State Agricultural Infrastructure Development Programme (SAIDP) under Rashtriya Krishi Vikas Yojana (RKVY-RAFTAAR) for Haryana

Report
Submitted to

Department of Agriculture & Farmers Welfare,
Haryana, Panchkula.

Dr. Kulwant Singh
Assistant Professor

Centre for Research in Rural and Industrial Development (CRRID), Sector 19 A, Madhya Marg, Chandigarh
March, 2021

ACKNOWLEDGEMENT

We are grateful to the Department of Agriculture & Farmers Welfare, Government of Haryana for sanctioning the project for preparing State Agriculture Infrastructure Development Programme (SAIDP) under Rashtriya Krishi Vikas Yojana (RKVY-RAFTAAR). I am grateful to the then Director, Agriculture & Farmers Welfare Department, Government of Haryana for giving permission to prepare SAIDP for Haryana. My special thanks are due to Dr. Suresh Gahlawat, Additional Director, Extension, Agriculture & Farmers Welfare Department, Government of Haryana for his consistent support to complete the project.

I am grateful to Dr. Rashpal Malhotra, Executive Vice-Chairman, CRRID, for his consistent encouragement and inspiration. I am thankful to Professor Sucha Singh Gill, Research Coordinator & Senior Professor and Former Director General, CRRID for encouragement and support at various stages of the project. I am very thankful to Professor Surinder Kumar, Senior Professor (Research & Coordination) CRRID and Former Director, Giri Institute of Development Studies (GIDS), Lucknow for his stimulating deliberations & constructive comments, consistent support and encouragement to complete this project on time. My thanks are due to Mr. Sunil Bansal, Director (Acting) CRRID, Chandigarh for his support to complete the project.

I am grateful to Mr. Kamaljit, ADO & Coordinator RKVY, Department of Agriculture & Farmers Welfare, Government of Haryana, Panchkula for his consistent support.

I am also thankful to the Officers from the Departments of Horticulture, Animal Husbandry & Dairying and Fisheries for providing information for this project. I also put on record my appreciation for the co-operation of the Deputy Directors, Agriculture and Farmers Welfare Department at districts who provided requisite information for this project.

My thanks are due to Mr. Baneshwar Singh, Field Investigator for helping in data collection and compilation for the project.

I am thankful to the entire staff of Administration, Library, Computer and Account Sections, CRRID for their co-operation and sincere help during the project.

Needless to say, any error or emissions that remain are my sole responsibility.

Dr. Kulwant Singh
Assistant Professor
CRRID, Chandigarh

Contents		
S. No.	Particulars	Page No.
State Agriculture Infrastructure Development Programme under Rashtriya Krishi Vikas Yojana (RKVY-RAFTAAR)		**1-54**
	Acknowledgement	ii
	Contents	iii-iv
	List of Tables	v
Chapter 1	**Introduction**	**1-5**
	1.I: Background	1-3
	1.II: Objectives	3
	1.III: Research Methodology and Data Base	4-5
Chapter 2	**Demographic and Economic Profile of Haryana State**	**6-8**
	2.I: Demographic Profile of the State	6-7
	2.II: Economic Profile of the State	7-8
Chapter 3	**Agricultural Profile of the State**	**9-31**
	3.I: Land Ownership	10-11
	3.II: Land Utilisation in the State	11-12
	3.III: Cropping Pattern	12-14
	3.IV: Irrigation	14-17
	3.V: Fertiliser Consumption in the State	17-18
	3.VI: Crop Diversification	18-22
	3. VII: Soil Health and Quality Seeds	22-23
	3.VIII: Certified Seeds	23-24
	3.IX: Agriculture Marketing	25-28
	3.X: Agriculture Extension	28-31
Chapter 4	**Profile of Agricultural Allied Sectors**	**32-41**
	4.I: Animal Husbandry and Dairying	32-40
	4.II: Fisheries	40-41
Chapter 5	**Key Issues for Agriculture and Allied Sectors**	**42-48**
	5.1: Agriculture – Key Issues	42-47
	5.1.I Agriculture Production	42-43
	5.1.II Agricultural Infrastructure	43-44
	5.1.III Agriculture Extension	44-45

List of Tables

Chapter 1

Introduction

1. I: Background

Agriculture is the primary sector of Haryana economy and majority of the population (65%) lives in rural areas depends directly or indirectly on agriculture and allied activities for their livelihood. Accordingly, state has accorded high priority to Agriculture sector since its creation on 1st November, 1966. The strong infrastructure facilities like metalled roads, rural electrification, network of canals, development of marketing infrastructure etc. act as catalysts and provide much impetus to agriculture development in the state. Such infrastructure facilities, coupled with agriculture research support and quality extension network to disseminate the information related to improved farm practices to farmers, yielded positive results. Consequently the state of Haryana has become one of the food surplus states. However, by the first decade of 21st century, deceleration in production and productivity set in and required effective strategy to break stagnation in the agriculture sector.

The approach paper to the 11th five year plan (2007-12) emphasised that reversal of the deceleration in agricultural growth was the pre- requisite for the success of the five year plan. A sustained and wide spread agricultural growth is a pre-condition for economic development in India as more than 50 per cent of country's work force still depends upon agriculture for its living. Slow growth in agriculture (including allied sectors) will act as a binding constraint on India's food security and self reliant economic development. Agriculture is not only an important driver of macro- economic performance, it is also an essential element of the strategy to make growth more inclusive.

Realizing the urgency in tackling the problems related to the slow growth of agriculture in many of the states in India, National Development Council (NDC) resolved that a special Additional Central Assistance Scheme, named National Agriculture Development Programme/Rashtrya Krishi Vikas Yogna (NADP / RKVY) be launched. The NDC also felt that Agriculture Development strategies must be reoriented to meet the needs of farmers and called upon the central and state governments to evolve a strategy to rejuvenate agriculture with a commitment to achieve at least four per cent growth in the agricultural sector during the 11th Five Year plan (2007-2011) period. To achieve this, formulation of action plans by means of developing District Agriculture Plans (DAP) was recommended. It was underlined that such plans would reflect various kinds of requirements of the farmers and other stake holders which may be effectively addressed. Such District Agriculture Plans were aimed at projecting the requirements for development of agriculture and allied sectors of the district

including animal husbandry, fishery, minor irrigation projects, rural development works, agricultural marketing schemes, schemes for water harvesting and conservation, *etc*. keeping in view the natural resource endowment and technological possibilities in each district. These plans thus, would present the vision for Agriculture and allied sectors within the overall development perspective of the district along with the financial requirement and the sources of financing the agriculture development plans in a comprehensive way.

Preparation of District Agriculture Plan for individual district in turn followed the formulation of State Agriculture Plan (SAP) and then State Agricultural Infrastructural Development Programme (SAIDP). The SAP integrated multiple programmes that were in operation in the district as well as at the state level, including the resources and activities indicated by the state. SAIDP was expected to highlight the needed infrastructure to achieve a higher growth trajectory in the state.

In the 12th Five Year Plan (2012-17), District Agriculture Plan (DAP), and State Agriculture Plans (SAP) and State Agricultural Infrastructure Development Programme (SAIDP) were accorded high priority and were considered as the corner stones for agricultural development in each state in the country.

The District Agriculture Plans (DAP) have been prepared in accordance with the specified guidelines. The DAPs were integrated in to the District Development Plans.DAP has been formulated after taking into consideration the resources that would be available during 12th Plan from other ongoing schemes (both State and Central), like Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Swarnajayanti Gram Swarojgar Yojana (SGSY) and Backward Regions Grant Fund(BRGF), Integrated Watershed Management Programme (IWMP), Accelerated Irrigation Benefit Programme (AIBP), Bharat Nirman, etc.

The District Agriculture Plans were not be the usual aggregation of the existing schemes but would aim at moving towards projecting the requirements for comprehensive development of agriculture and allied sectors of the district. These plans were expected to present the vision for agriculture and allied sectors within the overall development perspective of the district. DAPs would also present their financial requirements in addition to sources of financing the agriculture development plans in a comprehensive way. Since achievement of RKVY's objectives is sequel to proper District Planning, these requirements would be adhered to by the state.

The state is expected to specify the institutional mechanisms evolved by them for District Planning and submit a status report at the stage of the Annual Plan exercise. DAP

also includes animal husbandry and fishery development, minor irrigation projects, rural development works, agricultural marketing schemes and schemes for water harvesting and conservation, etc. keeping in view the natural resource endowment and technological possibilities in each district.

District level Potential Linked Credit plans (PLP) already prepared by the National Bank for Agriculture and Rural Development (NABARD) and Strategic Research and Extension Plans (SREP) developed under the Agricultural Technology Management Agency (ATMA) etc. may also be referred to, for revision of DAPs. It should also been sured that the strategies for convergence with other programmes as well as the role assigned to the Panchayat Raj Institutions (PRIs) be appropriately incorporated in DAPs. States may also engage consultants/consulting agencies to revise / update DAPs and SAP.

Thus, each state was expected to have a comprehensive State Agricultural Plan (SAP) for 12th Plan by integrating the District Plans. SAP would invariably have to indicate resources that can flow from the state to the districts.

1. II: Objectives

The scheme Rastriya Krishi Vikas Yojana (RKVY) has been launched to meet the following objectives:

- To incentivize the states for increasing public investment in agriculture and allied sectors.
- To ensure that agricultural plans of Districts/States are prepared keeping in view agro-climatic conditions, availability of technology and natural resources.
- To reduce the yield gap in important crops and increase production and productivity in agriculture and allied sectors through focused and holistic initiatives.
- To ensure that local needs/crops/priorities are better reflected in the agricultural plans of the Districts/States.
- To provide flexibility and autonomy to states in planning and implementation of agriculture and allied sector schemes.
- To maximize income of farmers in agriculture and allied sectors.

The RKVY scheme of the Department of Agriculture and Cooperation (DAC), Ministry of Agriculture was started in the 11th Five Year plan period with full central grants across states. During the 12th Five Year Plan the projects for crop development, horticulture, agricultural mechanization, natural resource management, marketing and post-harvest

management, animal husbandry, dairy development, fisheries, extension etc have been covered in the scheme.

In order to continue the momentum of development without any disruption, states were asked to identify the infrastructure development gaps. RKVY scheme has come up with a separate focus on infrastructure and brought out the Operational Guidelines. Accordingly, the states have been advised to come up with two separate set of plans - Comprehensive District Agricultural Plans (CDAP) and State Agriculture Infrastructure Development Plans (SAIDP).

1. III: Methodology and Data Base

In this project, we attempted to prepare **the State Agriculture Infrastructure Development Plans (SAIDP)** under **Rashtriya Krishi Vikas Yojana (RKVY- RAFTAAR)** taking into consideration two components: (i) District level plans encompassing development of agriculture and all the allied sectors, and (ii) the sector specific state plans. The district plans have been provided by the Agriculture & Farmers Welfare Department, Haryana which might have been prepared by involving various stakeholders. On the other hand, the state level sectoral plans have been prepared by involving the state level concerned department functionaries and other stakeholders.

The SAIDP has been prepared on the basis of the information and inputs from Comprehensive District Agriculture Plans (CDAPs) prepared for all the districts and the information received from the departments of agriculture, horticulture, animal husbandry and fisheries in Haryana. It has been complemented by the information in the Statistical Abstract of Haryana, Economic Survey of Haryana and Annual Administrative Reports of the concerned departments.

Major focus of infrastructural investment in agriculture has been on irrigation, agricultural markets, electric power, transportation, post harvest management, storage etc. having high potential to facilitate faster agricultural growth. Over the period, a perceptible progress particularly in terms of increase in agricultural production has been made in the state of Haryana. However, there is inadequate infrastructure for agricultural marketing and post harvest management which have emerged as serious constraints to accelerate the growth process. These inadequacies are becoming more and more acute with the emerging challenges due to changes taking place in agri-food systems in domestic and international markets. There is an urgent need to make agriculture competitive and develop an effective and conducive environment for agricultural marketing. The marketing channels operating in the economy especially in the rural economy and to evolve value chain management models,

taking in to consideration new developments in the marketing arena, are the important aspects that need to be taken in to consideration while preparing infrastructure development plans.

This State Agriculture Infrastructure Development Plan (SAIDP) comprises six chapters. Chapter I presents the Introduction and methodology & database of the State Agriculture Infrastructure Development Plan. Chapter 2 deals the Demographic and Economic profile of the state of Haryana. Agricultural profile of the state has been covered in Chapter 3. Status of Agricultural Allied Sectors has been discussed in Chapter 4. Chapter 5 comprises the key issues & suggestions regarding infrastructure for Agriculture and Allied Sectors. Chapter 6 presents recommendations for the proposed infrastructure.

Chapter 2

Demographic and Economic Profile of the Haryana State

2. I: Demographic Profile of State

Haryana is a land locked state in the northern India. It is between 27°39' to 30°35' Latitude and between 74°28' and 77°36' Longitude. Haryana is extremely hot in summer (around 45°C/113°F) and mild in winter. The hottest months are May & June and coldest are December & January. The altitude of Haryana varies between 700 ft and 3,600 ft above sea level. At 44,212 sq km, Haryana covers 1.34 per cent of India's geographical area and is home to 2.53 crore people that is, 48.58 lakh households (30.44 lakh rural plus 18.14 lakh urban) comprising 2.9 per cent of India's population as per 2011 Census report. Out of the total population, 53.23 per cent are males and remaining 46.77 per cent are females. The population density of the state is 573 persons per sq km with a sex ratio of 879 females per 1,000 males. Though Haryana has witnessed gradual urbanization since 2001, as per the Census of 2011, 65.1 per cent of its population (1.65 crore persons) still lives in rural areas a drop of 6 percentage points from 71.1 per cent recorded in the Census of 2001.

Table 2.1: Demographic Profile of Haryana

Population(2011 Census)	2,53,51,462
Males	1,34,94,765 (53.23%)
Females	1,18,56,728 (46.77 %)
Gender Ratio (Females/1000 Males)	879
Density of Population(Persons/ Square Km)	573
Rural Population (in percentage)	65.12
Urban Population (in percentage)	34.88
Literacy Rate (in percentage)	75.6
Male Literacy Rate (in percentage)	84.1
Female Literacy Rate (in percentage)	65.9
Birth Rate per 1000	20.5
Death Rate per 1000	5.8
Infant Mortality Rate per 1000	30
Sex Ratio at Births in 2018 (Male per 100 Female)	111

Source: Statistical Abstract 2018-19, Haryana

Overall literacy rate in Haryana comes out to be 75.6 per cent whereas female literacy rate (65.9 per cent) is much below than its counterpart males (84.1 per cent) as per the Census 2011. During this period the birth rate (20.7 per 1000 live birth) is much higher than the death rate (5.8 per 1000 live births) in the state. Maternal mortality rate (MMR) in Haryana declined by 59 points from 186 maternal deaths per1,00,000 live births in 2004-06 to 127 maternal deaths per 1,00,000 live births in 2011-13. Infant mortality rate (IMR) is 30 per 1000 live births.

