

## Research Article

# Government Programmes for Agriculture and Allied Activities in Sikkim: Implementations & Achievements

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Received: 19/Oct/2024; Accepted: 21/Nov/2024; Published: 31/Dec/2024

**Abstract**—The present study analyses the Government Programmes for Agriculture and Allied Activities in Sikkim: Achievements & Suggestions. The study is based on secondary data retrieved from the Annual Progress Report, 2015-2016, Department of Food Security & Agriculture Development, Government of Sikkim, Krishi Bhawan Tadong, Gangtok, East Sikkim.

Sikkim is an agricultural state where more than 60 percent of its total population is engaged in agriculture [12]. The increasing population pressure on land has resulted in low per capita land availability and there is decreasing trend of farmers working on farms. In addition to this, agriculture is facing a lot of competition from various other development sectors, which is discouraging the youth away from farming. The challenge is therefore to include innovative technologies in agriculture so as to make it more lucrative for the youth. The Animal Husbandry, Livestock, Fisheries & Veterinary Services Department of the state is working towards maintaining better infrastructure for supporting animal husbandry. The Government policies and programmes favouring agriculture and its allied activities will go a long way in achieving self sufficiency and will definitely uplift the socioeconomic status of the poor and the marginalized sections in the society. Hence, the study holds a great relevance.

**Keyword**—Sikkim Government Policies and Programmes for Agriculture and Allied Activities, Implementation, Achievements, Policy Suggestions.

## 1. Introduction

Sikkim is basically an agricultural state with over 60 percent of the total population depending on agriculture [12]. Being an organic state, the Department is propagating and advocating farmers to adopt new and modern technology of organic farming system to sustain the production and certification process in identified areas.

Due to the adverse geographical situation and difficult terrain condition, the extension of area under cultivation appears to be difficult. The increasing population pressure on land has resulted in low per capita land availability and there is decreasing trend of farmers working on farms. In addition to this, agriculture is facing a lot of competition from various other development sectors, which is discouraging the youth away from farming. The challenge is therefore to include innovative technologies in agriculture so as to make it more lucrative for the youth.

Till the end of the Eighth Five Year Plan, progress in Animal Husbandry and Veterinary Services Sector was insignificant

in Sikkim. Fisheries Department in the state was under the Forest Department as its role was limited to conservation and licensing of the fish stock in the various rivers and water streams. The real progress in Fisheries sector was made from the year 2004 onwards when Fisheries Directorate was brought under the umbrella of the Animal Husbandry and Veterinary Services Department from the Forest Department [12].

Animal Resources Sector provides milk, meat and eggs to meet the protein requirement of large human population. Today Sikkim can boast of best infrastructure in poultry, dairy and other sectors and has attained self-sufficiency in the broiler meat and milk production. Cross Breeding Programme carried out by the Department over the last two decades has resulted in significant improvement in milk production and today the organized sector (Sikkim Milk Union, North Dairy Milk Union and Sikkim Dairy Pvt. Limited) are processing around 40,000 litres of milk per day resulting in direct transfer of more than Rs.39 crores to our dairy farmers annually whereas in unorganized sectors, 60 percent of the milk is sold through open market [12].

Government of Sikkim has left no stones unturned to enhance the agriculture and the animal husbandry sector in the state through its various policies and programmes which will go a long way in achieving self sufficiency and will definitely uplift the socio-economic status of the poor and the marginalized sections in the society. Considering its significance in the state, the Government has undertaken numerous policies and programmes in these sectors.

## 2. Related Work

India is one of the fastest growing G20 economies, largely reflecting an ambitious reform agenda under implementation since 2014. Against this background, agriculture is a key sector in terms of its contribution to both employment and GDP. Sustained by improved access to inputs such as fertilizers and seeds, as well as better irrigation and credit coverage, production has been increasing on average at about 3.6 percent annually since 2011. The sector has also been diversifying from grains towards pulses, fruit, vegetables and livestock products, largely driven by evolving demographics, urbanization and changing demand patterns [1].

Agricultural policies in India are designed and implemented by a complex system of institutions. States have constitutional responsibility for many aspects of agriculture, but the central government plays an important role by developing national approaches to policy and providing the necessary funds for implementation at the state level. Nevertheless, no sufficiently strong mechanism exists to bring state and central level policy-makers together to discuss problems, design solutions, and monitor performance. At the central level, while the Ministry of Agriculture and Farmers' Welfare has responsibility for agricultural policy, many other ministries and agencies have important roles. There is, therefore, significant risk of fragmentation, overlapping and unclear attribution of responsibilities [1].

The diversity of natural regions and climatic conditions in India allow for the cultivation of a wide range of crops and various livestock activities. While the contribution of the agricultural sector to GDP has continued to decline over the last two decades – from 29 percent in 1990 to 17 percent in 2016 – it remains a major source of employment, accounting for about 47 percent of the total national workforce [2]; [3]; [4]; [5]. The green revolution in cereal production (late 1960s - early 1980s) was succeeded by the white revolution in milk production (starting in the 1970s), the gene revolution in cotton production (early 2000s) and the more recent diversification of production towards pulses, fruit and vegetables as well as meat and meat products. The share of the livestock sector in total value of agricultural production has increased from 27 percent in 2000 to 34 percent in 2016.

