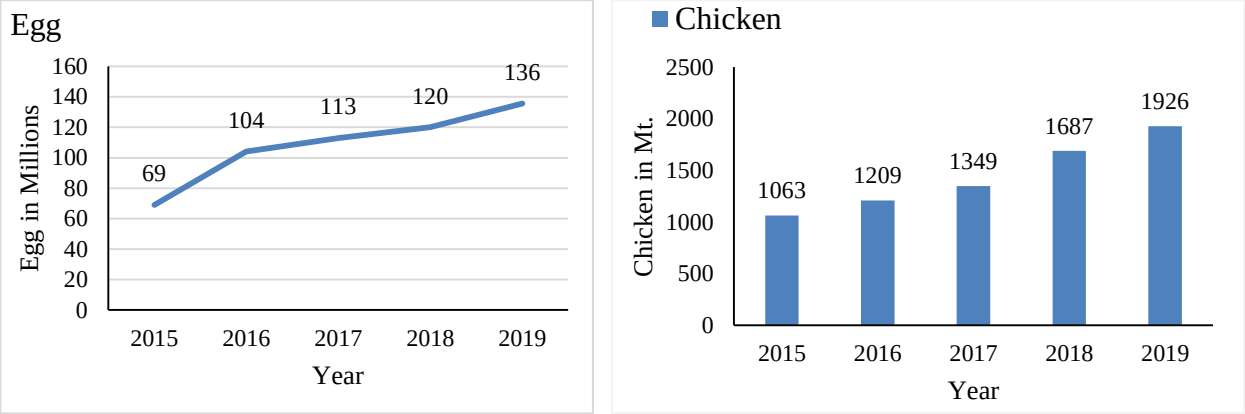


Figure 81: Indicate poultry sector has been doing very well both in egg production and chicken production. The egg production increased from 69 million eggs in 2015 to 136 million in 2019 similarly the chicken production has increased from 1063 MT in 2015 to 1926 MT in 2019.

Meat production trend Pork, Beef, Mutton & Fish (in MT).

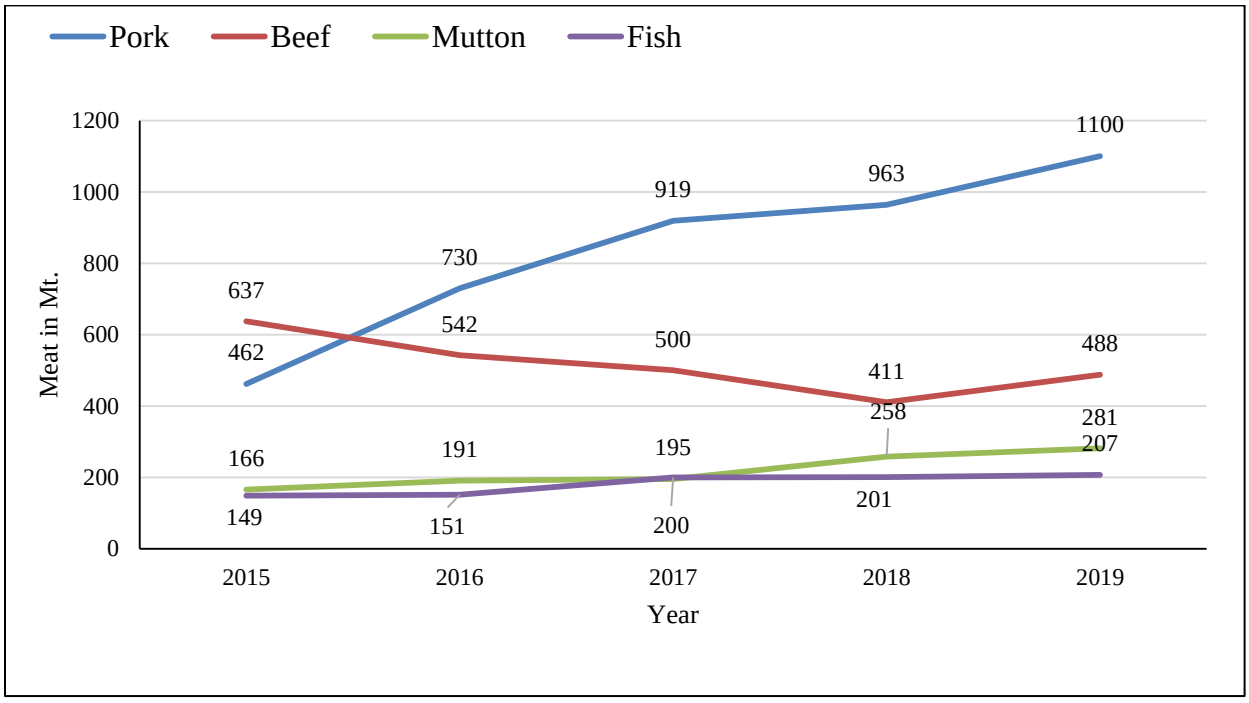


Figure 82: Indicate meat produced from 2015-2019 in MT. Beef production is mostly from the animals that have died accidentally. Comparing year 2015 to 2019 the pork production has increased by 138%, Mutton by 69% and Fresh fish by 39%.

C) Region wise Livestock population (2019)

Cattle:

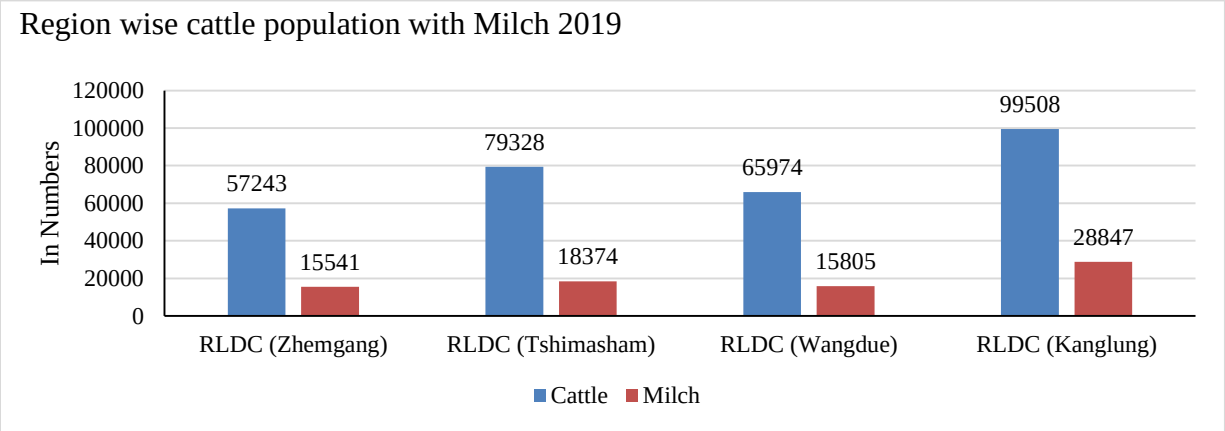


Figure 83: Region wise cattle population along with milk cattle

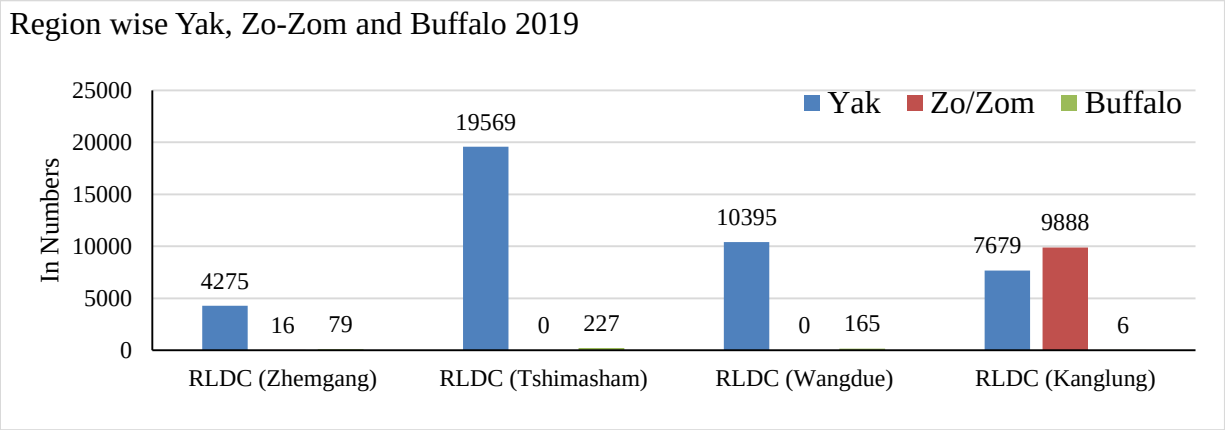


Figure 84: Region wise yak, Zo-zom and Buffalo

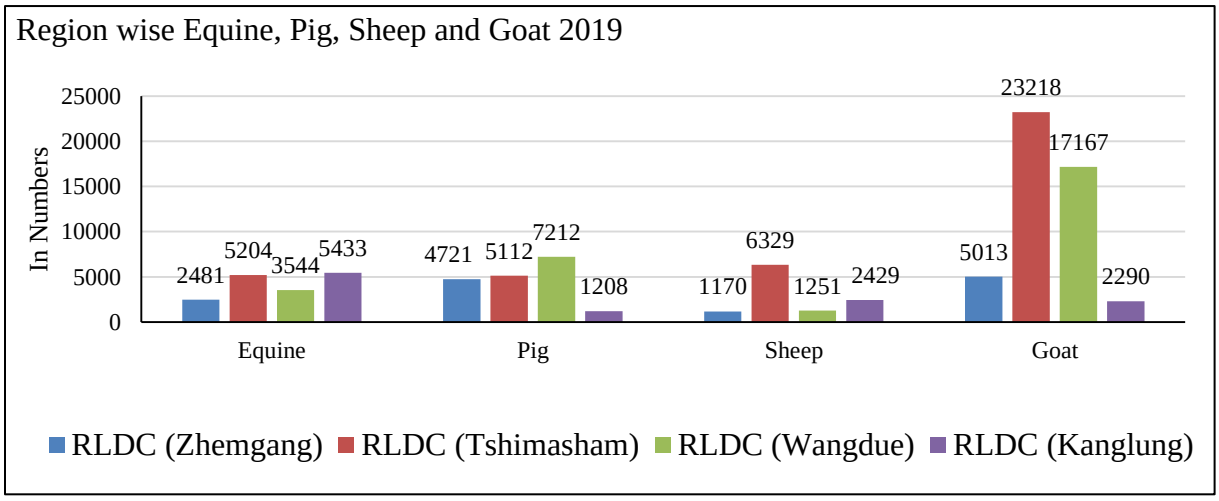


Figure 85: region wise Equine, Pig, Sheep and Goat

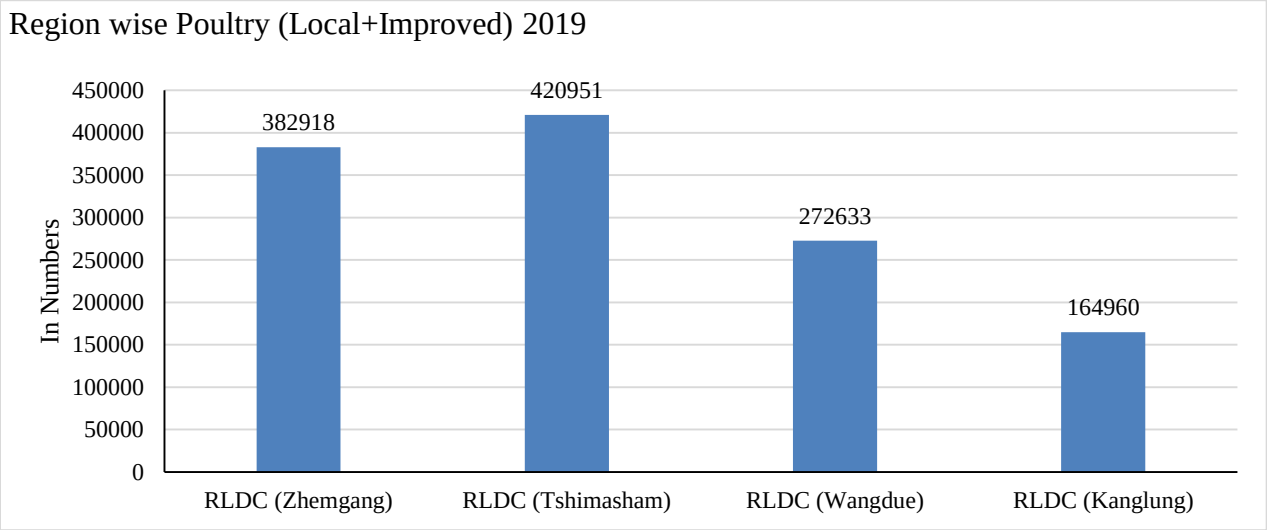


Figure 86: Region wise poultry population

Region wise Livestock production (2019)