Table 2.2: Division Wise Districts in Haryana

Name of Division	No of District	Name of District
Ambala	4	Ambala, Kurukshetra, Panchkula and Yamunanagar
Faridabad	3	Faridabad, Palwal and Nuh
Gurugram	3	Gurugram, Mahindergarh and Rewari
Hisar	4	Hisar, Fatehabad, Jind and Sirsa
Rohtak	5	Jhajjar, Charkhi Dadri, Rohtak, Bhiwani and Sonipat
Karnal	3	Karnal, Panepat and Kaithal
Total	22	

Source: Statistical Abstract 2018-19, Haryana

Haryana has been divided into six administrative divisions namely Ambala, Faridabad, Gurugram, Hissar, Rohtak and Karnal. There are 22 districts constituted by 140 blocks, 154 towns and 6,841 villages. There are at least three districts under one administrative division. But in case of Hisar and Rohtak divisions four and five districts have been covered respectively.

2. II: Economic Profile of the State

At the time of formation of Haryana State in 1966, the State economy was predominantly rural and agriculture based. At the beginning year (1969-70) of 4th Five Year Plan, the contribution of Agriculture and Allied Sector (crops, livestock, forestry and fishing) in the Gross State Domestic Product (GSDP) at constant prices was the highest (60.7 per cent) followed by Services (21.7 per cent) and Industry (17.6 per cent) sectors. At that time, the predominance of Agriculture (crops and livestock) sector in state was responsible for instability in the growth rate of the economy due to fluctuations in agricultural production on account of weather vagaries. Thereafter, the major drive towards diversification and modernization of State economy started and continued successfully in the following Five Years Plans.

During the period of 4thFive Year Plan (1969-1974) to 10th Five Year Plan (2002-2007), industry and services sectors registered much higher growth rates than the agriculture and allied sectors which resulted in the increased shares of industry and services sector and decreased share of agriculture and allied sector in the GSDP.

During the period of 11th Five Year Plan (2007-2012) and onwards, the pace of structural transformation of the state economy continued. Consequently upon the robust growth recorded by services sector in this period, the share of services sector in Gross State Value Addition (GSVA) further strengthened to 50.0 per cent in 2018-19 with the decrease in the share of agriculture & allied sector to 17.2 per cent. Thus, the composition of GSDP

shows that the share of agriculture & allied sector has continuously been declining whereas the share of services sector is continuously increasing.

Agriculture and allied Sector is composed of agriculture, forestry & logging and fishing sub-sectors. Agriculture including crop husbandry and dairy farming comprise the main component contributing about 92 per cent in GSVA of agriculture and allied sector. The contribution of forestry and fishing sub-sectors in GSVA of agriculture and allied sector is merely around 6 per cent and 2 per cent respectively resulting in very low impact of these two sub-sectors on the overall growth of agriculture and allied sector.

As per Quick Estimates for 2018-19, the Gross State Value Addition (GSVA) for agriculture and allied sector has been recorded as Rs.80, 383.53 crore as against the provisional estimates of Rs.76, 649.52 crore in 2017-18 with the growth of 4.87 per cent. As per the advance estimates for 2019-20, the GSVA from this sector has been recorded as Rs.84, 080.47 crore with the growth rate of 4.6 per cent. The GSVA from agriculture sector including crops and livestock has been estimated as Rs.78, 677.16 crore with the growth of 4.5 per cent whereas the GSVA from forestry & logging and fishing sub-sectors has been recorded as Rs.2, 834.46 crore and Rs.4, 497.46 crore with the growth of - 2.1 per cent and 3.62 per cent respectively during the year 2019-20 (Advance Estimates).

Since 2004-05, Haryana has outperformed the national GSDP (Gross State Domestic Product) growth rate. In 2018-19, Haryana reported a per capita income at current prices of Rs. 2, 36,147 per annum as compared to the national average of Rs. 1, 26,521. The GSDP of Haryana has increased at current prices from about Rs. 3,47,302 crore in 2013 to about Rs. 5,72,240 crore in 2020 that constitutes 8.34 per cent growth rate.

The changing sectoral composition of Haryana's economy has been witnessed. The service (tertiary) sector employs 67.6 per cent of the urban workforce and contributes 50.0 per cent of the GSDP in 2018-19. In contrast, primary, that is, the agriculture and allied sector, employed 51.3 per cent of the total (urban plus rural) workforce but contributed only 17.6 per cent of the GSDP during the same period. Thus, the majority of the rural population which is employed in the primary sector has only a slim share in the GSDP and therefore not able to come out of poverty easily. Thus, urban-rural income disparities have increased. It may be pointed out that the expansion of tertiary & secondary sectors has contributed to reduce poverty through providing employment & income to the people.

Chapter 3

Agricultural Profile of the State

Haryana is an agro-based economy. About 65 per cent of the population in Haryana live in rural areas and agriculture is the mainstay of its population directly or indirectly. Agriculture in Haryana is reeling under stress and to streamline the backbone of the economy, animal husbandry has been considered as alternative for rural population. It generates additional value both economically and socially. The growth of human population, declining holding size of farming and increased cost of agricultural lands and limited water sources are emerging as constraints. Along with farming, introduction of better yielding livestocks have led farmers to shift to various kinds of livestock rearing to add to their income for their livelihood. The state government should focus to implement various livestock oriented schemes to add to farmers income and deal with the problems of poverty and unemployment in the rural areas.

The farming sector in the state engages 24.81 lakh cultivators and 15.28 lakh agricultural labourers that constitute about 45 per cent of the total workforce in Haryana. The prevailing problems in agriculture are under employment, seasonal employment, and a deficit in adequately remunerative employment opportunities. The lack of rural industrialisation, food processing and agri-processing industries further accentuates dependencies on agriculture and results in low income sources for farming community. Overall, employability is a challenge, with a huge gap between the demand and supply of skilled manpower. Industry and service sector opportunities are both concentrated in a few regions in the state, particularly around the National Capital Region (NCR) namely Faridabad, Gurugram, Sonipat etc. which contributes to the slower growth of livelihood opportunities in remaining parts of Haryana which has spurred in rural-urban migration.

Agricultural infrastructure primarily includes wide range of interventions that facilitate agricultural production, marketing facilities, procurement, processing, preservation and trade. Such input based, resource based, physical and institutional infrastructure significantly influences the spread of proven and demonstrated technologies. This implies that different forms of infrastructure should be developed and provided to achieve better growth. In other words, the agricultural infrastructure covers a wide range of services that facilitate production, storage, procurement, preservation and trade. They can be grouped into four categories i.e., Input based, Resource based, Physical and Institutional Infrastructure. Input based Infrastructure covers high yielding varieties seeds, fertilisers, pesticides etc.

Resource based infrastructure includes water/ irrigation, farm power etc. Physical infrastructure covers road connectivity, transportation, storage, processing, preservation, farm equipment and machineries. Whereas agricultural research, extension & education, information & communication services, financial services, marketing etc. have been included under institutional infrastructure. The major focus should be investment on infrastructure such as nursery establishment, micro irrigation, agricultural implements and machineries, processing units, strengthening of market institutions, seed testing labs, animal breeding units, veterinary service centres, fish rearing units, agricultural markets, research and development in agriculture and allied sectors etc. Creation or strengthening of such infrastructure would not only contribute to the agricultural growth at the macro level, but also could help to reduce the disparity across sectors and regions.

It needs to be underlined that agriculture is the mainstay of the Haryana economy. Agricultural growth in sustainable manner is pre-requisite for development in the state as more than 50 per cent of state's work force still depends upon agriculture for its livelihood.

3. I: Land Ownership

The ownership of the land holdings plays a significant role in determining cropping pattern and crop rotation. The farming households may be grouped into two categories, own cultivation and tenant cultivation, on the basis of ownership of the land holdings. A household, having ownership of land holdings and engaged in self cultivation is regarded as own cultivation households while a household engaged in cultivation without any ownership of land holdings is defined as tenant cultivator. However, operational holding is defined as own land holding plus leased in land minus leased out land. Distribution of operational land holdings in Haryana are presented in Table 3.1.

Table 3.1: Operational Holdings as per Agricultural Census (2010-11) (Hectare)

Category	**Numbers**	**Number (%age)**	**Area**	**Area (%age)**	**Average Size**
Marginal (below 1.0 ha)	7,78,142	48.11	3,60,474	09.89	0.46
Small (1.0 to 2.0 ha)	3,14,818	19.47	4,62,703	12.69	1.47
Semi-medium (2.0 to 4.0 ha)	2,83,828	17.55	8,14,473	22.34	2.87
Medium (4.0 to 10. ha)	1,94,694	12.04	11,85,399	32.52	6.09
Large (10.0 ha and above)	45,829	02.83	8,22,519	22.56	17.95
Total	**16,17,311**	**100.00**	**36,45,568**	**100.00**	**2.25**

Source: Statistical Abstract 2018-19, Haryana

The data clearly brings out that land holdings are unequally distributed in Haryana. A majority of the households are marginal and small farmers having land ownership upto 2 hectare. More than 67 per cent of the households, being marginal and small farmers, own just about 22 per cent of the cultivable land in the state. Whereas large farmers, owning land

ownership of more than 10 hectare, constitutes about 3 per cent of the households but their share of land ownership is more than 22 per cent in total cultivable land. Average size of landholding comes out to be 2.25 hectares.

3. II: Land Utilisation in Haryana

Haryana has been considered as the food bowl of India as it enjoys a surplus in food grain production and contributes about 15 per cent of the central pool of food grains, despite constituting only 1.34 per cent of the national landmass. In 2018-19, Haryana produced 3,981 kg food grain per hectare as compared to the national food grain productivity of 2,299 kg per hectare. Since 1970-71 Haryana has witnessed an increase of 2.47 per cent in food grain productivity as compared to a 2.04 per cent increase at national level. While, the average annual fish production is 7000 kg per hectare as against the national average of 2900 kg. The state has also achieved self sufficiency in fish seed production of Indian major carp and common carp. The total fish production from all resources was 600 metric tonnes during the year 1966-67 which has now increased to 1,57,503.10 metric tonnes in 2019-20 in spite of depletion of fish population in natural water bodies. Similar patterns are witnessed in the availability of milk (1087 gm. of milk per capita per day) and eggs (224 eggs per capita per annum) in Haryana as compared to India (394 g of milk per capita per day and 79 eggs per capita per annum).

Table 3.2: Land Utilization Pattern in the State (2017-18) (000 hectare)

Geographical Area	4, 371 (100)
Forest	36 (0.85)
Not available for Cultivation	
A. Land put to non-agricultural uses	445 (10.18)
B. Barren and uncultivable land	117 (2.68)
Total	**562 (12.86)**
Other Uncultivated land excluding Fallow Land	
A. Permanent pastures & other grazing lands	24 (0.55)
B. Land under misc. Tree crops & groves	6 (0.14)
C. Cultivable but barren land	49 (1.12)
Total	**79 (1.81)**
Fallow Land	
A. Current follows	111 (2.54)
B. Old follows	75 (1.72)
Total	**186 (4.25)**
Cropped Area	
A. Net area sown	3,508 (80.26)
B. Area sown more than once	3,041 (69.57)
C. Gross cropped area	**6, 549 (149.82)**
Cropping intensity in percentage	186.7

Source: Statistical Abstract of Haryana 2018-19, Department of Economic and Statistical Analysis, Haryana

The Table 3.2 presents composition of total land available in Haryana. Total geographical area in Haryana is 4, 371 thousand hectares out of which about 80 per cent is cultivable area and remaining 20 per cent is uncultivable area. It may be noted that the share of the area under forests is less than one per cent of the total geographical area in the state of Haryana.

The gross cropped area comes out to be 6, 549 thousand hectares which constitutes 149.82 per cent of the total geographical area of the state. Consequently, the cropping intensity (gross cropped area/ net area sown) happens to be 186.7 per cent which is very high. It indicates the high level of pressure on the available cultivable land in the state. Scope for bringing more area under cultivation is limited. Only way out is to increase productivity of land.

3. III: Cropping Pattern

The gross area sown in the state was 45.99 lakh hectare in 1966-67 which increased to 65.49 lakh hectare in 2017-18. The contribution of area under wheat and paddy crops to the total gross area sown in the state was 60.35 per cent during 2017-18. The area under wheat crop was 25.30 lakh hectare during 2017-18. The area under paddy crop was 14.22 lakh hectare in 2017-18. The area under commercial crops i.e. sugarcane, cotton and oilseeds has fluctuating trends. The food-grains production in the state has reached an impressive level of 180.30 lakh tonne in the year 2017-18 from 25.92 lakh tonne in 1966-67, registering an increase of about seven times.

The wheat and paddy crops have played a major role in pushing up the agricultural production. The production of total foodgrains in the state was 180.30 lakh tonne in 2017-18, of which the production of rice and wheat was 48.80 lakh tonne and 122.63 lakh tonne respectively. The production of oilseeds and sugarcane was 98.47 lakh tonne and 82.20 lakh tonne respectively during the year 2016-17. The production of cotton was estimated 20.41 lakh bales in 2016-17. Haryana is a major contributor of food-grains to the Central Pool. More than 60 per cent export of Basmati Rice is taking place from State.

The Table 3.3 presents the area, production and yield of the principal crops in Haryana. The data shows that total area under cereals, pulses, oilseeds, cotton and sugarcane come out to be 4, 476.0, 56.6, 559.6, 668.5 and 114.9 thousand hectare respectively during the year 2017-18.