Sikkim, the 22<sup>nd</sup> state of India is basically an agricultural state with over 60 percent of the total population depending on agriculture [12]. The increasing population pressure on land has resulted in low per capita land availability and there is decreasing trend of farmers working on farms. In addition to this, agriculture is facing a lot of competition from various

other development sectors, which is discouraging the youth away from farming. The challenge is therefore to include innovative technologies in agriculture so as to make it more lucrative for the youth [12]. The Government of Sikkim has left no stones unturned to enhance the agriculture and the animal husbandry sector in the state through its various policies and programmes.

## 3. Data and Methodology

The study is based on secondary sources. The secondary data and information were collected from the Annual Progress Report, 2015-2016, Department of Food Security & Agriculture Development, Government of Sikkim, Krishi Bhawan Tadong, Gangtok, East Sikkim. The author also visited various departments under Government of Sikkim like Horticulture Department, Agriculture Department, Krishi Vigyan Kendra, Animal Husbandry Department and interacted with the concerned higher officials.

The present study analyses the Government Programmes for Agriculture and Allied Activities in Sikkim: It's Implementation & Achievements..

## 4. Results and Discussions

### 4.1. Government Policies and Programmes for Developing Agriculture in the State: Implementation and Achievements.

#### 1. Soil Health Card Scheme:

The Government of India launched Soil Health Card Scheme in February 2015 where soil cards were issued to farmers, which carried crop wise recommendations of nutrients and fertilizers required for the individual farms and to help farmers to improve productivity through judicious use of inputs. This soil card will help the farmers to get an idea on the crop-wise recommendations of nutrients and fertilizers required depending on soil nutrient status.

Keeping in view the organic agriculture in the state and the importance of soil testing, the State Agriculture Department has implemented the scheme on 12<sup>th</sup> September 2015. As 90 percent of the area in the state is rain fed, it was decided to do sampling on 10 ha grid basis. The field functionaries took up GPS coordinates i.e., latitude and longitude of the sampling area. The area of the state was divided into 10 ha grids, which was then superimposed on GPU boundary so that exact number of sampling units could be identified. The Survey of India (SoI) Toposheet was used to generate the grid map.

Soil sample was collected from each household within the GPU as per the criteria. Farmer's details which included address, Aadhar no., phone no., Khasra no., area of the land, crop sown in each season and their yield were simultaneously collected from the field. The samples were made into composite sample by mixing the samples, which fell within the particular grid. Composite sample was then tested in the lab for the report.

The soil sample was tested for parameters viz., pH, electricity conductivity (E.C.), organic carbon (O.C.) available major nutrient N,P,K, secondary nutrients (S and B), micronutrients (Fe, Mn, Zn and Cu). The extraction for micronutrient was prepared in the Soil lab East District for copper, zinc, manganese, iron, sulphur and boron. Micronutrient analysis was done in coordination with Sikkim University.

**Table - 1: Status of Soil Health Card 2015-16**

Sl. No.	District	Total No. of Grids	Farmers Covered	Health Cards Generated
1	South	2569	14614	14614
2	North	445	2629	2629
3	East	2471	14425	14425
4	West	3201	13359	13359
5	Total	8686	45027	45027

Source: Department of Food Security & Agriculture Development, Government of Sikkim, 2016.

**Table - 2: Soil Fertility Status of the State**

As per the analysis of the soil of different district of Sikkim, the fertility is as such:

Sl. No.	Parameters	Status
1	Organic carbon	High
2	pH	5.2 to 6.9
3	Nitrogen	Low to medium
4	Phosphorous	Medium to high
5	Potassium	Medium to high
6	Sulphur	Sufficient
7	Boron	Sufficient
8	Iron	Sufficient
9	Zinc	Sufficient in most of the areas 12 % of the area is deficient
10	Manganese	Sufficient
11	Copper	Sufficient in most areas 15 % is deficient
12	EC	Low in all the areas

Source: Department of Food Security & Agriculture Development, Government of Sikkim, 2016.

**2. Holistic and Sustainable Policy of Adopting Organic Farming:**

The hill agriculture has always been a challenge world over. The green revolution and other technological intervention have changed the scenario of agriculture in the plains where assured irrigation facilities were available, but the hill agriculture could not achieve significant improvement due to rain-fed farming. This led to adoption of organic farming system best suited to Sikkim. The then government presented the idea of transforming Sikkim into organic state in the year 2003 and in 2016 Sikkim became 100 percent organic state. Organic farming provided numerous livelihood opportunities in the state for its people. Huge demands of organic commodities within the country and abroad provided opportunity to sell the organic seeds, planting materials and other farm produce in premium price. Educated unemployed youth opted for low volume and high value organic crop production for livelihood. Organic farming demanded significant quantity of quality organic inputs, such as vermin-compost, enriched rural compost, phosocompost, bio-fertilizers, bio-pesticides etc. Farmers earned additional income by selling their surplus organic manure (Department of Food Security & Agriculture Development, Government of Sikkim).

**3. Establishment of Integrated Pest Management Laboratory:**

Integrated Pest management (IPM) Laboratory is established at Tadong, East Sikkim with an initiative to isolate and identify pests (diseases and insects); to rear bioagent like Trichogramma and release it in the field; provide diagnostic services; undergo survey and surveillance; conduct bio pesticide testing; leaf analysis for physiological disorders like nutrient deficiencies; provide training (as a resource persons for ATMA or HCCDD) and publishing technical handouts and leaflets.