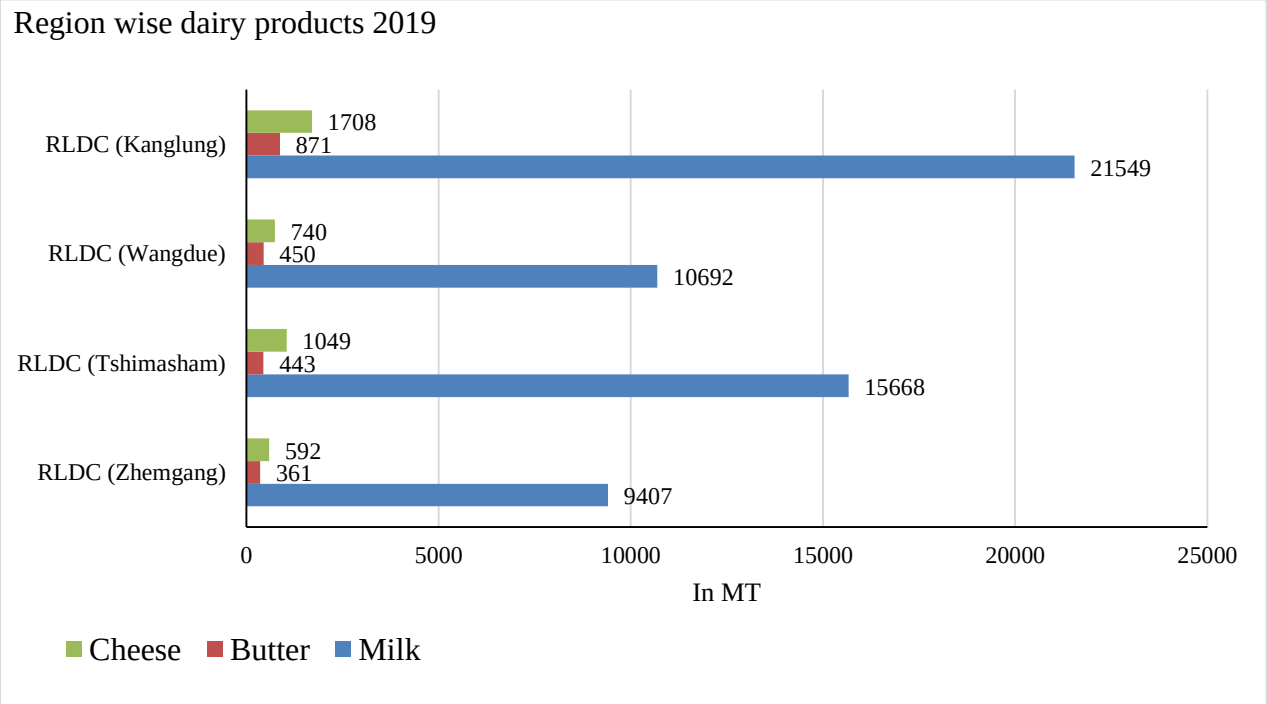


Figure 87: Region wise dairy production

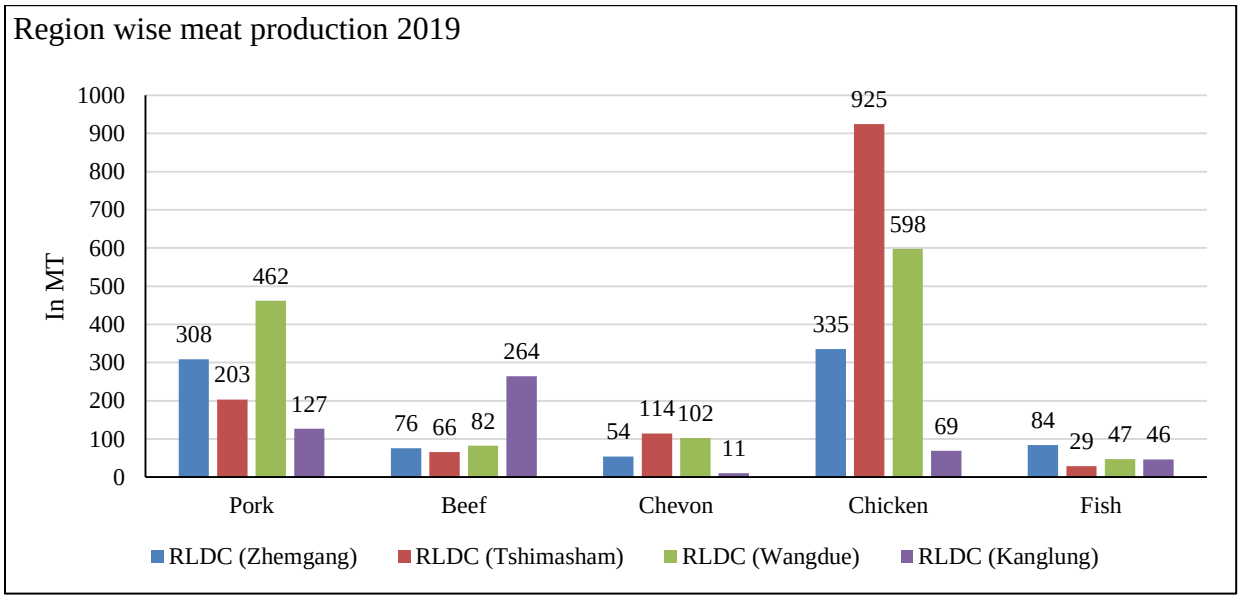


Figure 88: Region wise meat production

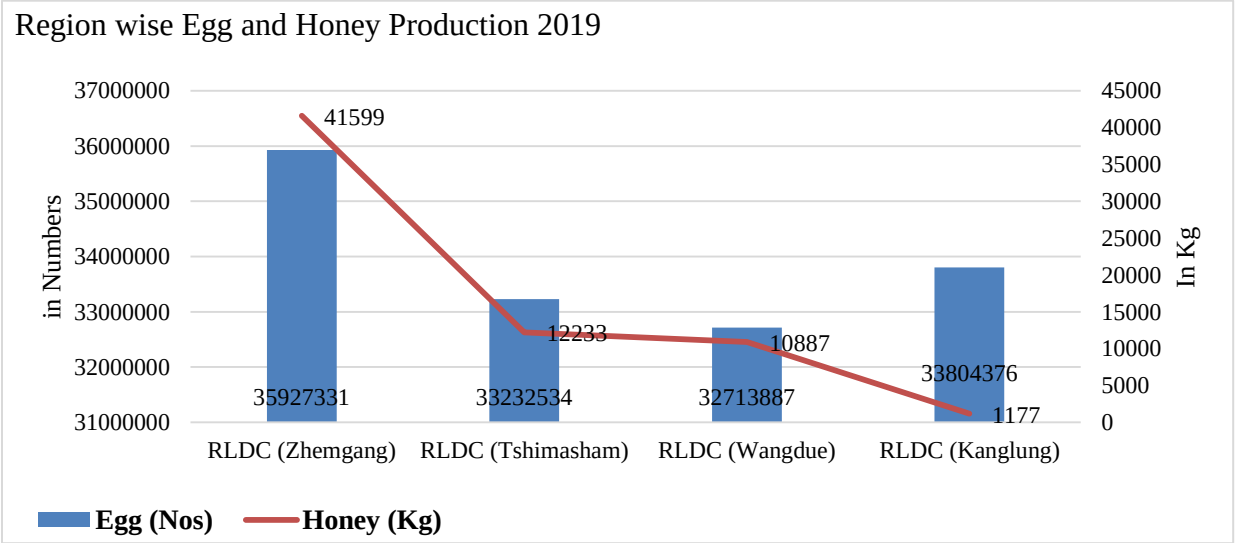


Figure 89: Region wise egg and honey production status

e) Livestock import from India (2019).

Dairy imports and value (Milk, Butter and cheese).