Table 3.3: Area, Production and Productivity of Principal Crops in Haryana

(Area in 000 hectare, production in 000 metric tonne, yield in kg/hectare)

Crop	2016-17			2017-18		
	Area	**Production**	**Yield**	**Area**	**Production**	**Yield**
Paddy (Rice)	1, 385.2	4, 453.0	3, 213	1, 422.0	4, 880.0	3, 422
Jawar	52.4	33.0	533	47.5	24.0	519
Bajra	467.1	964.0	2, 017	449.3	721.0	1, 609
Maize	6.2	26.0	3400	6.4	19.0	3, 168
Wheat	2, 564.0	12, 384.0	4, 828	2, 530.5	12,263.0	4, 847
Barley	20.0	73.0	3650	20.2	69.0	3, 450
Others cereals	0.5	-	-	0.1	-	-
Rabi cereals	-	-	-	-	-	-
Total Cereals	4, 495.4	17, 933.0	-	4, 476.0	17, 976	-
Gram	37.1	46.4	1179	32.0	36.4	1, 125
Mash	1.3	6.1	677	1.5	0.6	480
Moong	15.9	5.2	544	13.7	6.2	677
Massar	1.6	12.2	1329	1.6	1.3	849
Other pulses	11.6	92.0	-	7.9	69.3	-
Total pulses	***67.5***	***161.9***	**-**	***56.6***	***113.8***	**-**
Total Food Grains	**4, 562.9**	**18, 094.9**	**1, 201**	**4, 532.6**	**18, 089.8**	**-**
Ground nut	4.6	5.7	1201	3.3	3.7	1, 183
Sesamum	1.8	1.5	82	1.5	0.7	500
Rape seed/Mustard	506.1	946.1	1, 830	548.9	1, 107.5	2, 018
Other oil seed	10.5	31.4	-	5.9	22.8	-
Total oil seeds	**523.0**	**984.7**	**-**	**559.6**	**1, 134.7**	**-**
Cotton	571.2	2, 041.0	280	668.5	1, 626.0	-
Sugarcane	101.8	822.0	8, 061	114.9	963.0	8, 450
Potato	14.7	344.6	23, 240	13.1	331.6	25, 253
Chilly	0.6	3.6	5, 789	0.5	2.70	5, 696

Source: Statistical Abstract of Haryana 2018-19, Department of Economic and Statistical Analysis, Haryana

Paddy and wheat are the major cereal crops in the state which utilised about 87 per cent of the total area used under food grains whereas only 1.25 per cent (56.6 thousand hectare) area has been used under pulses. There is an urgent need diversification and enhance area under pulses and oil seeds on priority basis.

Table 3.4: Production of Total Cereals and other Crops in Haryana (000 tonnes)

Year	Cereals	Pulses	Gur	Cotton*	Total Oilseeds
1966-67	2, 592	563	510	287	92
2000-01	13, 295	100	817	1, 383	563
2016-17	18, 095	162	822	2, 041	985
2017-18	18, 090	114	963	1, 626	1, 135

Source: Annual Administrative Report 2017-18, Agriculture & Farmers Welfare Department, Government of Haryana

Note: *- Production in thousand (000) bales.

The data in Table 3.4 reveals that the production of agricultural crops has increased at a perceptible growth since inception of the state. The total production of cereals has increased from 2, 592 thousand quintals in 1966-67 to 13, 295 thousand quintals in 2000-01 and further to 18, 090 thousand quintals in 2017-18.The production of pulses has decreased from 563

thousand quintals to 114 thousand quintals whereas the production of gur increased from 510 thousand quintals to 963 thousand quintals during the period under consideration (from the year 1966-67 to 2017-18). Similarly, the production of cotton has also increased from 287 thousand bales in 1966-67 to 1, 626 thousand bales in 2017-18.

The Table 3.5 presents the area under high yielding varieties of foodgrain crops. The data brings out that there are four major foodgrain crops i.e., Rice, Maize, Bajra and Wheat for which high yielding varieties have been used.

Table 3.5: Area under High Yielding Varieties (HYV) of Foodgrains in Haryana

(000 Hectare)

Particulars	Rice		Maize		Bajra		Wheat	
	Total Area	%age Area under HYV	Total Area	%age Area under HYV	Total Area	%age Area under HYV	Total Area	%age Area under HYV
1970-71	269.2	11.1	114.4	12.2	879.6	27.3	1129.3	55.8
1980-81	483.9	85.6	71.3	39.3	870.3	38.4	1479.0	92.0
1990-91	661.2	72.4	34.8	46.0	608.6	67.4	1850.1	98.9
2000-01	1054.3	62.3	15.4	51.9	608.3	84.8	2354.8	97.5
2010-11	1243.0	62.7	10.0	70.0	661.0	97.6	2515.0	98.2
2017-18 (R)	1422.0	84.2	6.0	80.0	450.0	99.5	2530.0	99.3
2018-19 (P)	1447.0	85.3	5.9	100.0	424.7	100.0	2553.0	100.0

Source: Statistical Abstract of Haryana 2018-19

Note: R- Revised; P- Provisional; Total may not tally due to round off

The share of area under high yielding varieties to total area of rice has increased from 11.1 per cent in 1970-71, after green revolution initiated, to 85.6 per cent in 1980-81 which decreased to 62.3 per cent in 2000-01. Thereafter it again tended to increase to 85.3 per cent in 2018-19.

The share of area under high yielding varieties to total area of Maize, Bajra and Wheat has consistently increased from 12.2 per cent to 100 per cent; from 27.3 per cent to 100 per cent and; from 55.8 per cent to 100 per cent respectively during the period 1970-71 to 2018-19. It clearly highlights that the total area under all the foodgrain crops, except rice, has been cultivated with high yielding varieties.

3. IV: Irrigation

Water management is a thrust area not only for the state but also a very critical need to the Nation as a whole. Major thrust has to be given to the promotion of Water Saving Technologies under “On farm Water Management” programme. The natural resource base of agriculture has been continuously shrinking and degrading which consequently has serious implications for productive capacity of land in the state. About 62 per cent area of the state has poor quality ground water. There are problems of declining as well as rising water tables,

soil salinity/alkalinity, declining soil health and stagnating crop productivity. Micro irrigation systems and laser levelling have potential of enhancing irrigation and water use efficiency by 80 per cent to 90 per cent.

The agriculture department is providing assistance to farmers for laying of Under Ground Pipe Line (UGPL) System, Sprinkler Irrigation System and Drip Irrigation System in cotton and sugarcane crops. These water saving devices have been found most suitable for different agro-climatic conditions e.g. Sprinkler Irrigation System has been found well suited for sandy soils having undulating topography. But, UGPL has been found most viable in central flat region of the state. However, Drip Irrigation System in cotton and sugarcane crops was taken up on pilot basis for the first time during 2010-11.

At present, Haryana provides drinking water at a rate of 70 litres per capita per day in the areas covered by the Drought Development Programme (DDP) and 55 litres per capita per day in areas not covered by it. Individual household connections are encouraged in rural areas to save and conserve this precious resource, while simultaneously reducing time and risk otherwise involved in water collection. At present, 90 per cent of the urban population is already within the potable drinking water state supply network whereas the national average comes out to be 96 per cent.

Sprinkler Irrigation System is also in heavy demand especially in South-Western region of the state. So far,1,50,477 number of sprinkler sets have been installed with an expenditure of Rs. 249.97crore as subsidy in the state which also includes an area of 19,657 hectare by utilizing subsidy amount of Rs. 347.31 lakh during the year 2017-18. The subsidy@ 60 per cent for Small and Marginal Farmers and @ 50 per cent for others is being provided under different schemes.

The research studies on monitoring the underground water resources in the state have revealed that there has been consistent depletion of ground water specifically in the districts of Karnal, Kaithal, Kurukshetra, Panipat, Sonipat and Yamunanagar, where paddy-wheat is the dominant crop rotation pattern. The average decline in groundwater table has been reported as 9.3 meter in the state since 1999 to 2016 due to intensive cropping system (cropping intensity 182 per cent). Moreover, about, 55 per cent area of the state is affected by poor quality underground water (brackish) which results into decline in crop production and productivity.

Moreover, losses through deep percolation in the conveyance system in the field and the absence of pumping of saline ground water result in a rapid rise of the water table and subsequent water logging and soil salinisation. Rising saline ground water in a perceptible

part of the state creates conditions critical to agriculture because of increasing water logging and soil salinisation. It threatens the livelihood of about one million farmers, their families and having a significant influence on foodgrain production in the state.

The crop production can be enhanced by transporting the irrigation water from the source of good quality water by laying UGPL system in such areas. Therefore, efficient and judicious use of irrigation water through laying out Underground Pipe line system is need of the hour to keep away from degradation of underground reserves. The Underground Pipe Line Project (UPLP) is one of the flagship project of the department taken up under RKVY and the programme has widely been accepted by the farmers in the entire state. By laying UGPL System water losses are minimized, energy is saved; additional area is brought under cultivation. So far, an area of 2,06,223 hectare had been brought under the system by utilizing an amount of Rs. 312.04 crore. The pattern of assistance under UGPL is @ 50 per cent of the cost of system limited to Rs. 25,000 per hectare with a maximum of Rs. 60,000 per beneficiary.

Drip Irrigation System is being promoted in Cotton and Sugarcane crops. So far, an area of 5,196 hectare has been covered under this system by providing subsidy amount of Rs. 43.15 crore in the state. Out of which, an area of 614 hectare has been covered by providing subsidy amount of Rs. 314.22 lakh during the year 2016-17. The major districts covered under the scheme are Bhiwani, Hisar, Fatehabad, Sirsa, Kaithal and Yamunanagar.

During the year 2017-18, the target has been set to cover 1,200 hectare under 'Per Drop More Crop' component of Pradhan Mantri Krishi Sinchai Yojana (PMKSY) through providing assistance of Rs. 844.29 lakh. Assistance @70 per cent of the total cost of system for small and marginal farmers and @ 60 per cent for others has been admissible. Whereas 85 per cent assistance is provided on Drip Irrigation System in 36 identified over exploited blocks in the state.

It needs to be noted that one fifth of the total land mass is susceptible to wind and water erosion and about one tenth of the state territory remains seasonally water-logged in Haryana. Farm management and cultivation have significantly influenced soil health parameters. Defined by a combination of chemical, physical and biological indicators a soil in good health performs two cardinal functions; one sustaining potential productivity and two maintaining environmental services (water stocking, bio-diversity sheltering, contaminant filtering, buffering, moderating climate change). High cropping intensity involves excessive tillage, increasing use of fertilisers, pesticides, herbicides and irrigation water. Consequently, it leads to loss of soil fertility, physical stability, useful biology, productive capacity,

resilience and climate change neutralising ability of the land. Dominance with rice wheat cropping pattern in Haryana has hindered hard the crop diversity and has resulted in the disappearance of certain traditional crops/ plants and animal biodiversity.

The Department of Agriculture & Farmers Welfare is promoting the Direct Seeding of Rice (DSR) system from last few years to save ground water. The system saves about 25 per cent water and the yield also remains at par. An area 30,000 hectare has been covered under DSR during 2015-16 and about 30,000 hectare area covered during 2016-17 till date.

3. V: Fertiliser Consumption in the State

It has also been noted from various research studies that the nutritional value of agricultural produce has reduced perceptibly mainly due to excess use of the chemical fertilisers in the field over the period of time.

The Table 3.6 represents the consumption of chemical fertiliser (nutrients) in agriculture. There are three main constituents of nutrients namely Nitrogenous (N), Phosphastic (P) and Potassic (K). The data reveals that the consumption of fertiliser in agriculture has increased significantly over the period. Total fertiliser consumption has increased from 13, 57,622 tonnes in 2010-11 to 13, 75,751 tonnes in 2017-18 with a growth rate of 0.19 per cent per annum. It implies that farmers non-judiciously used the chemical fertilisers to increase crop yields without considering its implications on the fertility of land.

Table 3.6: Fertiliser Consumption (Nutrients) in Haryana (2017-18) (Tonnes)

Year	Consumption			Total
	Nitrogenous (N)	Phosphatic (P)	Potassic (K)	
2010-11	9,74,045	3,35,950	47,627	13,57,622
2011-12	10,20,892	3,69,624	37,531	14,28,048
2012-13	10,23,999	3,11,755	17,307	13,53,061
2013-14	9,50,563	1,98,457	15,651	11,64,671
2014-15	10,13,267	2,54,437	36,199	13,03,903
2015-16	10,37,101	2,90,591	19,699	13,47,391
2016-17	10,07,232	2,90,555	41,552	13,39,279
2017-18	10,49,270	2,80,270	46,211	13,75,751

Source: Statistical Abstract of Haryana 2018-19

The data further shows that the use of nitrogenous was increased from 9,74,045 tonnes to 10,49,270 tonnes whereas that of phosphatic and potassic decreased from 3,35, 950 tonnes to 2,80,270 tonnes and from 47, 627 tonnes to 46, 211 tonnes respectively during the period 2010-11 to 2017-18.

Moreover, the production as well as productivity of the major crops particularly in cereal crops has also increased over the period. It happened mainly on account of a package of high yielding varieties (HYVs) seeds, pesticides and chemical fertilisers during the period

of green revolution. Efforts to increase agricultural productivity, have led to non-judicious use of fertilizers and pesticides throughout Haryana which has resulted in the depletion of the ground water and deterioration in the quality of soil and ground water. Inefficiencies in water use and the declining water table have also led to water scarcity for irrigation that affected adversely the agricultural yields at the ground level. Due to shortage of labour, which is migratory in nature, has also adversely affected the agricultural productivity which resulted in reduction in farmers' income. Issues relating to the available quality of germplasm have also had an impact on agricultural productivity and its sustainability.

3. VI: Crop Diversification

Diversification of agriculture and improving the productivity of the workforce engaged in the primary sector needs to be focussed on priority leveraging the locational advantage of the state adjoining with National Capital Region (NCR) to give fresh impetus to the lagging industrial sector. The growth rates in both the primary and secondary sectors need to be accelerated to utilise the full potential of these sectors to meet the state's economic and social targets.

Presently availability of food is not a problem due to bumper production of foodgrains however, food quality and accessibility is a major challenge. There are issues of regional disparity and imbalance among different sections of society, as certain vulnerable groups do not have sufficient purchasing power to buy nutritious and quality food. Poverty reduction schemes must be focused to address the issue of hunger.

Cropping intensity and irrigation intensity are significantly high, at 182 per cent and 188 per cent, respectively in the state. However, further progress in this sector through horizontal expansion is no longer possible because all cultivable land has already been cultivated. Now the focus must be on productivity increase and diversification of cropping pattern for the doubling of farm incomes by 2022. The state government should make serious efforts to support and facilitate sustainable food production, ecosystems and genetic diversity in the state.

All efforts are being made to improve crop productivity and net income of farmers from agriculture. Supply of quality fertiliser, seeds, soil health programmes, crop diversification, post harvest management, less water intensive crops, easy credit supply to farmers, provision of monetary support, assured marketing etc are the key ingredients to enhance agricultural productivity and income of the farmers. Some of these schemes include Pradhan Mantri Fasal Bima Yojana, Rashtriya Krishi Vikas Yojana, National Livestock Mission, Soil Health Card Scheme and National Food Security Mission.

Crop diversification, a sub scheme of Rashtriya Krishi Vikas Yojana (RKVY), is supposed to promote technological innovation for sustainable agriculture and enable farmers to choose alternatives to increase crop productivity and income. This scheme/programme not only helps to meet challenges of the ecological problems, water table depletion, soil salinity etc. but also improve soil health and maintains equilibrium in agro-eco-system.

The Table 3.7 presents the growth of Horticulture in the state of Haryana. The data clearly highlights that the area under horticulture crops was 35.01 thousand hectare in 1970-71 which perceptibly increased to 528.94 thousand hectare in 2017-18.