National Centre for Integrated Pest Management (NCIPM) New Delhi had allotted a sum of Rs. 10 lakhs to IPM section under Tribal Sub-Plan (TSP) for the welfare of tribal farmers in Sikkim in the year 2015-16. IPM section had utilized the fund for procurement of Bio pesticides, conducted training and awareness programmes regarding uses of the different Bio-pesticides against different pests and diseases. The details are depicted in table 4.3 given below:

**Table -3: Allocation of funds under Tribal Sub - Plan: Target and Achievement**

Sl. No.	Component	Target		Achievement		Remarks
		Physical (in no.)	Finance (in thousands)	Physical (in no.)	Finance (in thousands)	
1	Procurement of bio pesticides		5,79,806		5,79,806	Distributed to the tribal farmers
2	Training and awareness to tribal farmers on IPM in spices, paddy and vegetables.	08	2,00,000	08	2,00,000	Tribal farmer beneficiaries attended the training and awareness programme on IPM in spices, paddy and vegetables.
3	Meeting, accommodations, transportation and miscellaneous		2,20,194		2,20,194	Expenditure incurred during the first meeting and subsequent visits.
<b>Total</b>			<b>10,00,000</b>		<b>10,00,000</b>	

Source: Department of Food Security & Agriculture Development, Government of Sikkim, 2016.

**4. Formation of Sub-Mission on Agricultural Extension Under State Agricultural Management and Extension Institute:**

The Government of India has launched Sub-Mission on Agriculture Mechanization (SMAM) under Extension Management in 2014-15. During 2015-16 a sum of Rs. 130.77 lakhs was sanctioned by the Government of India to

Sikkim, out of which Rs. 90.265 lakhs was the central share and Rs. 40.505 lakhs was the state share under the funding pattern of 50:50. The amount was used for demonstration of modern technology and training to the farmers. Financial assistance was given to the farmers for procuring machinery and implements. Sub-Mission on Agricultural Extension (SAME) under State Agricultural Management and Extension Training Institute (SAMETI) restructured and strengthened agricultural extension machinery with an objective to appropriately strengthen, expand and up-scale existing Extension & Information Technology (IT) Schemes. The ongoing Extension Schemes include the Central Sector and Centrally Sponsored Schemes being implemented by the Extension Division/Directorate of Extension. In the year 2015-16 a sum of Rs.529.26 lakh was received under this scheme which was utilized for conducting workshops, training and exposure visits to farmers within the state and outside the state, demonstrations, exhibitions, conducting interactions among the farmers and the scientists and for opening farm schools. Apart from this, twenty in service field functionaries were offered diploma in Agricultural Extension. Information was disseminated through agricultural cropping calendar, newsletters, success stories and boards displayed at all Gram Panchayat Units for wider publicity.

This scheme was successful in transforming the mindset of the farmers from subsistence farming to market oriented farming by adopting new technologies. The financial benefits from ATMA (Agricultural Technology Management Agency) was released through account payee cheque directly to the farmers in their bank accounts that enabled them to get bank loans without collateral.

##### 5. Rastriya Krishi Vikas Yojana:

Rastriya Krishi Vikas Yojana (RKVY) was started during the year 2007-08 with 100 percent Additional Central Assistance (ACA) from government of India. Now the funding pattern has been changed to 90:10 between the Centre and the State Government.. Total fund allocated for Sikkim by the Central government under this scheme in the year 2015-16 was Rs.4.07 crore which was used for assessing and mapping important soil parameter; establishing post harvest management cum storage at Rangpo; establishing input storage godown at Tadong; establishing input store at Kopchey; constructing godown at Mangan, North Sikkim; strengthening IT apparatus; conducting training and awareness programme for farmer members of Cooperative societies on Agricultural credit and marketing with focus to State Organic Mission.

##### 6. Launching of Paramparagat Krishi Vikas Yojana:

Paramparagat Krishi Vikas Yojana (PKVY) was introduced in Sikkim in 2015-16. The decision in allocation of the Central and state share from 50:50 to 90:10 delayed the actual implementation of the scheme. As a result the Cabinet approved the proposal for the implementation of the PKVY Scheme during March 2016 and hence the implementation of the scheme could commence from 2016-17. The scheme consists of organic certification through participatory Guarantee System (PGS) and Adoption of Villages for

Manure Management. It covers the organic farming process right from the production till the post harvest processing of the organic products.

The Central and the State Government with a share of 90:10 funded a sum of Rs. 454.56 lakhs to Sikkim where 66 clusters all over the state (20 West, 20 South, 18 East and 8 North) got the benefit. Total number of 3300 farmers were covered with total area of 3300 acres. Each farmer member was assisted for procuring and applying liquid bio pesticide for suppression of disease in crop plants; for procuring and applying neem cake for controlling pest and disease; for procuring and applying phosphate rich organic manure/zyme granules to soil to meet phosphorus/zinc deficiency in soil; for constructing vermicomposting in collaboration with MGNREGA where initially 33.00 lakhs have been transferred to the farmers for procurement of raw materials; for procuring packing material, for preparing labels, holograms, printing etc. and branding of organic products.

##### 7. Implementation of Pradhan Mantri Krishi Sichai Yojana (PMKSY):

Pradhan Mantri Krishi Sichai Yojana (PMKSY) has been a great relief to the State Government for development of irrigation infrastructure with 90:10 funding pattern by the Central and the State Government.

The PMKSY has supplemented the agricultural practices of the farmers with improved technology and assured water supply. Now, people have become efficient, conscious and are producing more food grains and vegetables. The implementation of minor irrigation channel schemes has generated direct employment to the rural poor females too.