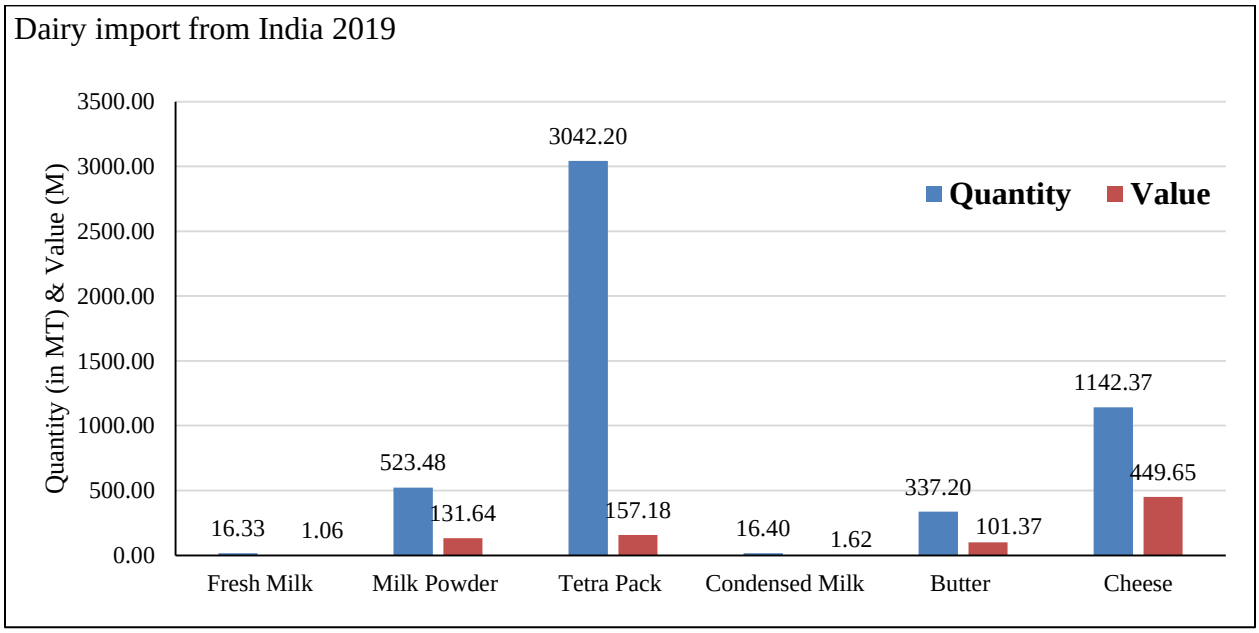


Figure 90: Showing various types of dairy products imported with value.

The above figure 10. Shows dairy import the year (2019). It shows that during 2019 maximum import in dairy product was Tetra pack 3042.20 MT followed by cheese 1142.37 MT and Butter 337.20 MT and lowest is fresh milk 16.33 MT. But if you see from the import value, cheese is the highest 449.65 Million followed by Tetra pack and Milk powder.

Meat import from India (2019).

Meat imports and value (Pork, Beef, Chicken and fish).

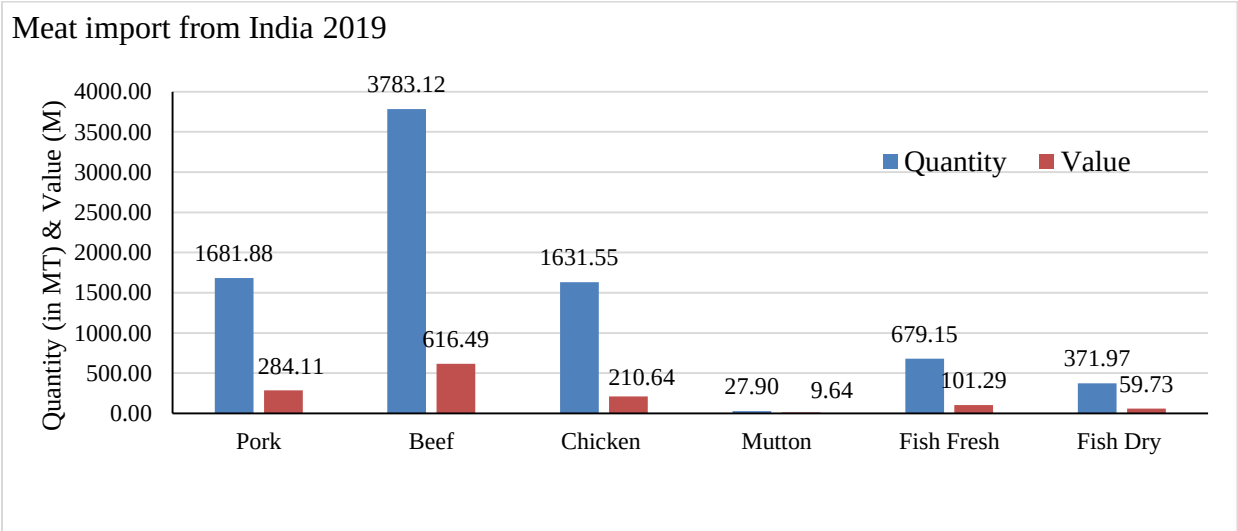


Figure 91: Shows the meat import with value in 2019. Beef import is the highest in 2019 with 3783.12 MT of value of 616.49 Million. Pork import is 1681.88 Mt with import value of Nu.

284.11 Million. Although internal chicken production has increased we still import chicken due to rising demand. The least imported meat is mutton (27.90 MT) with a value of Nu. 9.64 Million.

Honey import:

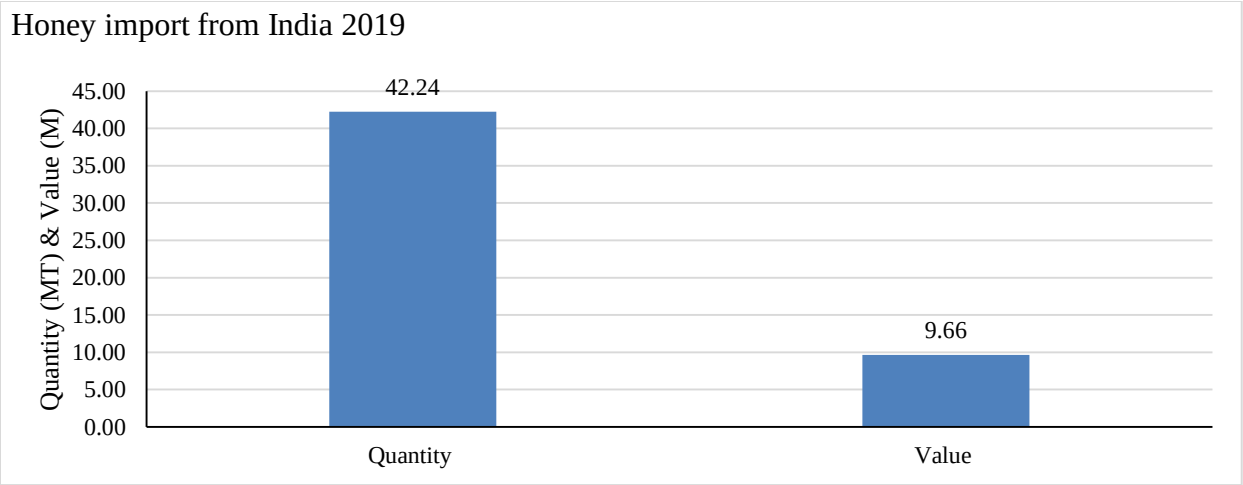


Figure 92: Import of honey with value. During the year 2019 a total of 42.24 MT of honey has been imported from India of worth 9.66 Million Ngultrum.