Table 3.7: Growth of Horticulture in Haryana (area in 000 hectare)

S. No.	Year	Geographical Area	Total Cropped Area	Area under Horticultural Crops	%age of Horticulture Area to GrossCropped Area
1	1970-71	4402	4957	35.05	0.71
2	1980-81	4405	5452	63.22	1.16
3	1990-91	4378	5919	68.05	1.15
4	2000-01	4402	6115	181.11	2.96
5	2010-11	4370	6505	415.93	6.39
6	2015-16	4371	6471	490.70	7.58
7	2016-17	4371	6471	490.14	7.57
8	2017-18	4371	6471	528.94	8.17

Source: Horticulture Department, Government of Haryana

Moreover, the share of area under horticulture crops to total cropped area has increased from 0.71 per cent to 8.17 per cent during the same period. It implies that the state government is making sincere efforts to promote horticulture cultivation in the state. The state government has implemented the centrally sponsored scheme namely Mission for Integrated Development of Horticulture in Haryana. Under this scheme the government has allocated of Rs. 100 crore for the holistic development of horticulture which specifically covers different components of production, including protected cultivation, creation of water sources and post harvest management, area expansion, mechanization, etc.

Another centrally sponsored scheme, on sharing basis between centre and state (60:40), National Horticulture Mission was implemented in 19 districts in the state of Haryana during the year 2018-19. Total financial provision was kept at Rs. 139.82 crore. Various components have been covered under this scheme, such as area expansion under fruits, establishment of big and small modern nurseries, Post harvest management packing & packaging, promotion of Protected Cultivation through Poly houses, Net house & High value vegetables under Poly house, Integrated Post-harvest Management (IPM) under flowers,

spices, medicinal and aromatic production, rejuvenation of old plants, training of farmers, production of vegetable seeds and mushroom etc.

A new scheme namely Crop Cluster Development Program (CCDP) has been launched by the government of Haryana on 21.02.2018 for a period of three years with the budgetary provision of Rs. 510.36 crore. Under this program in each cluster marketing infrastructure and post- harvest management facilities like pack house, primary processing centre, grading, sorting machine, storage facilities, refer vans, input and quality control facility shall be created to have forward and backward linkage for effective marketing of horticulture produce.

The Table 3.8 shows the area and production of the horticulture crops in Haryana. It has been observed that total area covered under horticulture crops has increased from 416 thousand hectare in 2010-11 to 526 thousand hectare in 2018-19 and correspondingly the production also has gone up from 5141 thousand tonnes to 8628 thousand tonnes. There is a perceptible growth in area and production of horticulture crops in Haryana. However, there is great potential to further increase horticultural production and marketing.

Table 3.8: Area and production of Horticultural crops in Haryana

(Area in Hectare & Production in Tonnes)

Year	Fruits		Vegetables		Spices		Flowers		Medicinal		Grand Total	
	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production
2010-11	46,250	3,56,620	3,46,400	46,49,280	15,960	73,460	6,300	61,320	1,020	590	4,15,930	51,41,270
2011-12	47,036	4,76,570	3,56,769	50,68,426	18,092	93,585	6,340	64,150	1,731	1,133	4,29,968	57,03,864
2012-13	49,536	5,16,070	3,60,339	50,11,311	18,454	94,800	6,470	64,726	1,750	1,135	4,36,549	56,88,042
2013-14	50,595	5,54,900	3,73,170	55,65,900	18,600	97,640	6,480	65,440	1,760	1,145	4,50,605	62,85,025
2015-16	60,915	7,37,820	4,10,740	61,56,880	12,630	81,280	6,125	63,030	1,090	1,058	4,91,500	70,40,068
2016-17	61,596	7,70,965	4,11,051	61,80,430	11,651	78,175	5,514	56,230	332	1,516	4,90,143	7087,316
2017-18	64,021	7,92,541	4,46,995	67,19,235	11,928	80,928	5,191	50,970	463	3,211	5,28,598	76,46,885
2018-19	67,165	11,78,915	4,43,598	73,05,010	9,178	70,300	5,383	72,796	315	1,088	5,25,639	86,28,109

Source: Department of Horticulture, Haryana **(www.hortharyana.gov.in)**

It may be pointed out that vegetable cultivation covered more than 84 per cent of total area under horticulture crops in the state in the year 2018-19 whereas the area under fruit cultivation comes out to be about 13 per cent of the total horticulture area. Moreover, the share of area under flower and medicinal cultivation happens to be just 1 per cent of the total horticulture area during the same year.

Under the programme for crop diversification, the alternate crops like maize, pulses, kharif moong/summer moong, dhaincha, etc are also being promoted in the state of Haryana. Inter cropping with agro forestry, promotion of farm mechanization and value addition by providing farm implements and site specific activities by providing Under Ground Pipe Line (UGPL) to avoid the losses of water. Distribution of dhaincha seed to improve soil health are

also being promoted among the farmers. Awareness training camps like State Level Kisan Mela, District Level Kisan Mela and Block Level Kisan Ghosti are also being organized to increase awareness the farmers for diversification of paddy to other alternate crops for additional income generation, restoration of soil fertility, agro-processing, value addition of crop produce to make farming more profitable enterprise. To make aware the farmers about the benefit of crop diversification, restoration of soil fertility, agro- processing, value addition of crop produce, capacity building training camps are supposed to be organised at state, district, block and panchayat levels by the Department of Agriculture & Farmers Welfare & Department of Horticulture, government of Haryana.

In order to promote horticulture the state government has implemented Bhavantar Bharpayee Yojana (BBY) in 2017-18 in Haryana. This is a Risk Mitigation Scheme for horticulture producers particularly during low prices in wholesale markets. For the year 2019-20, the fund of Rs. 25 crore was allocated for this scheme. The objectives of the scheme are to protect the producers of perishable crops like fruits, vegetables etc. from the risk of low prices in the market; to facilitate the producers in marketing of their produce through creating corpus fund; and to support the farmers for agricultural diversification in favour of horticulture.

The Central Government has introduced the Pradhan Mantri Fasal Bima Yojana (PMFBY) in 2016 to protect the farmers from the loss of crops yield on account of natural calamities, weather vagaries etc. The state government of Haryana has also implemented the Pradhan Mantri Fasal Bima Yojana since Kharif 2016, season. Under the scheme, the farmer's share of premium is 1.5 per cent for Rabi crops, 2 per cent for Kharif crops and 5 per cent for horticultural & commercial crops. The remaining share premium is borne by the Central and State Governments in equal proportion. There is single premium payable for all crops in a season. In the interest of the farmers, the state government has decided to take only 2 per cent premium from the farmers in case of cotton crop also, which is a commercial crop and falls under the 5 per cent premium category. The remaining 3 per cent will be borne by the state government. The three per cent will be in addition to the normal share of the state government which is to be paid by it along with the Central Government. The scheme has been compulsory for loanee farmers and optional for non-loanee farmers.

National Food Security Mission (NFSM), a centrally sponsored scheme that focuses on pulse production through utilization of rice fallows, rice bunds and intercropping of pulses with coarse cereals, oilseeds and commercial crops (sugarcane, cotton, jute). This scheme has been implemented on 60:40 per cent sharing basis between Centre and State. Government of

Haryana has implemented centrally sponsored National Food Security Mission (NFSM) in the state since Rabi 2007-08. The crops namely rice, wheat, pulses and coarse cereals and nutrient cereals have been covered under the mission. It has been considered to focus on districts having high potential but relatively low level of productivity. Initially, it was implemented in seven districts of Haryana namely Ambala, Yamunanagar, Bhiwani, Mahendergarh, Gurugram, Rohtak, and Jhajjar. Main objective of the Mission was to increase production of wheat and pulses through area expansion and productivity enhancement in a sustainable manner in the identified districts of the Haryana state. All the farmers are entitled to avail assistance for various components of the mission.The interventions covered under NFSM-Wheat & Pulses include Cluster Demonstrations on Improved package of Practices, Demonstration on cropping system, Seed Distribution of HYVs, Manual Sprayer, Power sprayer, Chiseller, Deep Ploughing, Sprinkler set, Pump set (up to 10 HP), Tractor mounted sprayer, Seed drill, multi crop planter, Zero till seed drill, Zero till multi crop planter, Power weeder, Water carrying pipes, Mobile raingun, Ridge furrow planter, Rotavator/turbo seeder, Multi crop thresher, Laser land leveller, Plant protection chemicals and Bio pesticides, Weedicides, gypsum/phospho gypsum/bentonite sulphur, Micro nutrients, Bio-fertilizers Cropping system based training of farmers, Local initiatives and Project Management team. During the year 2016-17, new initiatives like distribution of seed minikits of newer varieties of pulses free of cost to farmers, production of quality seed, creation of seed hubs at State Agriculture University and KVKs, strengthening of bio-fertilizers and bio agent labs at SAUs/ICAR Institutes, cluster front line demonstration by KVKs and enhancing up breeder seed production at ICAR institutes and SAUs have been included under NFSM for enhancing pulses production and productivity. However, these efforts need to be further promoted and strengthened.

3. VII: Soil Health and Quality Seeds

The soil testing laboratories plays a leading role for maintaining the quality of soil, increasing productivity and reducing adverse environmental implication. At present there are only 31 government owned soil testing laboratories in Haryana which are inadequate to cover about 7.78 lakh farmers in the state with fragmented pieces of land holdings. It was expected that a more number of Soil testing laboratories will be established in 12^{th} plan. But, for the time being, it is necessary that there must be at least one soil testing laboratory in each sub-division/ block level. Establishment of other testing laboratories like- fertilizer quality control lab, pesticide/ bio-pesticide quality control lab., bio-fertilizer testing and production lab/ unit,

pesticide residue testing lab., plant health clinic lab., etc. are also important and can go a long way for environment-friendly agricultural production and its sustainability in the state.

Soil Health Card (SHC) Scheme was launched by the Prime Minister of India on 19.5.2015 at Suratgarh, Rajasthan with the objective to address nutrient deficiency and to promote Soil Test based nutrient management. Under this scheme, Soil Health Cards (SHCs) have been issued to the farmers in the state. The scheme was introduced in Haryana state since April, 2015 during 1stcycle of the scheme i.e. 2015-16 and 2016-17.

After introduction of the scheme in the state, some of the farmers have started to submit to their soil samples directly in their nearby Soil Testing Laboratory (STL). Many success stories are reported from different districts. Some the farmers have started applying the doses of the fertilizer as per recommendation in the SHC, the input cost has been reduced and an increase in the yield is noticed.

In order to promote soil health management, central government provides assistance to state governments for setting up soil testing laboratories, fertilizer testing laboratories as well as implementation of organic farming project across the across the country. The goal is to promote soil test based application of fertilizers in respect of all 14 crore holdings in the country and to implement uniform norms in sampling and testing of soil. Soil data and information will be made available to all farmers so that they can apply appropriate dosage of fertilizers to increase crop productivity and enhance their profitability. These Soil Health Cards will be renewed after every three years. A national programme will be implemented through the state governments to issue soil health cards and develop a database to improve service delivery.

3. VIII: Certified Seeds

Agricultural production depends on many factors but timely availability of good quality seeds is of paramount importance. However, many private companies are operating in the market to sell their uncertified seeds of poor quality to the innocent farmers. Consequently, it affects adversely the production as well as productivity of the agricultural crops.

Moreover, the private companies blame the farmers in case of crop failure due to poor quality seeds. In this situation, it becomes necessary to provide certified seeds to the farmers through appropriate authentic channels. The agriculture department must make efforts to provide certified seeds to the farmers on demand at reasonable prices.

The Table 3.9 shows the details about seed distribution in the state. The data reveals that the agriculture department has distributed 15.17 lakh quintals certified seeds of various

crops to the farmers during the year 2017-18. It needs to be noted that out of the total distribution of certified seeds 94.81 per cent supplied to wheat and paddy crops in the state. The distribution of certified seeds to other crops should be promoted to ensure sustainability in agriculture which is reeling under stress.

Table 3.9: Distribution of Certified Seeds during 2017-18

S. No	Crop	Distributed Seeds (quintals)
1	Wheat	13,85,330
2	Gram	5,900
3	Barley	29,155
4	Oil seeds	24,000
5	Paddy	52,787
6	Cotton	320
7	Bajra	14,053
8	Gawar	2,073
9	Massar	415
10	Jawar	2,800
11	**Total**	**15,16,833**

Source: Annual Administrative Report 2017-18, Agriculture & Farmers Welfare Department, Government of Haryana

It needs to be highlighted that Haryana Seeds Development Corporation (HSDC) has been operating in the state for the welfare of the farmers through supplying quality seeds to them at reasonable prices. HSDC also works as a price stabilizer so that there can be a check on the prices of the seed in the state. Sometimes, HSDC has been providing seeds at the highly subsidised rates on the direction of the state government which results in financial crunch in the Corporation for which it must be compensated by the state government.

There is an urgent requirement to provide a platform by leveraging available technology for the efficient delivery of various rural services with public participation and ownership in a transparent manner. There is a lack of awareness among the farmers regarding latest scientific methods and technology. The farmers find it difficult to get the reliable information at local level. To generate awareness among farmers and to provide a platform to disseminate information regarding the updated technology & methods for agriculture, a local resource person may be appointed. Further, it may be targeted to provide training and enhance capacity of adequate number of persons who are engaged with ongoing agriculture & other development projects in the state. Various components of soil and water conservation, farm forestry, livelihood activities, social mobilization, and allied agricultural activities may also be covered in the training & capacity building programmes.

3. IX: Agriculture Marketing

In India, the agriculture markets are fragmented with barriers to movement even within states. There are restrictive regulatory provisions and multiple levies and licensing requirements. Farmers have limited access to alternative markets other than mandis.

Realising the problems of low price realization by the farmers, higher marketing costs and considerable post-harvest losses in agricultural produce, state governments introduced several mandatory regulations during sixties and seventies. In 1963, when the APMC Act was enacted, the broad idea was to ensure that farmers get remunerative prices for their crops through government regulated markets close to their farms. To protect farmers from getting exploited by traders and middlemen, the required regulations were put in place through APMC Act. But later these regulations were compromised and APMC market yards were converted into monopoly of trader cartels which control the wholesale markets and the exploitation of the farmers remained intact. The APMC Act mandates that these markets must have facilities like auction halls, warehouses, weigh bridges, shops for retailers, police station, post office, bore-wells, farmer amenity centres and a soil-testing laboratory. But most of the APMC markets offer very few of these facilities and the systems to buy produce from farmers, auction it, and sell to wholesalers and retailers through traders are very opaque and they leave enormous scope for malpractices.