##### 8. Adoption of Rainfed Area Development Programme:

Rainfed Area Development (RAD) programme was introduced during the year 2014-15 but due to the change in the funding pattern (earlier 50:50 and 90:10 later) the program couldn't be implemented on time. In 2015-16 a sum of 103.92 lakhs was received by the state under this programme which was used for accomplishing different activities which included integrated farming system, agro forestry system (crop/cropping system), horticulture based farming, tree silvipastoral farming, livestock based farming system (CB cow/heifers + mixed farming + poultry), value addition and resource conservation, bee keeping, land development, soil reclamation and renovation of old tank.

##### 9. Establishment of Krishi Vigyan Kendra:

The first KVK in Sikkim was established in Marchak, East Sikkim in 1982 under the agency of ICAR Tadong. Later on the Central Government decided to introduce KVK in each district of the state to provide better extension services to the public in general and farmers in particular. Then, three KVKs were established in the year 2006-07 at North, West and South districts under the administrative control of FS & ADD with 100 percent funding from ICAR with an objective to communicate the latest knowledge to the farmers through the principles of "Teaching by Learning and Learning by Doing".

## 4.2: Government Policies and Programmes for Augmenting Livestock Economy in the State: Implementation and Accomplishments.

### 1. The Dairy Development Programme:

Among the development programmes under animal husbandry sectors special priority was given to dairy. Accordingly, activities like capacity building, cattle induction, fodder development, entrepreneurship development for establishment of dairy farm were the main thrust of the development. The dairy development in the state in the three districts of Sikkim viz., East, West and South have been implemented through Sikkim Milk Union and in the North district through North District Milk Union. Some of the significant achievements in dairy sector in Sikkim are as mentioned below:

- The Sikkim Co-operative Milk Producers Union Ltd., the apex milk Cooperative of the state has successfully completed nearly four decades of operations in cooperative principles.
- The procurement of milk has grown from the level of 2000 liters per day in the year 1980 to 33000 liters per day in 2016. Accordingly, market has also grown up.
- The processing capacity had gone from the 5000 LPD in 1980 to 20000 LPD in 2016.
- The number of village Milk Producers Cooperative Societies has gone up from 51 in the year 1980 to 287 by the year 2016.
- The milk collection centres have increased significantly. The members pouring milk to the union has grown up from 2000 in the year 1980 to 13237 members in 2016.
- The Sikkim Milk Union has managed to earn profit since its inception. The bonus to the societies in the form of price difference is being distributed to the dairy farmers every year.
- Sikkim Dairy Products Pvt. Ltd (SDPPL) was formed in 1996 and registered under Sikkim Companies Act, 1961 in order to help small and marginal dairy farmers of Dentam area. It is a farmer based developmental company initiated and promoted by the Indo Swiss Project Sikkim (ISPS) and Government of Sikkim.
- In Sikkim for the first time, the Sikkim Milk Union represented a place in a National Level Body and become one of the Board of Directors of National Cooperative Dairy Federation of India (NCDFI) for a period of three years from 2008-09.
- Milk price to the farmers is offered at very competitive rates. The milk price provided to the farmers is one of the highest in the country on fat and SNF basis.
- Employee Gratuity Fund has been subscribed with the LIC to provide confidence among the employees and to avoid liabilities of the union on this.
- The Sikkim Milk Union has also been catering to the need of milk managed for defense establishment since 2008 including the units in Algara, Kalimpong in West Bengal.
- The Sikkim Milk Union has now diversified its products to meet consumer's requirements. Presently, paneer, butter, churpi, lassi, curd, cream are produced in addition to three varieties of liquid milk introduced ice cream, flavoured milk since the year 2009-10.

- Asian Productivity Organization head quartered in Japan selected Sikkim Milk Union to develop into a Demonstration Companies in the year 2010.
- Establishment of Dairy Development Programme in North district of Sikkim w.e.f. 1996-97 has benefited the tribal milk producers of North district. On 27<sup>th</sup> March 2008, the department was successful in creating North District Milk Producers Cooperative Union Ltd.

In order to augment the milk production of the state and to uplift the economic condition of the rural masses the government launched several missions like Dairy Mission, Livestock Self Sufficiency Mission etc. Capacity building and distribution of milch cows in cluster-based approach were given the prime importance.

**Table - 4: Induction of High Yielding Milching Cows in all the Districts of the State**

Sl. No.	Years	No. of Milch Cows Distributed	No. of Beneficiaries
1.	1994-1995	679 Nos.	679 Nos.
2.	2007-2008	232 Nos.	232 Nos.
3.	2008-2009	354 Nos.	354 Nos.
4.	2009-2010	686 Nos.	686 Nos.
5.	2010-2011	449 Nos.	449 Nos.
6.	2011-2012	433 Nos.	433 Nos.
7.	2014-2015	242 Nos.	242 Nos.

**Source: Department of Animal Husbandry, Livestock, Fisheries & Veterinary Services, Government of Sikkim, 2016.**

### 2. Modernization of Dairy Sector:

To modernize the dairy sector, State Government has set up a model mother dairy farm at Karfectar, South Sikkim with an objective to act as ready demonstration unit of a modern dairy farm and to produce high yielding heifer for farmer's distribution. Practical hands on training for departmental officials as well as progressive dairy farmers were carried out. To encourage farmers to take up the dairy activities on a large commercial scale, intensive trainings are provided to the farmers at National Dairy Research Institute, Karnal, Haryana. Further, farmers have been provided bucket type milking machines so that they are encouraged to adopt modern dairy practices.