Imports from India 2019

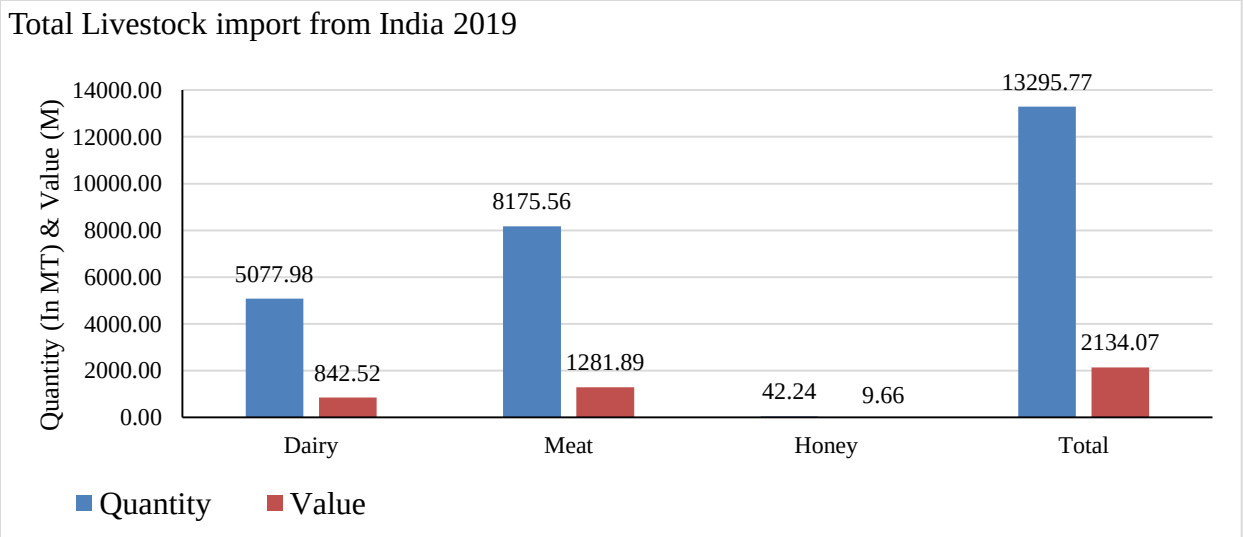


Figure 93: Overall livestock import with value in 2019.

g) Livestock Export to India 2019.

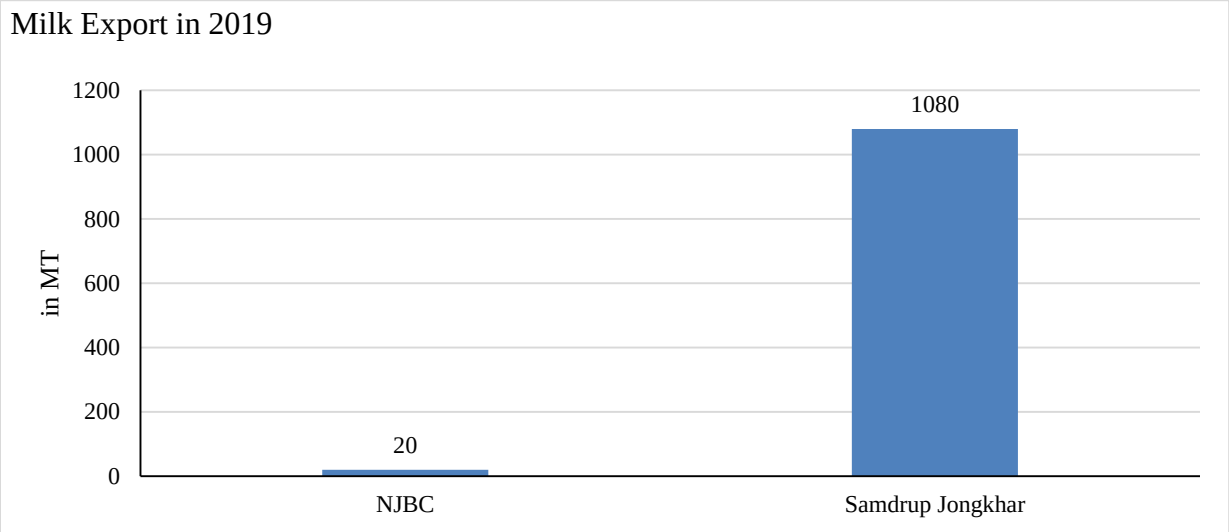


Figure 94: Export of fresh milk in 2019 to surrounding Indian border towns of Samtse and SamdrupJongkhar Dzongkhag.

Annexure II. Special Events during 2019-2020.

National Dog Population Management Strategy launched

The Department launched the revised National Dog Population Management (DPM) Strategy to improve the health and welfare of dogs, reduce dog population, achieve zero human deaths due to rabies by 2030 and create a positive impression of Bhutan for visitors making Bhutan a safer and happier place with minimum nuisance and dog threats.

The revised strategy will mainstream the DPM program at the national, Dzongkhag, Thromde and Gewog levels; ensure animal birth control of free roaming dogs and encourage adoption of stray dogs through community-based approaches and human behavioral changes.

Laboratory IMS for Veterinary Services launched

The Department launched the Laboratory Information Management System: http://lims.ncah.gov.bt, the online database system designed to ensure efficient management of the country's veterinary laboratory information. It has the features for online entry of sample details, test result, diagnosis and recommendations.

This web based system will help the veterinary laboratories to track real time samples from submission to testing and reporting. Besides data storage and test result dissemination, reports can also be generated for policy interventions.

The system is intended for all the laboratory facilities under DoL including the National Centre for Animal Health, Regional Livestock Development Centres, Satellite Veterinary Laboratories and Dzongkhag Veterinary Laboratories.

Department website launched

The Department launched its official website: http://www.dol.gov.bt which will serve as a source for scientific publications, protocols and other ground-breaking subjects on livestock related activities in Bhutan.

Besides the news, announcements, contact details and others, the website offers links to its central offices and other external services available in the country.

The website provides a suitable platform for livestock researchers and development workers to showcase their efficiencies of delivering goods and services in the 12th five year plan. Further, the Bhutanese and international academicians can now apply online for official clearances to undertake research works in Bhutan.