Over the period, for the welfare of the farming community, various reforms in the APMC Act were recommended and implemented in many states. The first comprehensive model on APMC was proposed during 2003, and thereafter similar efforts to incorporate more reforms have been proposed in 2007, 2013, and the last in 2017 by the central government. Many state governments have amended their APMC Act accordingly to make it more liberal. Several states such as Jharkhand, Himachal Pradesh, Uttarakhand, Haryana and Rajasthan have implemented one or more of these reforms.

Several states have also given out Direct Marketing Licenses (DMLs) to various private buyers including corporate houses such as Tata, Mahindra and Godrej. Many States have introduced direct marketing of farm produce i.e., the Uzhavar Sandhai (Tamil Nadu), the Rythu Bazaar (Andhra Pradesh and Telangana), the Raitha Santhe (Karnataka), the Apni Mandi (Punjab) and the Krushak Bazaar (Odisha).

The major question appears regarding private investment in agriculture marketing. Private investors will not invest in agricultural marketing unless there is a high margin with low volume activity. Kerala never had APMC Act but could not attract private investment in agriculture marketing. Bihar scrapped the APMC Act in 2006 but it could not create better

markets for farmers. In Delhi where fruits and vegetables were deregulated, there has not been any effort to create parallel infrastructure and farmers have gone back to the APMC markets.

In the existing system of agriculture produce marketing through APMC act, the states receive funds in terms of the levies and fees charges that are supposed to be used for rural development and creating state infrastructure. On the farmers' side, the need of credit of the farmers has also increased many folds to meet increasing cost of cultivation due to commercialisation and modernisation of agriculture in post green revolution period. Most of the inputs used by farmers in agriculture are now purchased from the market so that the farmers have to spend huge amounts of cash on purchasing market supplied farm inputs to carry out their production operations. The growing commercialisation of agriculture and inadequate availability of institutional credit have encouraged the increase of commission agents/ arhtiyas in the markets. There is a close socio-economic association between farmers and commission agents/ arhtiyas particularly in rural areas. Arhtiyas have been the life line of the rural economy. Over the period, some of the big farmers have also started working as commission agents/ arhtiyas. A perceptible share of credit requirements for agriculture and consumption expenditure of the farmers have been met by these commission agents/ arhtiyas who charge a high rate of interest from farmers. Formal institutions do not consider small farmers as creditworthy customers. So farmers' indebtedness is one of the most significant characteristics of the Indian rural economy which results in farmers' distress. The Situation Assessment Survey of the National Sample Survey Organisation has also confirmed the farmers' distress by highlighting the fact that a significant proportion (about 52 per cent) of the farmers was indebted with average amount of outstanding loan per agricultural household of Rs. 47, 000 (NSSO, 2014).

Moreover, there is interlocking of the markets. The commission agents/ arhtiyas provide seeds, fertilisers, pesticides etc. to the farmers on credit which is debited out of the value of farmers' produce. Such system is working just like contract farming. But whenever crop failure takes place due to natural calamities or any other disease, the loss is borne only by the farmers and the credit of commission agent remained intact and is further accumulated for next cropping season. It has been observed that the commission agents/ arhtiyas purchased the farmers' produce at the price below MSP most of the time on one pretext or the others. In such a situation the farmers have no choice but to sell their produce in the mandi at whatever price is being offered to them by the trader which leads to enhancement of their

distress over some period of time. The commission agents are relatively more influential and powerful as compared to the farmers.

In the prevailing situation, most of the requirements of the farmers are captured by three issues, assured timely irrigation, quality inputs at reasonable prices and assured marketing of their agricultural produce at MSP. The existing government regulated APMC mandis along with half hearted implementation of the required reforms by the state governments have been the main culprit of its failure to ensure protective cover to the farmers against exploitation instead of blaming the APMC Act. Small and marginal farmers have little alternative choice to realise remunerative prices than to depend on regulated mandis. However, Mandis need reforms as and when required.

The Haryana State Agricultural Marketing Board has been constituted under Section 3 of The Punjab Agriculture Produce Markets Act, 1961. It consists of a Chairman and a Chief Administrator who is in the rank of a Head of the Department, and a maximum of eleven other members, of whom four shall be official and seven can be non-official members. The working of Board is divided into four wings, namely Construction Wing, Enforcement Wing, Accounts Wing and the Administrative Wing.

The sanctioned staff strength during the year 2017-2018 was 3314 out of which 2244 were in position. Planning and development wing of the Board assesses demands and requirements for the development of mandis as well as providing additional facilities in the existing mandis. It is on the basis of this assessment that the Board directs a Market Committee from time to time to establish markets with the approval of the State Government and also provide basic facilities for farmers and persons visiting these mandis in connection with sale, purchase, storage and processing of agricultural produce. Agricultural marketing covers the services involved in moving an agricultural product from the farm to the consumer. Various inter connected activities are involved in marketing like planning the product, growing, harvesting, grading, packing, transport, storage, agro & food processing, distribution etc. In the year 2018-19, the total number of markets for agriculture produce were 476, consisting of 113 Principal Yards, 169 Sub yards and 194 Purchase Centres in Haryana. Average numbers of villages served per regulated market was 61 whereas average area served per regulated markets comes out to be 391 Sq Km during the same period. The capacity of state owned storage was 0.31 thousand tonnes in 1966-67 which increased to 100.28 thousand tonnes in 2018-19. The procurement of wheat and paddy was 87.57 thousand tonnes and 58.82 thousand tonnes respectively in the year 2018-19. During the

same period the arrival of wheat and paddy was 87.95 thousand tonnes and 90.34 thousand tonnes respectively. It implies that there is inadequate storage capacity in the state.

The Marketing Board of Haryana has constructed 90 food storage godowns having capacity of 418934 M.T. The Board received Rs. 1 crore 26 lakh as rent from these godowns during 2017-2018. As provided under Section 26 of the Act, the funds of the Board shall be expended for acquisition of land for Market Committees, maintenance and improvement of the markets, construction and repairs of buildings, which are necessary for the purposes of the market and for the health, convenience and safety of the persons using it providing comforts and facilities such as shelter, sheds, parking accommodation and water, on constructions and repairs of approach roads, culverts, bridges and other purposes.

Over the period, various changes have been introduced in agriculture marketing. Agri Tech Infrastructure Fund (ATIF) is also a centre sponsored scheme which envisages implementation of the National Agriculture Market by the creation of a common electronic platform deployable in selected 585 regulated wholesale markets across the country during 2015-16 to 2017-18. Small Farmers Agribusiness Consortium (SFAC) will implement the national e-platform. Department of Agriculture, Cooperation & Farmers Welfare (DAC&FW) will meet expenses on software and its customisation for the states and provide it free of cost to the states and UTs. DAC will also give grant as one time fixed cost subject to the ceiling of Rs.30.00 lakhs per Mandi (other than to the private mandis) for related equipment / infrastructure in 585 regulated mandis, for installation of the e-market platform. Big private mandis will also be allowed access to the e-platform for purposes of price discovery without any financial support for equipment / infrastructure from the government. The state governments are required to suggest names of APMCs where this project would be initiated.

For integration with the e-platform, the States/UTs will need to undertake prior reforms in respect of

- A single license to be valid across the state,
- A single point levy of market fee, and
- Provision for electronic auction as a mode for price discovery.

Only those States/UTs that have completed these three pre-requisites have been eligible for assistance under the scheme.

3. X: Agriculture Extension

Agricultural Extension (AE) is a crucial component in agricultural development because it plays a significant role in terms of improvement in crop productivity and

production. It promotes access to and willingness among farmers to apply necessary/ updated knowledge and skills in their fields. AE is not a monolithic activity involving only education of individual farmers on new methods of farming. Its content and context change with the location and situation of farming.

Over the period of time, AE has evolved as a public supported activity. It covers trainings, capacity building and infrastructure of agricultural inputs. With the induction of high yielding varieties, chemical fertilisers, pesticides and irrigation facilities, agricultural transformation took place particularly in North Indian states i.e., Punjab, Haryana and Western Uttar Pradesh. However, the growth in crop production has almost saturated due to excess use of chemical fertilisers and pesticides over the period. Cropping intensity was increased due to exceeding use of chemical fertilisers, pesticides etc. Presently, the farmers are not aware about methods for reducing the negative impact of chemical fertilisers & pesticides on crop yield & production.

Over the period, modifications in AE have been made focusing mainly on impacting practical knowledge & skill to the farmers, loss free harvests, proper post-harvest management of the produce etc. However, there is huge shortage of post harvest infrastructure. Taking into account the critical issues and weaknesses, Department of Agriculture and Cooperation (DOAC), Ministry of Agriculture (MOA), GOI, has introduced a Modified Extension Reforms Scheme to bring the then existing 17 different extension programs under the umbrella of Agriculture Technology Management Agency (ATMA) in 2010. Thereafter, the Ministry of Agriculture and Farmers Welfare has established the National Mission on Agricultural Extension and Technology (NMAET) in 2015 as the next step for reaching the objective on amalgamation of these schemes. The NMAET has been focused to help creating a judicious use of modern ICT for dissemination of information on popularization of right kind of technologies by strengthening individual and institutional capacity. In pursuance of that NAMET has organizes itself into following 4 sub-missions:

i. Sub Mission on Agricultural Extension (SMAE)

ii. Sub-Mission on Seed and Planting Material (SMSP)

iii. Sub Mission on Agricultural Mechanisation (SMAM) and

iv. Sub Mission on Plant Protection and Plant Quarantine (SMPP)

Seeds, pesticides and machinery are the three key input components where technology and economic significance can be disseminated to the farmers through efficient extension network. The main objective of National Mission on Agriculture Extension and Technology (NMAET) was to provide the latest technological innovations to farmers through training,

exposure visits and kisan melas. In this manner, farmers are to be kept up-to-date with available technologies and are able to modernize production in a sustainable manner. Subsequently, the objective of Agricultural Mechanisation was to provide agricultural implements to small and marginal farmers on a custom-hiring basis. It also targets reducing the costs of cultivation by increasing the productivity of implements.

Indian Council of Agricultural Research (ICAR) has attempted to strengthen the implementation of the centrally supported AE programs from time to time. It has launched initiatives like National Demonstration Project 1965, Krishi Vigyan Kendra (KVK) Scheme 1974, Operational Research Project 1975, Lab to Land Program 1979, Frontline Demonstrations on Oil Seed and Pulses, 1991, Technology Assessment and Refinement through Institution-Village Linkage Programme (TARIVLP),1995, National Agricultural Technology Project (NATP) 1998 and National Agricultural Innovation Project (NAIP) 2007. These initiatives representing 'frontline extension' brought farmers closer to the scientists, but feebly invoked wide area impact.

It needs to be noted that Krishi Vigyan Kendra is the single largest network of frontline extension system in the country. The main functioning of KVKs include verification of area specific technologies, awareness generation among farmers about new technologies, organising demonstrations on improved technologies, capacity building among farmers, production and supply of new seed and planting materials etc. The KVK has been considered as a linkage among researchers and farmers for enhancing the impact of research in farm productivity. However, NSSO data (59^{th} & 70^{th} Rounds) revealed that the access of farmers to information and advice extended by the KVKs was below expectations as merely 1 per cent of the farmers interviewed accessed technical information from all the 652 KVKs put together. Consequently, there is an urgent need to improve functioning and visibility of KVKs so that it could generate the desired impact of modern methods of farming. There are 18 Krishi Vigyan Kendras at district level in Haryana.

Skill development initiatives of the state government along with access to institutional credit may encourage labour mobility from farm to non-farm sectors (including MSMEs and services). The growth of food and agri-processing industries may reduce the dependence purely on agriculture. Moreover, there is an urgent requirement to develop market linkages between farmers, food & agro industries, transporters, manufacturers, exporters and other stakeholders in the agriculture markets.

The Government of Haryana must have implemented new approaches to generate employment opportunities particularly for the poor sections of the society within the livestock

& service sectors through capacity building and creating opportunities for self employment. Such policies need to be supported by incentives, subsidies and access to affordable formal credit.

Chapter 4

Profile of Agricultural Allied Sectors

4.1: Animal Husbandry and Dairying

Agriculture sector is reeling under stress where growth of agriculture is almost stagnant, therefore the animal husbandry has been considered as a viable alternative for achieving higher growth in state domestic product and employment generation along with doubling the farmers' income.

Animal husbandry is also one of the most important economic activities in the rural agrarian sector of the state where more than 70 per cent people live in villages and majority of them are involved in livestock related activities directly. It plays a significant role to support the livelihood of the weaker sections of the society including small & marginal farmers, landless labourers and women. Livestock rearing is also one of the remunerative self-employment for the rural people. Activities allied to agriculture i.e., Animal Husbandry & Dairy, Poultry and Fisheries provide supplementary occupation to the people besides contributing to Gross State Domestic Product (GSDP). The dependence on the agriculture sector for supporting livelihood is well known while the allied sectors offer scope for absorbing surplus labour from the agriculture.

The Animal Husbandry and Dairy sectors play a significant role in supplementing family incomes and generating gainful employment in the rural sector, particularly among the landless labourers, small &marginal farmers and women. It is endowed with high potential of self employment opportunities. It also provides nutritional food at reasonable prices to millions of people. Livestock are the best insurance against the vagaries of nature like drought, famine and other natural calamities. Animal Husbandry activities contribute significantly to GSDP and have tremendous scope for further expansion to serve as sustainable source of income for rural population.

The Government of India has launched an initiative namely National Livelihood Mission (NLM) for the sustainable growth and development of the livestock sector. The mission covers components for improvement of livestock productivity, with special emphasis on small ruminants, increases in availability of feed and fodder and risk management.

The government of Haryana has proposed to establish Hi-Tech & Mini Dairy units with the budgetary provisions of Rs. 10 crore for the year 2017-18. The target was set to establish 25 Hi-tech and Mini Dairy units with 50 milch animals for the same period. To attract the individuals for establishing the Hi-tech & Mini Dairies, the provisions of subsidy in terms of subvention in the interest on the loan has been made. It is strongly believed that

establishment of dairy units of 3, 5, 10 milch animals can generate substantial employment opportunities to the small, marginal farmers, landless labourers and women in the state. The Department of Animal Husbandry & Dairying has also proposed the projects on Rabies Control Programme, Mobile Veterinary Clinics, Glanders Surveillance Units and Construction of Community Drinking Water Troughs for livestock of SC villages for the year 2019-20 under RKVY- RAFTAAR sub scheme.