On 15<sup>th</sup> August 2009, a landmark initiative was taken by the Government of Sikkim by launching Dairy Mission for Sikkim for the year 2009-2012. The mission has very clear objectives that to achieve per capita milk availability at par with the developed countries and to meet the complete nutritional requirement for future generations within the mission period. To make the farmers self reliant, the Department intends to increase the milk production by adopting the following strategies:

1. Introducing at least additional 2400 high yielding crossbreed cows in the rural areas for rearing and for enhancing milk production within mission period.

2. Strengthen the existing Apex Milk Cooperatives such as Sikkim Cooperative Milk Producers Union Ltd. and North Sikkim Cooperative Milk Union Ltd. to cope up with the increasing production levels and marketing requirements. Milk processing capacity to be increased from 15000 liters per day in 2009 to 30000 liters per day by 2012.
3. Promoting the value addition to milk and milk products by branding the milk and milk products as Sikkim Organic and also making it available outside the state and country. Products like ice cream, flavoured milk, cheese, paneer and sweetened milk products will be introduced to increase the marketing capacity and profitability of the milk unions. In this, Sikkim Co-operative Milk Producers Union Ltd. in Tadong will play the lead role.
4. Strengthening the breeding facilities such as Artificial Insemination and breeding bull availability and establishment of Bull Mother Farm in the state. Total number of Artificial Insemination centre in the state was increased from 140 in 2009 to 250 by 2012.
5. Strengthening the stockman centres and Veterinary hospitals to provide health and reproductive care to the dairy cows in the state.
6. Progressive dairy entrepreneurs will be facilitated for financial tie up with NABARD and SISCO bank with reasonable interest rate loans. At least 100 commercial dairy farms will be opened in the private sector by unemployed youths, each of which will be having 20-50 cows under milking.
7. Massive extension and training programmes will be organized for capacity building of dairy farmers to take up dairying farming as business enterprise rather than a subsidiary activity. At least 3000 dairy farmers will be provided training within and outside the state.
8. Providing support to the dairy farmers for practicing clean milk production methodologies in the form of Stainless Steel milk cans, other milking utensils, detergents, sieve, etc. at subsidized cost.
9. Promotion of cultivation of feed and fodder using the High Yielding Varieties of feed and fodder crops. Further, facilitating feeding of balanced and milch ration to the dairy cows by setting up feed plant in Sikkim in public/private sector.
10. Providing comprehensive health coverage to the dairy cows at subsidized cost, providing health management medicines such as mineral mixture, de-worming, vaccination at free of cost and providing dairy cow insurance at a very low cost.
11. A modern state of the art dairy farm is set up at Karfectar with automatic milk parlour, with carrying capacity of 100 cows. This dairy farm would act as a demonstration farm and would encourage our farmers to take up commercial dairy farming with latest technique.

**3. Foundation of Breeding Cell:**

The breeding cell is the hub of cattle breeding activity of the state by means of natural service (use of breeding bulls) and by the artificial insemination (artificially inseminating a cow for pregnancy). These activities are now exclusively carried out in cattle and buffalo in the state resulting to high milk production. The A.I. Center of Deorali Veterinary Complex

was renamed as Breeding Cell in the year 1995 and the job and responsibilities were defined with a proper organizational set up with arrangement of manpower for carrying out appropriate cattle breeding programme in the state.

Artificial Insemination Centers are established in both private and Government veterinary institutions. The state now possesses more than 127 Artificial Insemination centers with increased performance every year. Educated unemployed youths are identified from different locations of the state and thereby trained to become a private A.I. workers who can provide service on payment.

**4. Initiation of New and Innovative Programme Under the Common Minimum Programme:**

The department initiated a new and innovative programme under the Common minimum Programme of Government of India where cows and buffalo are insured and the farmers are benefitted during the time of difficulties when animals succumb to disease/accident/natural calamities. The insurance of livestock is covered by paying 50 percent premium share from the farmers and 50 percent by the Department. A total of almost 20 percent of the breedable cattle were covered under this scheme.

**5. Implementation of Feed and Fodder Scheme:**

In order to meet the requirement and availability of green and dry fodder, two fodder seed farms namely at Rabongla and Karfectar both located in South Sikkim have been established for the production of fodder seeds and planting materials. The important fodder species namely hybrid napier, rooted slips, coimbatore 172 along with guinea, signal grass, green leaf, disodium etc. have been multiplied and distributed to the progressive farmers from Karfectar farm. Similarly a number of temperate grass and leguminous fodder species have been propagated viz., rye grass, clover etc. have been multiplied and distributed to the progressive farmers.

In order to combat the green fodder deficit during prolonged dry winter period, the department provided nutritious fodder seeds like oat seed and maize seeds under the fodder seed distribution program and the farmers were motivated to increase the area under cultivation of winter fodder.

**Table - 5: Fodder Saplings and Cuttings Distributed to the Dairy Farmers, SHGs, NGOs from Fodder Seed Farm, Karfectar, 2015-16**

Sl. No.	Type of Fodder/Saplings/Slips Distributed	No. of Saplings/Slips Distributed				Total No. of Beneficiaries			
		East	West	North	South	East	West	North	South
1	Hybrid Napier	85962	85900	45962	125962	500	500	200	500
2	Guinea Grass		112750		112750		50		50
3	Amliso	-	-	10000	-	-	-	10	-
4	Signal Grass	27125	27125	27125	27125	20	20	20	
5	Hamel Grass	23730	23730	-	23730	15	15	-	15
6	Desmodium	-	250	-	250	-	5	-	5

Source: Department of Animal Husbandry, Livestock, Fisheries & Veterinary Services, Government of Sikkim, 2015 - 2016.