The website is a result of commendable team work and dedication of the Research and Extension Division, DoL who liaised with the Ministry's Information and Communication Technology Division in developing it as a user-friendly. DoL shall regularly update the content to provide better services to its clients.

Sanam Lyonpo visits to Trongsa and Bumthang

The Hon'ble Sanam Lyonpo, Yeshey Penjor visited Trongsa and Bumthang as the 12th five year plan focal Minister for these two Dzongkhags from 3-7 August 2019. He was accompanied by the Director for Directorate Services among others.

In both Dzongkhags, Lyonpo reviewed the progress for the fiscal year 2018-2019 and the annual work plan and budget for the fiscal year 2019-2020. The meeting was attended by Dzongdags, sector heads, gups, mangmis and heads of the regional organisations.

Lyonpo also visited the National Research Centre for Animal Nutrition, National Highland Research and Development Centre, Regional Cattle Breeding Centre, Central Machinery Unit, National Horse Breeding Farm, Nagsphel and Bhutan Herbal Tea in Bumthang.

DoL wins the Ministry's first annual Intra-Ministerial Basketball Tournament

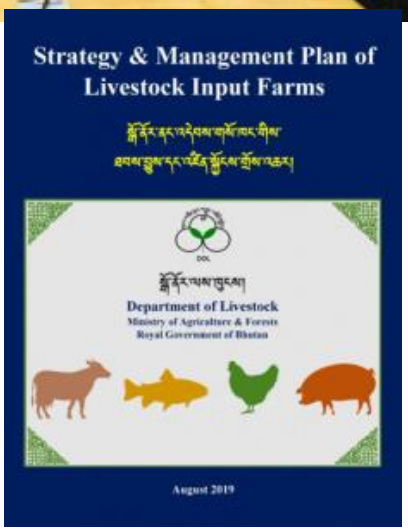
Out of six teams, the team of Department headquarter won the Ministry's first Intra-Ministerial Basketball Tournament held from 11-21 August, 2019 at the Swimming Pool Complex. The winner was awarded a cash prize and a rolling trophy.

The tournament was organised to enhance coordination and team work among the staffs and promote healthy lifestyle. The Hon'ble Sanam Lyonpo graced the opening and final matches along with other senior officials.

Livestock Annual Performance Agreement for 2019-2020 signed

The Department signed its Annual Performance Agreement (APA) for the financial year 2019-2020 with its respective divisions, central programs and units on August 30 at the Department's conference hall.

Livestock Input Farms Strategy and Management Plan launched



On August 30, 2019 the Department launched the first edition of Strategy and Management Plan of Livestock Input Farms (August 2019), in pursuit to achieve livestock product self-sufficiency for a prosperous Bhutanese society. The strategy will streamline the mandates and functions of the livestock input farms and commodity centres towards fulfilling 12th five year plan and priorities.

Bhutanese Farmer wins the Agriculturalist Award 2019

A Bhutanese Dairy Farmer, Ms. Chimmi Dema, an aspiring dairy farmer from Gogona, Wangduephodrang received a prestigious FAO's "Model Agriculturalists" award on 18th October 2019 at the FAO Regional Office for Asia and Pacific in Bangkok, Thailand.The Assistant Director General of FAO RAP presented the FAO's annual Asia-Pacific award to Ms. Chimmi Dema and four other Asian and Pacific farmers for their outstanding achievements in agriculture and food production.

Ms. Chimi Dema is a progressive dairy farmer in Gogona under Gangtey gewog in Wangdue Phodrang. She is an active member and also serves as the dairy technician at the Milk Processing Unit (MPU) of Gogona Gonor Yargay Chethuen Detshen. Finding dairy enterprise as a promising enterprise for cash income generation, she and her husband planned to strengthen their dairy business last year (2018). They applied for a Priority Sector Lending (PSL) loan to build and expand their dairy farming business. With the loan from the PSL, they build an improved dairy shed and bought 20 Holstein Friesian dairy cows. With the addition of these dairy cows, the milk supply to the MPU has increased and this has helped the Gogona Gonor Yargay Chethuen Detshen to supply more dairy products to consumers in Wangduephodrang and in Thimphu.

4th Royal Highland Festival to boost highland opportunities

The 4th Royal Highland Festival was held at Langothang in Laya, located above 3800 masl which attracted more than two thousand visitors providing them an opportunity to experience the yak based livelihood and unique nomadic culture.

The highlanders from Wangdue, Thimphu, Paro, Haa, Trongsa, Bumthang, Trashigang, Lhuentse, Trashiyangtse and Gasa also participated in the festival exhibiting their local yak products such as chugo, fermented cheese, bags, neck sleigh, rope and caps among others. According to Sangay Tenzin from Nubi in Trongsa, attending the festival for the first time was a learning experience for him. He got an opportunity to explore technologies, meet new highlander friends and share ideas. He was able to make a sale of Nu. 12,000/- from yak products.

Further, the highlanders from Sikkim and Nepal joined the event through ICIMOD displaying various diversified highland products for locals to explore and learn about their potential opportunities in Bhutan. Dr. Karma Tenzin, the Acting Director from the Department of Animal Husbandry and Veterinary Services, Sikkim shared that the team was happy to be a part

of the beautiful festival witnessing many similar yak activities. Considering the positive impacts and importance of such festival for the highland community, “Sikkim is keen to organise similar festival where Bhutanese highlanders will be also invited to explore opportunities and exchange ideas and knowledge,” shared the Acting Director. Various entertaining programs including the

animal parade, tug of war, horse race, cattle show, strongwoman competition, wrestling, run and lottery along with various cultural dances also steal the hearts of visitors.

According to a spokesperson, the festival served as a source of income for many highlanders through homestays pack pony services, sell of yak products and other business opportunities.

The Hon'ble Lyonchhen, Dr. Lotay Tshering graced the festival along with other dignitaries.

It was organised by Gasa Dzongkhag jointly with the Office of the Gyalpoi Zimpon and the Department of Livestock.

Statement by Sanam Lyonpo on the occasion of World Antibiotic Awareness Week

Today we join the global community in observing World Antibiotic Awareness Week (WAAW) from 18 to 24 November 2019- a worldwide initiative to raise awareness of antimicrobial resistance and to encourage the responsible use of antibiotics in all areas, including human and veterinary medicine. Antibiotics are used for treating infections caused mainly by bacterial agents. Failure to use them in prudent way is one of the main reasons attributing to development of resistance in disease causing agents. Treating an infection caused by resistant agent requires higher generation antibiotics.

Globally, about 70% of the antibiotics manufactured by pharmaceutical companies are used in veterinary practices that include production animals, companion animals and wildlife. This means a substantial amount of antibiotics are pumped into our food chain and environment. Weak compliance to regulations of prudent use of antibiotics will expose humans and animals to sub-therapeutic dose and facilitate resistance development.

I am informed that the human and animal health sector has embarked on Fleming Fund Grant Project which will specifically focus on antibiotic resistance containment practices and generate evidence based information that will augment policies and new directions in use of antibiotics in both human medicine and veterinary practice. I am also aware that to date we have only Action Plan for antimicrobial resistance (AMR). Should the Fleming Fund activities generate quality science based evidence, the existing Action Plan will be transformed into policy.