Table 4.1: District wise Composition of Livestock in Haryana as per 20th Census 2019

(in 000)

District	Cattle	Buffalo	Sheep	Goat	Horses / Ponies	Mule	Donkeys	Camel	Pig	Dog	Total Livestock
Ambala	67.85	219.24	12.70	7.80	11.54	0.19	0.03	0.00	5.23	10.42	335.00
Bhiwani	130.34	524.86	50.27	50.91	1.93	1.05	0.37	5.40	8.51	15.22	788.86
Faridabad	35.30	121.33	2.87	11.70	0.26	0.07	0.11	0.00	4.22	8.63	184.49
Fetehabad	100.61	321.96	17.25	12.96	1.54	0.28	0.12	1.84	4.99	9.50	471.05
Gurugram	58.37	153.31	2.46	11.55	1.11	0.31	0.33	0.09	5.54	23.44	256.51
Hissar	161.67	509.54	49.04	21.96	1.60	0.66	0.15	1.62	8.97	10.01	765.22
Jhajjar	54.30	254.91	19.81	10.38	0.69	0.92	0.19	0.11	7.80	7.73	356.84
Jind	118.99	503.95	28.07	10.31	2.06	0.65	0.11	0.10	10.93	3.81	678.98
Kaithal	93.63	423.40	16.48	9.15	2.44	0.42	0.12	0.00	10.80	6.98	563.42
Karnal	149.98	357.62	15.09	11.59	2.96	0.27	0.25	0.09	9.07	10.34	557.26
Kurukshetra	93.20	223.26	10.04	4.76	1.41	0.15	0.01	0.00	3.52	6.83	343.18
Mahendragarh	50.45	260.82	24.38	54.69	0.81	0.41	0.06	3.60	1.50	7.65	404.37
Mewat	34.00	228.21	8.11	38.17	0.28	0.12	0.11	0.13	3.52	0.74	313.32
Palwal	38.76	286.29	11.62	9.35	0.45	0.23	0.13	0.01	4.31	1.84	352.99
Panchkula	24.08	68.94	3.47	8.20	0.21	0.25	0.12	0.05	1.40	4.28	111.00
Panipat	54.92	245.24	6.91	5.40	1.51	0.13	0.03	0.00	5.95	2.99	323.08
Rewari	44.38	208.79	8.68	23.24	0.54	0.84	0.10	1.00	2.69	6.30	296.56
Rohtak	61.49	263.44	16.12	6.48	1.02	0.55	0.10	0.01	10.90	5.11	365.22
Sirsa	214.28	343.55	41.89	41.72	1.32	0.80	0.32	4.77	1.45	2.15	652.25
Sonipat	104.14	348.46	7.42	8.64	1.59	0.50	0.11	0.00	11.16	7.42	489.44
Yamunanagar	117.38	218.16	7.42	10.15	1.38	0.20	0.00	0.00	4.54	7.94	369.66
State Total	1808.12	6085.28	362.59	369.11	36.65	9.00	2.87	18.82	126.93	159.33	8978.7

Source: Annual Administrative Report 2018-19, Animal Husbandry & Dairying Department, Haryana

The Table 4.1 represents the composition of livestock in Haryana. The data shows that total number of livestock comes out to be 8978.70 thousand in Haryana. Out of the total livestock 87.91 per cent are cattle & buffalo whereas the share of sheep & goats comes out to be 8.77 per cent. The remaining 3.95 per cent are pigs, dogs, horses/ ponies, camel etc. in the 20th Livestock Census 2019.

The data in Table 4.2 shows the status of Poultry in Haryana. The total poultry in Haryana was recorded as 42821.33 thousand in the Livestock Census 2012. Out of which 99.34 per cent happens to be commercial poultry. Seven districts namely Jind, Karnal,

Panchkula, Hisar, Bhiwani, Ambala and Kurukshetra have 66.88 per cent of the total poultry livestock in the state.

Table 4.2: District wise Poultry Status in Haryana as per 12th Livestock Census 2012

(000)

District	Backyard Poultry	Commercial Poultry	Total Poultry
Ambala	8.71	2,545.67	2,554.38
Bhiwani	12.11	2,814.53	2,826.64
Faridabad	11.27	31.60	42.87
Fetehabad	08.03	285.30	293.33
Gurugram	03.21	497.85	501.06
Hissar	09.69	3,605.84	3,615.53
Jhajjar	06.27	218.57	224.84
Jind	10.65	6,930.28	6,940.93
Kaithal	13.73	1,578.48	1,592.21
Karnal	12.03	6,549.11	6,561.14
Kurukshetra	54.08	3,573.31	3,627.39
Mahendragarh	05.54	942.32	947.86
Mewat	24.48	21.61	46.09
Palwal	05.23	03.20	08.43
Panchkula	00.98	6,192.36	6,193.34
Panipat	05.90	2,281.06	2,286.96
Rewari	04.01	735.72	739.73
Rohtak	05.06	689.30	694.36
Sirsa	14.66	538.72	553.38
Sonipat	11.27	1,553.12	1,564.39
Yamunanagar	48.95	957.52	1,006.47
State Total	275.86	42,545.47	42,821.33

Source: Annual Administrative Report 2018-19, Animal Husbandry & Dairying Department, Haryana

The data further shows that poultry population has increased from 87.85 lakh in 2010-11 to 428.21 lakh in 2018-19 by annual growth of 4.51 per cent. Consequently, egg production has also increased by 5.16 per cent from 38523 lakh to 60577 lakh during the same period.

The Table 4.3 presents the progress about livestock population & production during the period from 2010-11 to 2018-19. The data highlights that the number of technical staff who got training regarding animal husbandry has perceptibly decreased by annual growth rate of -3.21 per cent from 2186 in 2010-11 to 1630 in 2018-19. The number of top quality murrah buffalos has significantly decreased from 9840 to 850 with annual growth rate of -23.82 per cent during the same period. Consequently, the number of dairy units established in the state has increased from 2090 in 2010-11 to 1493 in 2018-19 by - 3.67 per cent annual rate of growth. But, the number of persons who got training in dairy has decreased by 19.71 per cent from 525 to 2650 during the period under consideration.

Table 4.3: Statement Showing Progress about Livestock Population & Production made during 2010-11 to 2018-19

S. No.	Item	Units	Statement showing Progress made during 2010-11 to 2018-19					ACGR (%)
			2010-11	2015-16	2016-17	2017-18	2018-19	
1.	Training of Tech Staff	Nos.	2186	1048	1095	1286	1630	-3.21
2.	No. of animals insured	Nos.	9840	116195	55847	2557	8968	-1.03
3.	No. of top quality Murrah buffalos. Identified	Nos.	9840	4452	809	844	850	-23.82
4.	No. of male buff calves purchased	Nos.	739	83	56	42	40	-27.68
5.	No of Murrah buffalo bulls supplied to Panchayats	Nos.	352	29	12	12	5	-37.67
6.	No. of Dairy Units Estb.	Nos.	2090	4278	3731	4009	1493	- 3.67
7.	No. of persons imparted dairy training	Nos.	525	2050	1958	1722	2650	19.71
8.	Total No. of Veterinary Institutions	Nos.	2789	2801	2816	2832	2835	0.18
9.	Fodder seed production	in MTs	21.27	250.77	269.61	273.57	203.92	28.55
10.	Livestock Population	Lakh	90.50	88.19	88.19	88.19	88.20	-0.29
	Poultry population	Lakh	287.85	428.21	428.21	428.21	428.21	4.51
11.	Milk production	Lakh MTs	60.06	83.81	89.75	98.09	107.26	6.66
12.	Per capita availability of milk per day	Grams	680	877	930	1005	1085	5.33
13.	Egg production	Lakh	38523	49133	52139	55855	60577	5.16
14.	Wool production	Lakh Kgs	12.49	7.02	6.91	6.93	7.19	-5.95
15.	Meat production	Lakh Kgs	112.12	402.77 (including poultry meat)	427.48	470.38	511.99	18.38

Source: Animal Husbandry and Dairying Department (www.pashudhanharyana.gov.in), Government of Haryana

The total number of veterinary institutions remained more or less the same during the period from 2010-11 to 2018-19. The data further reveals that the production of fodder seed has increased from 21.27 metric tonnes in 2010-11 to 203.92 metric tonnes in 2018-19 with annual growth rate of 28.55 per cent. Similarly, the milk production has increased to 107.26 lakh metric tonne in 2018-19 as against 60.06 lakh metric tonnes in 2010-11. Consequently, per capita milk availability per day has gone up from 680 grams in 2010-11 to 1085 grams in 2018-19.

The meat production has also increased from 112.12 lakh Kgs to 511.99 lakh Kgs with annual growth rate of 18.38 per cent during the period from 2010-11 to 2018-19. However, wool production has tended to decrease by -5.95 per cent from 12.49 lakh Kgs in 2010-11 to 7.19 lakh Kgs in 2018-19.

Table 4.4: Details of Veterinary Institutions in the State in 2019

District	GVH	GVD	Semen Bank	Semen Production Centres	Veterinary polyclinics	Disease Diag. Lab	Pet Animal Hospital cum-Training Centre	Haryana Veterinary Training Institute	State Disease Diag. Lab	Total
Ambala	37	93	0	0	0	1	0	0	0	131
Bhiwani	52	92	1	0	1	2	0	0	0	148
Charkhi Dadri	30	54	0	0	0	0	0	0	0	84
Faridabad	19	44	0	0	0	1	0	0	0	64
Fetehabad	50	92	0	0	0	1	0	0	0	143
Gurugram	27	43	1	1	0	1	0	0	0	73
Hissar	85	139	1	1	0	1	0	1	0	228
Jhajjar	93	49	0	0	0	1	0	0	0	143
Jind	62	172	1	0	1	1	0	0	0	237
Kaithal	40	83	0	0	0	1	0	0	0	124
Karnal	52	130	1	0	0	1	0	0	0	184
Kurukshetra	49	72	1	0	0	1	0	0	0	123
Mahendragarh	59	75	1	0	0	1	0	0	0	136
Mewat	25	61	0	0	0	1	0	0	0	87
Palwal	27	86	0	0	0	1	0	0	0	114
Panchkula	15	29	0	0	0	1	1	0	0	46
Panipat	39	73	0	0	0	1	0	0	0	113
Rewari	53	62	0	0	1	1	0	0	0	117
Rohtak	64	46	1	0	1	1	0	0	0	113
Sirsa	59	168	1	0	1	1	0	0	0	230
Sonipat	55	89	0	0	1	1	0	0	1	147
Yamunanagar	26	65	1	1	0	1	0	0	0	94
State Total	**1018**	**1817**	**10**	**3**	**6**	**22**	**1**	**1**	**1**	**2879**

Source: Annual Administrative Report 2017-18, Department of Animal and Husbandry, Haryana (http://pashudhanharyana.gov.in)
Note: GVH- Government Veterinary Hospitals; GVD- Government Veterinary Dispensaries

The Table 4.4 presents the data on operational veterinary institutions in the state. The data shows that total 2879 veterinary institutions are operating in the state. Out of which 35.36 per cent (1018) are government veterinary hospitals, 63.11 per cent (1817) government veterinary dispensaries and remaining 0.63 per cent (47) other institutions in the state during the year 2017-18. Other institutions include semen banks, semen production centres, veterinary policlinics, disease diagnostic labs, pet animal hospital and training centre, veterinary training institute etc. It may be noted that there is only one state diagnostic lab in Sonipat and one state veterinary training institute in Hisar in the state. It may be argued that disease diagnostic facility at doorstep has been urgently required. It is one of the most important flagship programmes of the state government. The prominent infrastructure

required in the state is polyclinic with latest equipments and treatment facilities in all the districts. Moreover, it is also required to provide breeding, feeding and management services at the door steps of the dairy farmers. In those places where there is relatively higher density of veterinary institutions, the services are rendered quickly to farmers and consequently these areas have become more productive over a period of time in case of livestock.

There is an urgent need to establish more veterinary institutes along with strengthening the existing ones with the latest technologies and machines. Priority should be given for an area where public livestock service delivery coverage is poor and those high potential areas where demand lies for superior quality services.

Table 4.5: Details of Vaccine Produced and its Distribution (in Lakh)

S. No.	Name of Vaccine	Initial Balance	Production	Purchase	Total Available	Distributed			Balance
						State	Outside State	Total	
1	H.S	17.98	143.78	0	161.76	136.63	0	136.63	25.13
2	B.Q	0.33	0.89	0	1.22	0.32	0	0.32	0.90
3	E.T.V.	5.86	6.72	0	12.58	6.29	0	6.29	6.29
4	Swine Fever	0	1.15	0	1.15	1.02	0	1.02	0.13
5	P.P.R	0.18	4.50	0	4.68	3.70	0	3.70	0.98
6	Sheep Pox Tissue Culture	2.20	3.90	0	6.10	3.61	0	3.61	2.49
2017-18	Total	26.55	160.94	0	187.49	151.57	0	151.57	25.92
2016-17	Total	23.20	153.57	0	176.77	150.22	0	150.22	26.55

Source: Annual Administrative Report 2017-18, Animal Husbandry & Dairying Department, Haryana

The Table 4.5 shows the production and distribution of vaccine in the state of Haryana. The data shows that the vaccine H.S. has been mainly produced and distributed in the state. The total availability of vaccine has increased to 187.49 lakh in 2017-18 as against 176.77 lakh in 2016-17. Consequently, the distribution of the vaccine has also increased from 150.22 lakh to 151.57 lakh during the period under consideration. It indicates that the state government is making efforts to cover all the animals under vaccination.

Artificial Insemination is not only a novel method of bringing about impregnation in females but also a powerful tool for livestock improvement. It is also very helpful to reduce genital and non-genital diseases in livestock. The data in Table 4.6 highlights that cases of Artificial Insemination (A.I) done in animals has significantly increased from 20.37 lakh in 2010-11 to 41.78 lakh in 2018-19 with a growth rate of 8.31 per cent. An Artificial Insemination in cows has increased at a growth rate of 6.94 per cent from 5.85 lakh to 10.71 lakh whereas growth rate was 8.82 per cent from 14.52 lakh to 31.08 lakh in buffalos during the same period. Due to artificial insemination the calve born rate has also increased by 7.93

per cent from 7.39 lakh in 2010-11 to 14.69 lakh in 2018-19. It is considered to be a positive effort of the department. Moreover, number of outdoor treatment cases of animals has also perceptibly increased by 7.86 per cent from 38.25 lakh to 75.60 lakh during the period under consideration.