**6. Implementation of Mineral Mapping and Mineral Feeding Programme:**

Mineral mapping in Sikkim has been completed in 2010 in technical collaboration with the West Bengal University of Animal Sciences and Fisheries. It was found that almost all the animals were suffering from deficiency of micro and macro minerals. The department has prepared area specific mineral mixture and started feeding to the animals, the result of which is highly encouraging.

**7. Establishment of Pig Industry and Promotion of Pig Husbandry:**

In Sikkim, considerable population consume pork thereby pig sector provides a potent livelihood option to the people of the state. Pig husbandry not only plays an important role in improving the socio-economic conditions of the weaker sections of the people but also supplements protein requirement. High quality piglets were distributed to the farmers under scheduled Tribe and Scheduled Caste.

The Department of Animal Husbandry, Livestock, Fisheries & Veterinary Services has established six numbers of Piggery demonstration farms at different district namely:

1. Bop Piggery Farm, Chungthang (North Sikkim) demonstration farm with 30 sow unit established during the year 1987, the breed maintained in this farm is Hampshire, Large White Yorkshire and it produces 300 to 350 numbers of piglets per annum.
2. Tingvong Piggery Demonstration Farm (North Sikkim) established in the year 1990 with 10 sow unit and the breed maintained is Hampshire with production of 150 to 200 numbers of piglet per annum.
3. Gyaba Piggery Demonstration Farm (Gyalshing, West Sikkim) with 30 sow unit established in the year 1986. The breed maintained is Hampshire with a production of 300 to 400 numbers per annum<sup>2</sup>.
4. Assam Lingzey Demonstration Piggery Farm (East Sikkim) with 30 sow unit established in the year 2011. The breed maintained is Large White Yorkshire with a production of 400 to 550 numbers per annum.
5. Karfector Piggery Demonstration Farm (South Sikkim) with 20 sow unit established in the year 1986 with Hampshire and Durac breed with production of 150 to 200 numbers per annum.
6. Melli Dara Piggery farm (South Sikkim) with 50 sow unit established in the year 2013. The breed maintained is Large White Yorkshire with a production of 400 to 450 numbers per annum.

Most of the piglets produced in the above farms are distributed to the progressive farmers for breeding/fattening.

**Table - 6: Piggery Scheme adopted in the State and its Achievements**

Sl. No.	Year	Name of the Scheme	Name of the Work	No. of Beneficiaries
1	2011-12	National Mission for Protein Supplements	Establishment of nucleus units	Six government piggery farms were strengthened as nucleus units
2	2012-13	National Mission for Protein	Establishment of satellite units	25 satellite units were established for farmers/self help groups/entrepreneurs.

		Supplements		169 farmers were benefitted. Six piglets, including housing, feed and medicines were provided to each satellite unit.
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Source: Department of Animal Husbandry, Livestock, Fisheries & Veterinary Services, Government of Sikkim, 2016.

**8. Establishment of Poultry Sector:**

Today Sikkim has become self sufficient in the broiler Chicken production. The broiler Chicken production is more than 400 MT per month and is sufficient to meet the requirements of domestic population as well as tourists and army establishments. Some of the initiatives taken by the Government of Sikkim for enhancing poultry sector are as follows:

Sikkim Poultry Development Corporation was set up in the year 1995 for promoting poultry activities in the state. There are approximately 5000 poultry growers who are taking up poultry activities on a regular basis and supplying their products to the various markets in the state. Sikkim Poultry Development Corporation has also provided three utility vehicles to Denzong Agriculture Cooperative Society as a marketing support. These utility vehicles are used for carrying poultry from the local farmers to the end customers under the umbrella of Denzong Agriculture Cooperative Society.

Sikkim Hatchery Ltd. (SHL) was set up as a sister organization of the Sikkim Poultry Development Corporation (SPDC). The concept of integrated poultry development was conceived in the year 1997 which envisaged a Hatchery and Patent Stock Farm for the supply of hatching eggs to the hatchery. As a consequence of the decision taken by the government of Sikkim, Tokal Bermiok, South Sikkim was selected as the site of the hatchery and the construction work and installation of the machines was initiated in collaboration with M/S Vanketeshwar Hatcheries, Pune. Over the years SHL has been strengthened to meet the continuous increasing demand of the day old chicks.

State Government has set up several state poultry farms to act as a training and demonstration unit for the local farmers and unemployed youths. Chujachen Poultry Farm in East district and Karfector Poultry Farm in South district were established in 2000. Kamling Poultry Farm in West district was established in 2005. Nandugaon Poultry Farm, South District; Bermiok Poultry Farm, South District; Gyaba Poultry Farm, West district, Rhenock Poultry Farm, East district and Chandey Poultry Farm, North district were established in 2009 and Sirwani Poultry Farm, East district was established in 2013. The first three poultry farms were used for keeping the parent stock for the backyard poultry like Kalinga brown, Van raja breed of birds. Other five poultry farms were used for rearing for commercial layer poultry breed like white legion, etc. for egg production. The installed capacity of each poultry farm is 3000 birds and at present 3000000 table eggs are being produced per annum.