New community AI centre for Nangmalam, Pemagatshel

A new community artificial insemination (AI) centre was inaugurated at Nangmalam under Zobel gewog on December 23, 2019. It will benefit around 96 households and help youths to earn income by providing the AI community services. It is the 11th centre in the Dzongkhag with an aim to improve the cattle breed.

Nangmalam community has 357 female cattle populations. The AI services will be provided by the trained Community Artificial Insemination Technician (CAIT).

Ap Karma is totally happy with this initiative. He said, “With the centre in place, I have now a dream to own a better jersey breed and supply milk to the MPU.” One of the CAITs, Tshewang who is also the chairman of the dairy group hopes that his services will contribute towards the breed improvement in the community and enhance income generation in the coming years. He aspires to improve milk production in the community to ensure more profit for the dairy group members. Abi Tshomo is thankful to the government for bringing the service at her doorstep, availing which the earlier was tedious and time-consuming.

Quarg Cheese Production: Innovation in dairy product diversification

Training on Quarg cheese production was conducted from 10-12 January, 2019 for the Dzongkhag extension staffs of 12 gewogs and two plant workers of the Louten Om Detshen (LOD) at Yoghurt plant, Sarpang. Quarg cheese is an acid coagulated fresh unripened variety of cheese with high nutritional value.

The training was aimed to develop a new dairy product for display during the Southern Foothills Festival which was held from 16-18 January, 2019.

Participants were trained on the production process of Quarg cheese starting from milk reception, quality testing, production steps and storage of the final product. In addition, participants were also trained on the production of Rasgulla and flavoured yogurt.

It was organized by the Dzongkhag Livestock Sector, Sarpang with technical experts from the NDRDC, Yusipang.

Coordination Workshop on National Highland Development Program

Three-day Coordination Workshop on Highland Development Program was held at Gelephu from 13-15th January, 2020 on the theme Promotion, Protection and Preservation yaks and highlanders.

The main objectives of the coordination workshop was to sensitize the highland dzongkhags and central agencies on the National Highland Development Program(NHDP), to draw 12th Five Year Plan of NHDP and deliberate the implementation of the current plan period, and to develop strategy of Gid eradication Program.

With the increasing number of highlanders preferring cordyceps collection over yak herding, the yak herding practice has been declining over a period of time. So as to promote, protect and preserve yaks and highlanders, the then National Highland Flagship Program(NHFP) was switched to National Highland Development Program(NHDP).

The closing of three-days coordination workshop was graced by Hon'ble Agriculture Minister and the workshop was organized by Research and Extension Division, Department of Livestock in collaboration with the National Highland Development Centre.

Towards Enhancing Dairy Product Quality

Based on the findings of research conducted by NDRDC, Yusipang, milk supplied by the farmers is of poor quality in terms of adulteration and microbial load. It is imperative that milk indented for production of products should be of high quality with low microbial load.

As a follow up action to the initial findings, a team from the NDRDC in collaboration with the Dzongkhag Livestock Sector, Sarpang conducted training on Clean Milk Production for the dairy farmers of Gelephu Om Detshen. It was conducted from 7-9 January 2019 at the RNR Centre, Gelephu.

The training aimed to improve awareness on clean milk production and improve dairy product quality in near future.

Awareness program on potential of Yak-based enterprise

The officials from the NDRDC, Yusipang and the RLDC, Tshimasham carried out a sensitisation program for the yak herders and livestock officials of Haa and Paro from 2 to 7 February, 2020 . They created awareness on different opportunities in yak farming and importance of establishing yak cooperatives with funds support from the Resilient Mountain Solutions (RMS), ICIMOD.

The livestock officials who availed study visits to ANAND, Gujarat in India through RMS funds from 15-23 December 2019 shared their knowledge and experiences to take forward the existing groups and cooperatives to a federation level.

Effective Micro-organism (EM) technology based farming knowledge to poultry farmers of Bhutan

A model poultry layer farm with a capacity of 500 birds was inaugurated at Pelrithang of Gosarling gewog on 7 February 2020. It was attended by the Chief Representative of Japan International Cooperation Agency (JICA), Director General of the Department of Livestock, Chairman and officials of Miyagi Farm Co, Japan along with senior officials and farmers from Tsirang.

The farm was funded by JICA with technical input from Miyagi Farm Co to transfer Effective Micro-organism (EM) technology based farming knowledge to poultry farmers of Bhutan. This transfer of knowledge is expected reduce cost of production, increase farm efficiency, increase use of local resources and develop egg brands for international market.

Bhutan: A Pioneer in Mahseer Conservation

Bhutan has a rich aquatic biodiversity and Mahseers is one of the largest fish which reins our aquatic ecosystems.Two Mahseer species are found in Bhutan's major river; Golden Mahseer (*Tor putitora*) which is listed as Endangered in IUCN Red list and the near threatened Chocolate Mahseer (*Neolissochilush exagonolepsis*).

Golden Mahseer are considered one of the majestic of all fish species found in the fresh waters of South Asia and in Bhutan, it is revered as one of the eight lucky signs, *Sernya*: The Golden Fish. Golden mahseer is listed as a Schedule I species in the Forests and Nature Conservation Act 1995. Yet, illegal fishing is still a concern. Efforts have been put in by the Ministry of Agriculture and Forests (MoAF) for Mahseer research and conservation works in Bhutan and our works are being applauded by the conservationists across the world.

The Ministry was honoured to have organised the first International Mahseer Conference (IMC) in Paro in December 2018. Subsequent to this, on behalf of the MoAF, the Royal Government of Bhutan (RGOB), Dr. Tashi Samdup, the Director General of the Department of Livestock handed over the "Baton" of the Bhutan Declaration of the 1st IMC to Dr. Apinun Suvarnaraksha, the Director of the 2nd IMC, Maejo University. It was held from 12-14 February 2020 at Chiang Mai, Thailand.

The Director General of the Department of Livestock highlighted on the impacts of the 1st IMC held in Bhutan. Bhutan Declaration, an outcome of the 1st IMC identified key issues and strategies for Mahseer conservation in Bhutan which the Ministry is keenly following up and addressing as recommended. As, Thailand take up in organising the 2nd IMC, the Director General shared that Bhutan remains committed towards safeguarding the aquatic ecosystems and ensuring a safe haven for Mahseer.

Reviving the traditional use of sheep wool and fibre

Yak fibre and sheep wool were used by the highlanders over thousand years to make clothes, tents, ropes and blankets. Currently, with availability of different wool and yak fibre materials in the markets, the cultural and traditional use of wool, fibre, knowledge and art of traditional wool processing is diminishing in the country.

Thus, a three days advocacy and hands-on training on sheep wool and yak fibre processing was organised for the highland livestock staffs at the National Sheep Breeding Centre (NSBC), Dechenpelrithang, Bumthang. It was aimed to revive and promote the traditional wool and fibre use; impart local skills and knowledge on traditional sheep wool and yak fibre processing, expose to different improve wool processing equipment and start annual sheep wool and yak fibre collection and recording. The event was attended by livestock staffs from Paro, Haa, Trashigang, Bumthang, Gasa, Thimphu and Wangdue and NHRD, Bumthang.