Table 4.6: Statement Showing Progress in Animal Health made during 2010-11 to 2018-19

S. No	Particular	Unit	Species	2010-11	2014-15	2015-16	2016-17	2017-18	2018-19	Growth Rate (%)
1	Artificial Insemination Done	lakh	Cows	5.85	9.20	9.16	8.69	10.15	10.76	6.94
			Buffalos	14.52	23.48	23.55	23.19	29.71	31.68	8.82
			Total	20.37	32.68	32.71	31.88	39.86	41.78	8.31
2	Calves Born	lakh	Cows	2.07	3.29	3.68	3.58	3.44	3.86	7.17
			Buffalos	5.32	7.81	9.03	8.88	8.89	10.83	8.22
			Total	7.39	11.10	12.71	12.46	12.33	14.69	7.93
3	Outdoor Cases Treated	lakh		38.25	62.05	74.72	78.74	75.02	75.60	7.86
4	A.H. Care Camps Organised	Nos.		9762	5372	5539	4142	4241	3781	-10.00
	Infertility Camps Organised			3505	7580	6932	6570	6028	6198	6.54
5	Animal Dewormed	lakh		36.63	27.90	35.65	40.42	37.00	52.59	4.10
6	Vaccination Done	lakh		139.3	161.25	145.55	144.94	148.42	160.95	1.62
7	Vaccine Production	lakh		82.62	142.3	156.91	153.67	160.94	136.30	5.72
8	Frozen Semen Straw	lakh	Cows	7.21	13.20	9.03	10.54	11.76	11.14	4.95
			Buffalos	16.39	37.91	30.71	24.93	31.40	28.87	6.49
			Total	23.60	51.11	39.74	35.47	43.16	40.01	6.04

Source: Annual Administrative Report 2018-19, Animal Husbandry and Dairying Department, Government of Haryana

It has been noted that the number of animal husbandry care camps being organised in the state have decreased from 9762 in 2010-11 to 3781 in 2018-19 with a rate of -10.00 per cent but the number of infertility camps was gone up by 6.54 per cent from 3505 to 6198 during the same period. The number of vaccination done has also increased from 139.31 lakh in 2010-11 to 160.95 lakh in 2018-19 with by 1.62 per cent growth rate. During the period under consideration, the vaccine production in the state has increased with an annual growth rate of 5.72 per cent from 82.62 lakh to 136.30 lakh.

The data further reveals that total frozen semen straw has also increased with an annual growth rate of 6.04 per cent from 23.60 lakh in 2010-11 to 40.01 lakh in 2018-19. It needs to be noted that frozen semen straw of buffalos has increased relatively at higher

annual growth rate of 6.49 per cent as compared to that of cows 4.95 per cent during the period under consideration.

It has been observed that there is lack of awareness among the farmers on enriching the available dry fodder with nutrient supplements. The farmers have inadequate knowledge on hygienic milk production, scientific rearing of calves and management of cross bred cows during advanced pregnancy period. There is also problem of non availability of adequate veterinary services within the easy reach/ access of the farmers particularly in remote areas mainly due to insufficient technical manpower.

In Haryana, the livestock farmers are mainly dependent upon the village ponds for watering their animals. Most of these village ponds are rain-fed, where surface runoff water is collected. During rains, lot of pollutants, silt and other contaminants reach to these ponds along with the rainwater. Such water, if not cleaned regularly, becomes non-potable and hazardous for the health of the animals. Therefore, there is a need of regular cleaning of these ponds to maintain the health and production of the livestock. Regular supply of water is required not only for survival but also for maintenance of production in animals.

Animal husbandry activities in the state play a crucial role in the rural economy through a variety of contributions in the form of income generation, socio-economic upliftment, employment generation and better nutrition through livestock production of milk, eggs & meat etc. The state has vast potential for further growth of its livestock sector over the next 10-15 years. There is a need to exploit full potential of our livestock resources for realizing our long cherished dream of making Haryana 'the Denmark of India' and to bring smile and prosperity in the lives of the farming community. To achieve this goal the main focus of department of Animal Husbandry & Dairying shall be on wide publicity, extension and teaching for quality scientific management, breeding, feeding and marketing strategies in the field of animal husbandry which should be brought forward through various schemes. The Department is implementing various schemes for economic upliftment of the farmers & rural people and to generate large scale employments in the state. Due to lack of awareness farmers are unable to tap full benefit provided by the department and also are unable to adopt new techniques, thereby hinder the transfer of technology in Animal Husbandry sector. There is wide gap between technology developed by researcher and technology adopted by farmers. Moreover, to deal with this problem the Department of Animal Husbandry & Dairying would have to focus on strengthening the lab to farm linkages, generating awareness among the farmers regarding various schemes of the Department and disseminating scientific Animal Husbandry practices in a better way to the livestock owners in the rural areas. It may be

implemented through holding animal husbandry education and awareness camps, preparing and distributing extension literature and documentary CDs and strengthening of infrastructure of the department for extension activities by creating regional training centres at the polyclinics of the state.

The success story of the Foot and Mouth Disease Control Programme may be replicated for hemorrhagic septicaemia in Haryana. Control and eradication of important zoonotic diseases such as brucellosis, rabies and gastro-intestinal infestations shall be targeted. Therefore, the Government of Haryana should provide veterinary and breeding services through its existing government veterinary hospitals, dispensaries and mobile veterinary diagnostic clinics at the doorstep of livestock owners. In addition, new government veterinary hospitals and government veterinary dispensaries with adequate infrastructure may be established in villages which meet the standards and regulate ons of the Government of Haryana. For providing specialized services, veterinary polyclinics need to be established in each district. For comprehensive and holistic planning, animal identification and use of information technology are of prime importance, so the Management Information System (MIS) of the Department of Animal Husbandry and Dairying may be developed for efficient functioning and planning of activities. Animals can be identified in a phased manner by tagging through the Information Network for Animal Productivity & Health (INAPH) system and the issuance of unique identity numbers. This system would be useful to monitor the health of the animals.

4. II: Fisheries

Fisheries and aquaculture play an important role in earning the livelihoods for millions of people in India directly or indirectly. But Haryana has no traditional fishing communities who depend mainly on fishing for their livelihood as it is landlocked state. However, over time the state has made a significant progress in fisheries development, though it was initially promoted as economic utilisation of village ponds. In the year 1966-67 only 58 hectare of village ponds were under fish culture with total fish production of 600 tonnes. Growth has been quite impressive. Fish production shot up to 23,200 tonnes by 1990, 33,040 tonnes by 2,000 and nearly 1 lakh tonnes by 2010. During the year 2017-18, the fish production was recorded as 1,90,000 MT as compared to 1,44,210 MT in the year 2016-17.The total 18,550 hectare water area was brought under fish culture by stocking 2205.81 lakh fingerling fish seed in 2017-18 which was 18975 hectare water area by stocking 7,665.65 lakh fish seed in 2016-17. Average fish production comes out to be 10,000 kg/hectare/year in 2017-18 as compared to 1,200 kg. / hectare / year during the year 2016-

17.The area under fish culture has gone up. But there is very little scope for increasing fish culture area through private ponds with good quality freshwater sources. It needs to be noted that 4,625.09 lakh fingerling quality fish seed was produced at various Government Fish Seed Farms and Private Hatcheries of the State during the year 2017-18 as against 6,532.44 lakh in the year 2016-17.

Moreover, an area of 96.12 hectare was brought under prawn farming and 288.406 Kgs of prawn was produced in the state and marketed in the different fish markets of the state and in National Capital during the year 2017-18.

Efforts have been made to diversify from traditional carp fish culture to high valued fish species such as ornamental fish and to conserve saline/water logged areas. The provision has been made for mobilizing the untapped water resources such as water logged areas, saline soil and water for aquaculture. The saline area and water logged area has been estimated at about 20,000 hectare and 2,000 hectare respectively in the state of Haryana.

After making successful experimental trials some of the proven technologies like Tiger-shrimp culture, vannamei culture and fresh water prawn poly culture have been adopted for saline water and saline affected barren lands. The unit cost for the culture of Pacific White Shrimp Letopenaeus vannamei under saline water comes out to be 24.95 lakh per hectare consisting of Rs.14.05 lakh and 10.90 lakh as capital cost and operational cost respectively.

Chapter 5

Key Issues for Agriculture and Allied Sectors

5.1: Agriculture- Key Issues

5. 1. I: Agriculture Production

- **Key Issues**: Most of the land holdings in the state are small and fragmented. The farmers with small land holdings are unable to afford agricultural machinery mainly due to non-viability and resource constraints. There is problem of non availability of adequate canal irrigation water in all the regions in the state, consequently ground water has been extensively used for irrigation purposes. Ground water is depleting at an alarming rate in the state. Due to excess extraction of the ground water, its quality has been also deteriorating which results in the problems of soil salinity and water table getting down. There is also the problem of water logging in some of the districts mainly in rainy seasons. Cropping pattern is getting mostly concentrated to wheat-paddy rotation. Consequently, soil fertility has been declining continuously. Organic matter content is also decreasing in the soil. There is problem of non availability of quality seeds and other inputs in time on demand. The farmers are also not adopting specified package of practices for various agriculture crops. Farmers generally approach the private dealers for seeds, fertilisers and other inputs without any prescription from the agriculture field officials. Management of crop residue is also emerging as one of the major problems.
- **Suggestions**: Cooperative farming must be promoted to harness economies of scale. Agriculture machinery should be provided to the farmers through Custom Hiring Centres (CHCs) at the village level. State should harness existing potential for canal irrigation and its optimal use may be ensured. Electricity use for tubewell irrigation and other farming operations is very wasteful. Its efficient use may be encouraged through various means. The farmers may also be motivated for water harvesting. Water recharge structure should be developed at appropriate places. The farmers may be motivated and encouraged to adopt sprinkle and drip irrigation by providing incentives in terms of subsidies for the purchase of required equipment which would reduce the pressure on the ground water. There is an urgent need to use pesticides, insecticides and chemical fertilisers judiciously. The farmers should be motivated for crop diversification in favour of less water consuming high yielding crops. Crop diversification should be encouraged in favour of pulses, oil seeds in dry areas. MSP

and assured procurement of pulses and oil seeds can be used as an effective instrument of diversification and change in the existing cropping pattern of wheat-paddy rotation. Horticulture must be encouraged in areas near the urban centres. The varieties of crops suitable to the different soil conditions in the state should be developed and promoted through R&D in the agricultural universities. Green manuring should be encouraged and subsidy can be provided on Dhaincha and pulses etc. to promote it as it will protect soil health. The land reclamation programme needs to be implemented properly to rectify the problem of soil salinity. Serious efforts should be made to ensure timely supply of seeds and other inputs at reasonable prices. Crop residue can be used for power generation. Incentive should be provided to farmers who have done in-situ/ ex-situ management of paddy straw. The farmers may be motivated to follow recommended package of practices for agricultural crops. Losses occurred due to fire, stray animals, insects, pests and diseases may be included in Pradhan Mantri Fasal Bima Yojana (PMFBY).

5.1. II: Agricultural Infrastructure

- **Key Issues:** There is the problem regarding supply of poor quality of seeds, fertilisers, pesticides and other inputs. Quality Control and Plant Health clinic/ labs in most of the districts of the state of Haryana are deficient and inadequate. There is inadequate custom hiring centres in the state. Marketing of agricultural produce is also one of the main problems particularly for small farmers. In the present marketing system farmers, wholesalers and retailers are the stakeholders. There is close nexus between wholesalers and retailers and the small farmers are at margin. Due to lack of food processing, value addition units and storage facilities, farmers are not willing to adopt horticulture/ vegetables crops as crop diversification mechanism. There is shortage of milk product & processing facilities at the village/ block level.
- **Suggestions**: A common service facilitation centre should be established at district and block levels so that the farmers can avail all the facilities under single roof. Proper quality control and plant clinic labs should be made available at block level. Adequate marketing of agricultural produce is also one of the crucial components for agricultural sustainability. The government should procure all the agricultural produce of the farmers at minimum support price (MSP). Cold storage & Warehouse facility should be provided to the farmers at block level at reasonable prices. Food processing and value addition units crops & milk products should be established at block level.

Sampling power should be given to all the agricultural officers so that they can provide insightful inputs on quality of available seeds, pesticides, fertilisers etc. in the market to the farmers.

5.1. III: Agriculture Extension

- **Key Issues**: Institutional and physical infrastructure for extension services in the field centres is inadequate to cater to the requirements of providing various types of extension services to the farmers. There is lack of government office buildings for Agriculture Development Officer (ADO) / Block Agriculture Officer (BAO) at field headquarters and block levels. There is problem regarding non availability of computer, printer, projector, internet connection and power backup at block and field level offices. There is inadequate number of Centres of Excellence of various agriculture crops. Audio visual meeting halls and library facilities for conducting awareness programmes for farmers are inadequate at the block level. There is lack of transportation vehicle for field agriculture officials and staff for field visits. There is lack of full time extension staff both technical and non technical. Due to shortage of technical staff there is no proper organisation of demonstration plots for dissemination of new technologies. Lack of dissemination of new generation extension tools & technology in the fields happens mainly on account of resource shortage. There is lack of block based plan for extension activities. Moreover, there is lack of coordination between the resource institutions and extension functionaries. There is lack of seed research programme of the government. The markets are flooded with adulterated inputs without any prescription from the agricultural officials/ experts. There is lack of interaction between farmers and agriculture field officers to transfer the technology from labs to fields consequently technology transfer process has been very slow. Agriculture Development Officers (ADOs) are the main channel for technology transfer. There is lack of audio video aids facilities for agriculture extension services. The extension staff has been occupied for other activities i.e., crop booking survey, crop cutting experiments etc by the department. So they are unable to perform their extension services judiciously.
- **Suggestions**: Proper government office building should be established for BAOs/ADOs at block and cluster/ village level. There should be proper units of government land for demonstration and to conduct trials of new tools & technologies. Centre of Excellence of various agriculture crops must be established at sub division

or block levels. It would enhance the exposure and confidence of the farmers. Extension functionaries should be engaged only for extension activities. The department is focussing on old extension methods/ techniques. New Extension tools based on social media, internet based technology, direct linkage with reputed institutions and research centres should be adopted. Every policy should be framed on the basis of agricultural scenario of regions/blocks because at present all activities are running as per the directions issued by the Agriculture Department at state level. There should be close association between research centres, state government and the concerned department so that the new region specific high yielding varieties may be provided to the farmers at reasonable prices. Presently most of the high yielding varieties of paddy and wheat are supplied by the private sectors. The state government should run Seed Research Programme on self seed farms so that latest new varieties may be provided at reasonable rates. All inputs should be sold to the farmers with the prescription of BAOs/ADOs. The Crop Cutting Experiments and Soil Health Cards work should be enacted through separate agency. There should be a separate wing for data collection. Extension services should also be provided for bee keeping whereas it is required. Extensions officers should be provided manpower for field work such as collection of Soil and ground water samples etc. They should not be over burdened with other activities/ tasks. Agriculture Extension work should be done only by the well qualified extension staff. In order to enhance interaction between farmers and agriculture field officers kisan gosthi / mela must be organised at village level / block level in consultation with the farmers. Library and meeting halls with audio video facilities should be made available at block level for the farmers on priority so that latest innovations regarding new techniques/ practices may be delivered to them. Latest study material in simple language should be made available to the staff and farmers to understand the agricultural problems. The computer/ laptop with internet connection should be provided to the field officials and staff so that they can finish work efficiently on time. Solar panels may be installed to ensure uninterrupted power supply for computer and internet at block level offices. Transportation facilities should be provided to ADOs and BAOs for field visits.