Rural Backyard Poultry Scheme was established where large number of BPL families were provided 45 numbers of low



input technology month old birds in two installments. Besides, each family is also provided Rs.750 for night shelter. These low input technology birds of breeds like Van Raja, RIR, Kalinga Brown, etc., survive even in the household backyard.

State Government is providing credit cum subsidy scheme to the educated unemployed youth to take up large-scale commercial poultry activities. Under this scheme, 15 percent subsidy is provided to the youths on the project cost and they are also provided one month training inside the state as well as outside the state. This has resulted in large number of youths taking up poultry activities.

Sikkim is first state in the country to set up a poultry estate at Mangalbari, West Sikkim with the assistance from the Department of Animal Husbandry, Government of India. At this poultry estate, 50 numbers of farmers are provided infrastructural facilities at one place so that each can rear 2000 poultry birds at one place. With the conscientious effort of the State Government, there has been drastic increase in the poultry production in the state which is shown in table 7 below:

**Table - 7: Total Production (Poultry, Egg & Broiler)**

Year	Local Poultry	Broiler
2005-06	60 MT	400 MT
2006-07	120 MT	500 MT
2007-08	110 MT	500 MT
2008-09	100 MT	400 MT
2009-10	120 MT	800 MT
2010-11	125 MT	2000 MT
2011-12	126 MT	2200 MT
2012-13	140 MT	2500 MT
2013-14	180 MT	2750 MT
2014-15	200 MT	3000 MT
2015-16	218.5 MT	3300 MT

Source: Department of Animal Husbandry, Livestock, Fisheries & Veterinary Services, Government of Sikkim, 2016.

As evident from table 7, the state has already become surplus in broiler Chicken production. Similarly, the egg production in the state and per capita availability of the eggs is continuously on the rise.

**9. Promotion of Goat and Sheep Rearing:**

The population of goat has considerably increased in the state. The market for Chevon in Sikkim is immense. From time immemorial, Sikkim peasants have always been rearing animals for extra income. Goat and sheep together constitute around 38 percent of the state livestock population. Over 65 percent of the state rural households are rearing goat for their supplementary income and nutritional security. Livestock, goat in particular are among the most indispensable and readily liquidated asset owned by the poor, can easily be sold off for urgent cash need like health cost, child’s education etc. Realizing significance of small ruminant in rural economy and to give impetus on goat production, Department has promoted goat rearing in the state by inducing high quality superior male goat at farmers level to bring improvement on meat production efficiency of local goat through cross breeding. State local goat popularly known as “Shingharey” is

widely reared by the farmers. Department has set up five goat farms to carry out a selective breeding of Shingharey goat for bringing productive performance on meat type. Goats are being maintained under grazing system providing all natural environment of the organic farming system.

**Table - 8: Parent Stock of Goat Inducted at the Time of Opening of Farm during the Year 2013-14 in Sikkim**

Sl. No.	Name of the Farm	District	No. of Goat		Total
			Male	Female	
1	Mangalbarey Goat Farm	West	03	41	44
2	Rorathang Goat Farm	East	02	20	22
3	Assam Lingzey Goat Farm	East	02	05	07
4	Rateypani Goat Farm	South	02	20	22
5	Tingvong Goat Farm	North	02	10	12
Grand Total			11	96	107

Source: Department of Animal Husbandry, Livestock, Fisheries & Veterinary Services, Government of Sikkim, 2015.

**Table - 9: Total Number of Goat Farms in the State of Sikkim during 2014-15**

Sl. No.	Name of the Farm	Parent Stock	No. of Goat		Total
			Male	Female	
1	Mangalbarey Goat Farm	44	08	-	52
2	Rorathang Goat Farm	22	07	03	32
3	Assam Lingzey Goat Farm	07	02	09	18
4	Rateypani Goat Farm	22	02	-	24
5	Tingvong Goat Farm	12	-	-	12
			107		138

Source: Department of Animal Husbandry, Livestock, Fisheries & Veterinary Services, Government of Sikkim, 2015.

**Table - 10: Total Number of Goat Farms in Sikkim in 2015-16**

Sl. No.	Name of the Farm	Parent Stock	No. of Goat		Total
			Male	Female	
1	Rorathang Goat Farm	32	09	07	48
2	Assam Lingzey Goat Farm	07	02	09	18
3	Tingvong Goat Farm	12	04	02	18
4	Mangalbarey Goat Farm	52	(-2)	(-2)	48
5	Rateypani Goat Farm	22	-	-	22
			125		154

Source: Department of Animal Husbandry, Livestock, Fisheries & Veterinary Services, Government of Sikkim, 2016.

In order to reduce the import of livestock products and become self sufficient, Government of Sikkim launched a “Livestock Self Sufficiency Mission 2015”. To achieve the target, department distributed free goats to small farmers, landless labours to help them to enhance their income.

**Table - 11: Distribution of the Goat carried by the Department during 2011-14**

District	Financial Year	No. of Constituency Covered	No. of Beneficiary	No. of Goat Distributed
West	2011-2012	8	120	480
	2012-2013	5	100	380
	2013-2014	1	21	63
<b>Total</b>		14	241	923
South	2011-2012	7	105	420
	2012-2013	2	45	140
	2013-2014	2	48	144
<b>Total</b>		11	198	704
East	2011-2012	10	150	600
	2012-2013	2	80	320



	2013-2014	1	91	273
<b>Total</b>		13	321	1193
<b>North</b>	2011-2012	3	45	180
	2012-2013 2013-2014	2	35	140
<b>Total</b>		5	80	320
<b>Grand Total</b>		43	840	3140

Source: Department of Animal Husbandry, Livestock, Fisheries & Veterinary Services, Government of Sikkim, 2015.