The two expert herders, Kunzang and Kencho from Tsento gewog, ESPs at NSBC and Ugyen Dorji from Meteorology Section, Bumthang who is known as the third-generation farmers with skills on sheep wool processing provided a hands-on demonstration-cum-training on yak fibre and sheep wool carding, spinning and needle and wet felting. Ugyen who hails from Khaling, Trashigang said that his family used to rear more than 800 sheep in the past. He is willing to share his skills and knowledge on sheep wool processing to any interested individual and organisations.

The event was organised by the Research and Extension Division in collaboration with the NHRDC and NSBC from 28 February to 1 March, 2020.

Harnessing benefits of transboundary cooperation for Yak conservation and development

: The Department, MoAF, handed over to Government of Sikkim (India) one young yak breeding bull and two young yak breeding bulls to Government of Nepal within the purview of Kangchenjunga Landscape Conservation and Development Strategy and Regional Cooperation Framework and National Highland Development Program (NHDP), Bhutan on 28th February, 2020 at Paro, Bhutan.

The Kangchenjunga Landscape Conservation and Development Initiative (KLCDI) coordinated by International Central for Integrated Mountain Development (ICIMOD) provides excellent platform for KLCDI member countries (Bhutan, India and Nepal) to cooperate and implement systematic yak breeding bull exchange programme to address the emerging issue of inbreeding and reduced productivity in yak.

Yaks play significant role in ecosystem management and food security of the highlanders in the Kangchenjunga Landscape covering an area of 25,081 square kilometers of eastern Nepal, Sikkim and west Bengal of India, and western and south-western parts of Bhutan. The culture and economy of yak rearing has connected people for centuries in this landscape.

Dasho Secretary, MoAF, Dasho Dzongdag, Paro Dzongkhag, Dr. Nakul, Program Coordinator, KLCDI, ICIMOD, Nepal, Director General, Department of Livestock, Nepal Veterinary officer from Sikkim, Towchu Rabgay, Chief, RED, DoL and other dignitaries were present during the event.

The Department (DoL) goes Video Conferencing

Fortunately, technology makes it easy, to be more efficient and cost-effective. The Department used video conferencing to communicate with its field officials who are stationed across the country to discuss and finalize the stimulus plan and front loading of the 12th FYP activities and align to the financial year 2020-2021.

Use of this technology was very effective and resourceful. The Department will capitalize on this technology to communicate and make decision with field officials on livestock related activities in future.

Bhutan prepares for emergency response actions to tackle African swine fever

Bhutan prepares for emergency response actions to tackle African Swine Fever (ASF) following the report of ASF mortality in Assam and Arunachal Pradesh, India on May 2, 2020.

The case was confirmed by the National Institute of High Security Animal Diseases in Bhopal.

ASF is a severe viral disease of pigs affecting both domestic and wild pigs. It does not directly affect public health and does not transmit from animals to humans. It is a terminal and highly infectious viral disease which causes a serious impact on the pig population and there is no vaccine nor cure for ASF. It can be spread by live or dead pigs and pork and occur via contaminated feed and objects such as shoes, clothes, vehicles, knives and other equipment. The disease has been spreading globally for several years since its first report from China in August 2018.

To prevent the disease from entering into the country, officials from the Department and Bhutan Agriculture and Food Regulatory Authority (BAFRA) met on May 4, 2020 to discuss the emergency preventive measures.

The joint team is assessing the risk of ASF incursion through legal and illegal imports of animal feed, equipment and other materials as well as wild pig movement across the border. The existing pig population both commercial and scavenging pigs in the risk areas are being mapped. The information generated from the study will be used for updating the ASF emergency preparedness plan.

The Department is disseminating the appropriate awareness and educational materials to the relevant officials and communities.

Pig farmers are advised not to feed any pork or pork products to pigs as this is the greatest risk for ASF spread. Besides, those individuals who raise or rescue pigs for Tshethar purposes are advised to confine the pigs as the mixing of domestic pigs with the wild pigs pose a threat for an incursion of disease.

National Apiculture Strategy and Action Plan in place

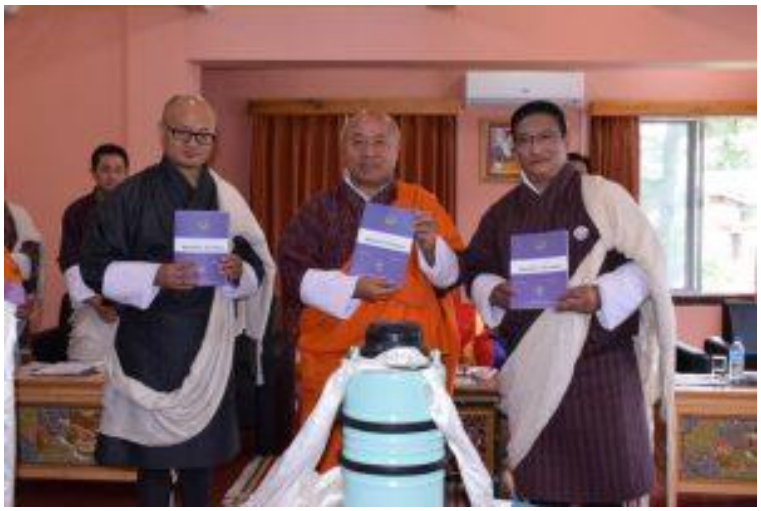
The Hon'ble Sanam Lyonpo launched the National Apiculture Strategy and Action Plan toenhance apiculture development in the country. It highlights the important issues and key action areas and provides a practical approach to optimise the sustainable utilisation of the rich diversity of honeybee resources for greater socio-economic benefits of Bhutanese people.

Animal health disease control plans for PPR, FMD and Avian Influenza Launched

The National Centre for Animal Health and Animal Health Division of the Department launched the National Peste des Petits Ruminants (PPR) prevention, control and eradication plan 2020 for proper management of livestock diseases.

4th volume of Bhutan Journal of Animal Science launched

The Hon'ble Sanam Lyonpo launched the 4th volume of Bhutan Journal of Animal Science (BJAS) which is published annually by the Department.



Sexed semen technology launched

Considering the growing demand for heifers to boost dairy production, the Department launched sexed semen technology and its user guidelines.

Native Poultry and Heifer Production Centre-Sertsam

The Native Poultry and Heifer Breeding Centre is located at Sertsam under Jarey Geog, Lhuntse Dzongkhag. The center lies adjacent to Gorgan highway at an altitude of 986 meters above sea level (masl) and an area of 95.5 acres. The farm was initiated in February 2017 with 63 heads of cattle under the Royal command coinciding with the birth anniversary of Gyalsey.

Vision

To conserve and maintain pure lines of Siri/Indigenous cattle and native poultry breed and to be the source of the pure line of native poultry and cattle in the country