5.1. IV: Manpower

- ***Key Issues:*** There is acute shortage of manpower both technical and non technical in the field. Numbers of posts are lying vacant.

- **Suggestion**: All the vacant posts should be filled up on priority so that better results may be realised in agriculture. Agricultural Inspector (AI) and field man should be attached with the field level officers for smooth functioning of various agricultural tasks. Adequate manpower should be provided for soil and water conservation at the block and village levels.

5. 1.V: Training and Capacity Building

- ***Key Issues:*** There is lack of training and capacity building programmes for the field officials, staff and farmers. There is shortage of master trainers. The quality of training is also poor. There is shortage of training infrastructure i.e., training hall, library, demonstration materials, audio video aids, computer, printer, projector, power back up etc.
- **Suggestions**: Trainings and capacity building programmes for should be conducted regularly for the field officials and other staff and it should be made compulsory for all the concerned staff. ADOs / BAOs should be included in the workshops for Rabi and Kharif seasons which are conducted at Chaudhary Charan Singh Haryana Agriculture University, Hisar. Moreover, refresher courses for field staff should be organised at district/ block level regularly. Adequate infrastructure should be made available for conducting training and capacity building programmes smoothly. Exposure/ field visits for staff and farmers should also be conducted regularly. The content of the exposure visits should be attractive, market oriented, realistic, adaptable and suitable to different soil conditions. The field staff and farmers should be motivated to attend the exposure/ field visits. Facilities to preserve and restore indigenous knowledge and experience should be provided at block level.

5. 1.VI: Any Other:

- **Key Issues**: Loss from stray and wild animals, lack of sampling power to agriculture officers, inadequate soil & water testing facilities and inadequate post harvest management infrastructure are major problems for agriculture production and crop productivity in the state.
- **Suggestions:** Sampling power should be given to all agriculture officers so that quality of agriculture products & inputs may be checked and adulteration in agriculture produce, seeds, pesticides, fertilizers and other inputs can be controlled. Soil and water testing facility should be strengthened. It is urgently required to ensure the facilities for soil and water testing to the farmers at block & village levels free of

cost. The farmers may be motivated to adopt solar panels/ fencing for tube well connections through adequate incentives in terms of subsidies. Storage facilities, cold storage and warehouse facilities should be provided to the farmers at village/ block level at reasonable prices. There should be separate data collection units for Pardhan Mantri Kisan Samman Nidhi Yojna and Pardhan Mantri Fasal Bima Yojana.

5. 2: Horticulture- Key Issues

- There is lack of area specific varieties of horticultural and vegetable crops.
- There is lack of high yielding disease resistant varieties of horticulture crops.
- There is lack of awareness among the farmers regarding mushroom & horticulture cultivation.
- Post harvest infrastructure i.e., collection, grading, waxing, packaging, storing and marketing for fruits, vegetables, mushroom and other horticulture crops is poor. Consequently a good quantity of horticulture crops particularly vegetables has been lost.
- There is lack of proper knowledge among farmers regarding latest recommended package of practices regarding production, post harvest handling and marketing of horticulture crops.
- There is shortage of fruit processing and value addition units in the state.
- There is lack of transparency in the markets for horticulture crops mainly due to monopoly of traders and multiple inter mediatory which leads to inefficiency.
- The quality of planting material/ seeds for fruits and vegetables crops is also poor.

5.3: Animal Husbandry and Dairying- Key Issues

- There is lack of green fodder availability throughout the year.
- There are inadequate cattle feed testing labs in the state and consequently there is lack of concentrates and mineral mixture in cattle feed.
- There is shortage of silage making units for cattle.
- The farmers are following poor management practices regarding feeding and breeding of livestock.
- The panchayat & pasture lands for cattle grazing are shrinking in the state.
- There are inadequate dead cattle disposal ponds in the state.
- Veterinary infrastructure is inadequate and there is shortage of veterinary staff in the dispensaries and hospitals.

5.4: Fisheries-Key Issues

- There is weak infrastructure for fish seed production and genetic up gradation.
- There is lack of awareness, capacity building activities, trainings programmes for the field staff. Demonstration and exposure visits to update the farmers regarding fish production and management practices are at very low level in the field.
- There is inadequate availability of quality seed of high yielding fresh water prawn.
- Fish storage and cold chain infrastructure is inadequate in the state.
- The common land and ponds are not properly maintained.
- There is lack of awareness among the fish farmers regarding post harvest management practices for fisheries.
- The latest amendments in Panchayat Act regarding reduction in lease period from 10 years to 3 years is not gaining expected supports from the farming community.

Chapter 6

Key Recommendations

6. I: Key Recommendation for Agriculture

- Haryana state agriculture development policy should give high priority to crop diversification from wheat-paddy rotation cycle towards pulses and oil seeds, especially in water deficit regions. Pulses and oil seeds may be provided assured market through procurement at the MSP. For this area planning can be resorted to for guaranteed procurement from the registered farmers.
- There is an urgent need to develop High Yielding Varieties of seeds for pulses & oilseeds and other less water intensive crops. For this Haryana Agriculture University, Hisar may be asked to undertake required R&D for this purpose.
- As more than 80 per cent holdings are small and marginal farmers, cooperative farming should be encouraged to haraness the benefits of large scale farming. These cooperatives can act or be a part of the Agriculture Producer Market Committees for better price realisation in the Mandis.
- Farm mechanization needs to be strengthened, different latest farm implements may be provided to the small and marginal farmers through custom hiring centres at reasonable rates in each village.
- Organic farming should be promoted for which HAU may be called upon to impart required information and skills to the farmers to develop organic seeds, organic fertilisers, organic pesticides and suitable farming practices for which help from various NGOs can also be solicited.
- Institutional and physical infrastructure of extension services in the state is in shambles. Government should formulate a long term policy and provide required support at the Block and District level extension service centres which will provide all the extension services at one place in each Block.
- Utilisation of bio-pesticides and fertilisers may be promoted in agriculture production. It would help to preserve soil fertility and enhance quality of agriculture produce.
- Farmers' facilitation centres are urgently required at villages' level with the help of village panchayats. It would help the farmers to get resolved their immediate agriculture related problems.

- There is an urgent need to establish of technology dissemination centres at district & block levels.
- To enhance awareness, serious efforts are required to organise training and capacity building programmes for farmers, field staff, block officers, Krishi Vigyan Kendras (KVKs), and for elected representatives of Panchayati Raj Institutions (PRIs) regarding agriculture and allied activities on regular basis.
- Farmer's exposure may be enhanced through field visits, krishi melas, and kisan gosthies etc.
- Manpower at field level needs to be strengthened.
- Seed storage units may be established at block level so that the farmers may get quality seeds from government outlets on time.
- There is an urgent need to provide ground water and soil testing facilities to the farmers at their doorsteps.

6. II: Key Recommendation for Horticulture

- State has huge potential for the development of Horticulture in the foothill Shivalik belt from Kalka to Yamunanagar areas and regions neighbouring urban centres. State needs to undertake a conscious policy decision and promote horticulture in the state. Production planning may always be complemented by development of marketing infrastructure, agro-processing units for successful implementation of a scheme.
- New high yielding disease resistant varieties of fruits, vegetables and medicinal crops needs to be developed.
- Emphasis should be given to post harvest infrastructure for horticulture crops as well.
- Protected cultivation for off seasonal varieties through net houses, poly houses, green houses may be promoted by giving adequate incentives to the farmers.
- To enhance awareness among the farmers about horticulture cultivation, the state government should increase frequency of awareness generation and capacity building programmes at village levels. The quality of these programmes should also be improved. In order to ensure frequency and quality of the awareness and capacity building programmes at grass root level an effective monitoring mechanism is required. A good quality printed materials in simple language about horticulture cultivation should be supplied to the farmers.
- The Kisan Melas should be organised regularly at local levels to demonstrate latest technologies for horticulture cultivation. The farmers visiting the melas may

themselves judge the performance of the different technologies. These melas will also provide a common platform to the farmers to exchange their views/ experiences with the other farmers and the experts/ scientists.

- Updated government nurseries equipped with the latest technologies/ innovations must be established at cluster level so that the farmers may get quality seeds/ planting materials easily.
- Mushroom cultivation needs to be promoted as it is very remunerative crop.
- Provision of refrigerated vans for transportation of fruits and vegetables from fields to markets at reasonable prices must be made on priority.
- The state government should encourage the establishment of fruits and vegetables processing and value addition units in clusters. The processed products may be sold with the brand name of HAFED. This proposition is desirable not only for strengthening marketing system but also the farmer could get reasonable prices for their produce.
- Solar panels/ fencing for drip & sprinkle irrigation and protected cultivation need to be promoted so that dependency of irregular electricity supply may be reduced.

6. III: Key Recommendations for Irrigation

- There is an urgent need to generate awareness among the farmers regarding adoption of Under Ground Pipe Lines (UGPL) instead of flood irrigation.
- The farmers may be motivated for judicious use of irrigation water both ground as well as canal water.
- Emphasis should be given to establish rain water harvesting structures at appropriate places to preserve the precious ground water which is depleting at an alarming rate in the state.

6. IV: Key Recommendations for Animal Husbandry and Dairying

- Cattle feed testing labs may be established at block level so that quality feed for cattle could be provided to the farmers.
- Adulteration in milk and milk products is required to be checked. Therefore milk & milk product testing/ checking machines may be made available at village level.
- Hydroponic production units may be established at appropriate places to ensure green fodder throughout the year.
- Silage making units may be established at appropriate places.

- Construction of dead cattle disposal ponds may be established at appropriate places.
- There is an urgent need to strengthen pond water cleaning system to make safe drinking water available to animals. Drinking water taps on pond side can also be established.
- Compost making, packaging and storage units are required to be constructed in the villages.
- Veterinary dispensary services needs to be strengthened with the latest facilities/ techniques so that the livestock holders/ farmers may avail the facilities easily. Government veterinary medicine stores may be established in dispensaries at least block level. Efforts may be made to strengthen the animal diseases and surveillance facilities which would help to monitor the disease prone animals.
- Skill development training/capacity building programmes for field staff/ farmers/ livestock holders on milk sector, meat sector, egg sector and fodder sector are required to be conducted at the their nearest feasible places on regular basis.It would help the livestock holders to adopt latest practices for livestock management.

6. V: Key Recommendation for Fisheries

- Incentives need to be enhanced to promote the fish culture in the state.
- There is an urgent need to hold demonstration visits on field based fish culture technology for capacity building and skill up-gradation for field officials and fish farmers on regular basis. It would help to generate awareness among the fish farmers regarding fish culture. Fish technology dissemination centres must be established at block level.
- In order to meet the challenges of saline water, the state government needs to focus on develop new varieties of fish seeds for saline water.
- The laboratories for fish feed, soil and water testing are required to be established at cluster level.
- Adequate arrangement should be made for fish storage and fish marketing equipped with the latest technologies to boost up the confidence of the fish farmers.

Selected Bibliography

Government of India (2017): Operational Guidelines for Rashtriya Krishi Vikas Yojana-Remunerative Approaches for Agriculture and Allied Sector Rejuvenation (RKVY-RAFTAAR) 2017-18 to 2019-20, Department of Agriculture, Cooperative & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Krishi Bhawan, New Delhi.

Government of India (2019): Annual Report 2017-18, Department of Agriculture, Cooperative & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Krishi Bhawan, New Delhi.

Government of India (2014): Rashtriya Krishi Vikas Yojana Operational Guidelines for XII Five Year Plan, Department of Agriculture & Cooperative, Ministry of Agriculture, Krishi Bhawan, New Delhi.

Government of India (2017): Basic Animal Husbandry & Fisheries Statistics- AHS- Series 18, Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture & Farmers Welfare, Krishi Bhawan, New Delhi.

Government of India (2014): Impact Evaluation Study on National Mission on Micro Irrigation, Department of Agriculture & Cooperation, Ministry of Agriculture, Krishi Bhawan, New Delhi.

Goverment of Haryana: Working Group Report on Development of Horticulture in Haryana, Haryana Kisan Ayog.

Government of Haryana (2016): Vision Document up to 2030, Department of Horticulture.

Government of Haryana (2020): Statistical Abstract of Haryana 2018-19, Department of Economic and Statistical Analysis, Haryana.

Government of Haryana (2020): Economic Survey of Haryana 2019-20, Department of Economic and Statistical Analysis, Haryana.

Government of Haryana (2019): Annual Administrative Report 2017-18, Agriculture & Farmers Welfare Department, Government of Haryana.

Government of Haryana (2019): Annual Administrative Report 2018-19, Department of Animal Husbandry & Dairying, Haryana.

Government of Haryana: Department of Horticulture, Haryana (www.hortharyana.gov.in).

Government of Haryana: Department of Animal Husbandry & Dairying, Haryana (www.pashudhanharyana.gov.in).

Government of Haryana: State Agriculture Plan for Rashtriya Kisan Vikas Yojana of XI Five Year Plan, Directorate of Extension Education, CCS Haryana Agriculture University, Hisar.

Government of Haryana: Comprehensive District Agriculture Plans (C-DAPs), Department of Agriculture & Farmers Welfare, Panchkula.

Government of India (2014): The Situation Assessment Survey of Agricultural Households-All India Debt and Investment, National Sample Survey Organisation, Ministry of Statistics and Programme Implementation.

Government of Haryana (2017): Working Group Report on Agricultural Extension in Haryana, Haryana Kisan Ayog, Panchkula.

Ramesh Chand (2010): Research Study on Estimation of Marketing Efficiency of Horticultural Commodities under Different Supply Chains in India, National Centre for Agricultural Economic and Policy Research, New Delhi.

Saumya Chakrabarti and Anirban Kundu (2009), " Rural Non-Farm Economy: A Note on the Impact of Crop-Diversification and Land-Conversion in India", Economic and Political Weekly, Vol. 44, No. 12, pp. 69-75.

Usha Tuteja (2011): Impact of the National Horticulture Mission (NHM) Scheme in Haryana, Agricultural Economics Research Centre, University of Delhi, Delhi

Singh, Kulwant (2016): "Agricultural Sustainability and Subsidised Power Supply: Reflections from Haryana", Agricultural Situation in India, Vol. LXXIII, No. 6, September, pp. 23-30.

---------- (2016 a): "Implications of Subsidised Power Supply for Sustainable Agriculture in Haryana", Man and Development, Vol. 38, No. 1, pp. 51-70.

K. N. Ninan (1992), "Economics of Shifting Cultivation in India", Economic and Political Weekly, Vol. 27, No. 13, pp. A2-A6.

K. V. Subrahmanyam (1981), "Employment Potential of Horticulture Industry", Indian Journal of Industrial Relations, Vol. 16, No. 4, pp. 605-613.