#### 10. Establishment of Rabbit Breeding Centres:

The Department of Animal Husbandry & Veterinary Services introduced 90 Angora rabbits as a parent stock from North Temperate Regional Station of the Central Sheep and Wool Research Institute Gharsa (Kulu) in Himachal Pradesh at Angora Rabbit Breeding Centre at Rabum (North Sikkim) in the year 1997.

Angora Rabbit Breeding Farm located at Rabum, North Sikkim has been established as a nucleus farm with an objective for further multiplication of angora rabbits and to popularize this venture for the production of Angora wool and its products in the state for creating supplementary source of income to the farmers particularly women folk residing in high altitude areas besides other Livestock Husbandry.

#### 11. Conservation of Germplasm of the Indigenous Yak Species and Improvement of the Breed:

To conserve the germplasm of the indigenous Yak species and also to improve the breed in terms of quality and productivity, the Department has introduced 41 numbers of elite parent breeding stock from Bhutan. A good quality cross breed offspring has also been produced at farmer's level with the introduction of new breeding stock. As a result of these efforts, the yak population has increased to more than 6000 in number.

#### 12. Deployment of Fisheries Industry:

Trout Fishery has a huge potential in the state due to the presence of abundance cold-water resources. Both the public and the private sector initiate trout farming as an economic activity. It has become an important source of livelihood for the rural people in the upland areas of the state where due to hilly terrain, agriculture and other allied activities are not feasible. So far 249 beneficiaries have been given financial support under the scheme of Trout Culture in Raceways with the financial assistance from NFDB, RKVY and State Plan. With the increase in the number of trout growers the production has risen sharply in the past few years. In the year 2008-09 trout production in the state was negligible which has increased to 110 MT in the year 2015-16.

With the objective to utilize the water resources of mid-altitude level, carp fishery development programme is initiated under various beneficiaries scheme in the private water bodies for carp fish production and in the public water bodies for carp seed production. In order to motivate farmers to take up carp fish farming, the Directorate has been providing subsidies under various financial schemes.

In the year 2012-13, 100 local unemployed youths were sent for exposure tour to Jammu & Kashmir on Trout farming and other places for Carp farming. Fish farmers of the state are sent for training on breeding and hatchery management of Carp fish and Prawn at College of Fisheries, Lembucherra, Tripura. The Departmental Officers are also sent for short term training to various places like Central Institute of Fisheries Education (CIFE), Mumbai, Directorate of Coldwater Fisheries Research (DCFR), Bhimtal under capacity building programme of National Fisheries Development Board and ICAR.

A retail fish market at Gangtok has been constructed with the financial support from the National Fisheries Development Board, Hyderabad. Fish produced locally will be sold from this market. Refrigerated vans are procured by the Directorate of Fisheries for the transportation of the fish from the production center to the market in fresh condition.

#### 13. Promotion of Preventive and Curative Veterinary Services:

Animal diseases constitute a major constraint to livestock production and the safe utilization of animal products. The impact of the livestock disease on the lives and livelihoods of the poor is very severe. Therefore, disease prevention through vaccination campaigns, reduction of mortality and morbidity has remained a priority. For the promotion of the animal health and delivery of preventive and curative services at the doorsteps of the farmers, the department has established a network of veterinary institutions all over the state. The department has introduced the latest technology in diagnosis and treatment of animals. The basic essential medicines including feed supplements and minerals mixture are provided free of cost to the farmers. Areas infected with parasites both ecto and endo parasites are accordingly dealt with and appropriate deworming medicines are produced on need basis. Similarly in areas with high incidence of mastitis, haematuria and during period of out breaks etc. team of officers from the department conduct on the spot study of the area and accordingly curative/preventive measures are taken up in war footing basis.

### 5. Conclusion and Suggestions

The importance and the success of agriculture and animal husbandry sector in Sikkim are seen by looking at the number of people involved and their income generation. The Model Organic State tag achieved by Sikkim indicates the progress of the state in the agricultural ventures. Furthermore, in livestock undertaking as well, the State is growing which is clear from the fact that more than 2,000 families are engaged in the broiler poultry chicken production.

Similarly, in the dairy sector, milk unions are processing more than 36,000 litre per day resulting in direct transfer of more than Rs. 3 crores per month to dairy farmers. Thus, approximately 36 crores per annum are transferred to the dairy farmers through organized sector alone.

As farmer's income has improved, employment in the agriculture sector has also improved. More educated persons are venturing into commercial farming. They can achieve reasonably better return on their investment in the animal husbandry sector.

The government pro-farmer policies support an environment of innovative and progressive farming. Besides, the increase in animal production has become a vital source for providing health to the public and their families in the form of rich nutrition. This could be achieved only due to consistent pro farmer's policies of both the Central and the State Government.

#### Data Availability

The data is available with the author.

#### Conflict of Interest

There is no Conflict of Interest

#### Funding Source

No Funding was received for this research

#### Authors' Contributions

The author has visited various concerned departments under Government of Sikkim and collected data for study.

#### Acknowledgements

I would like thank the officials from the concerned departments and my family members for their incessant support and cooperation throughout.

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