

অসম চৰকাৰ



Government of Assam

# REPORT ON AGRICULTURE & ALLIED ACTIVITIES OF ASSAM

## IN THE BACKDROP OF COVID 19 PANDEMIC

STATE INNOVATION AND  
TRANSFORMATION AAYOG (SITA)  
GOVERNMENT OF ASSAM

MAY 2020





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GOVERNMENT OF ASSAM

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**MAY 2020**



**Sarbananda Sonowal**



**Chief Minister, Assam  
Guwahati**



**MESSAGE**

The COVID-19 has impacted the entire world and forced countries to enforce lockdown to prevent spread of the pandemic and to save the mankind. This has however adversely affected the economy as all revenue generating activities have come to a grinding halt. Nevertheless, I must applaud that in such an austere situation, farmers of our State have ensured that while the country is locked, there is no shortage of food supplies. The State Government is cognizant of the challenges faced by the farmers and committed to overcome the same with effective strategic interventions.

I am happy that taking our initiative forward, the State Innovation & Transformation Aayog (SITA), Assam has come up with an evaluation report in a matter of few days on the impact of the pandemic on the agricultural sector that sheds ample light on the challenges faced by farmers of the State and suggests action-oriented recommendations to revive the sector.

I appreciate the KPMG team who have prepared this report in collaboration with SITA, Directorate of Economics & Statistics, Directorate of Animal Husbandry & Veterinary, Government of Assam, renowned academicians from Assam Agricultural University, Farmer Producer Organizations, private agencies, State Public Sector Enterprises and farmers of the State for this timely endeavour.

**(SARBANANDA SONOWAL)**





## MESSAGE

It is a matter of great importance that State Innovation & Transformation Aayog(SITA), Assam has prepared a ‘ Revival Strategy of Agriculture and Allied Sectors in Assam’ during this unprecedented time of crisis when a lockdown has been imposed throughout the country including our state, Assam due to spread of COVID-19.

Primarily a rural dominated state and with 70% of the population dependent on Agriculture for livelihood, a strategic and inclusive plan for its citizens is the need of the hour in both the short and the long run. The expected resultant rise in rural demand may be our only chance to vector around this economicdownturn. At a time when the entire country is under lockdown, very low consumption levels are expected from secondary and tertiary sectors. Therefore, only the primary sector (which includes Agriculture and Allied sectors) has the potential to maneuver the economy back to a sustainable growth trajectory. As such, agriculture could turn out to be the dominant sector in Assam’s future economy having substantial demand across country and overseas as well in the coming times given the state’s unique geo-economic position. Agriculture and allied sector has the potential to provide food security for Assam and 70% employment for the state’s population. Reviving this sector is likely to help provide employment, arrest demand deterioration at a time when domestic production as well as exports are sinking.

In this report, an erudite effort has been made not only to assess the impact of COVID-19 pandemic on the Agricultural and Allied sector economy but also to ingrain very useful insights and recommendations. It is my firm belief that the recommendations in this report will help us tide over the current situation and emerge victorious in this fight against COVID-19.

Accordingly, I would like to appreciate the sincerest efforts of SITA and KPMG team for putting together this paper on revival strategy for Agriculture and Allied Sector. I hope that this paper shall serve its’purpose as a ready reckoner for Assam’s action plan for implementing the steps for a revival of Assam in general and Agricultural and Allied Sector in particular.

(DR. HIMANTA BISWA SARMA)



**Atul Bora**

**Minister**

Agriculture, Horticulture & Food Processing  
Animal Husbandry & Veterinary



**GOVERNMENT OF ASSAM**



### **MESSAGE**

Government of Assam has undertaken several measures for revival of Agriculture and Allied Sectors in the wake of the COVID 19 situation.

A call centre for helping farmers will be available for a range of topics from procurement of seeds to spraying of disinfectants in the fields. Eggs and meat supply chain are being regularized in the state and fertilizer shops have been exempted from the lockdown. Farmers can collect petrol and diesel for running agricultural machineries. An amount of Rs. 2,500 is also being transferred through DBT to all the farmers of the state. Several other measures are also being taken to ease the problems of our farmers.

State Innovation & Transformation Aayog's Report of strategy for revival of Agricultural and Allied Sectors will help us bring together a structured approach in our action plan. I would like to offer my sincerest appreciation to SITA team as well KPMG for helping us in these unprecedented time.

We will be happy to consider the recommendations provided in this report which will certainly help us to adopt a strategic approach to our plan for bringing the agricultural economy back to normal.



(Atul Bora)



## Dipok Kumar Barthakur

### Vice-Chairman

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### MESSAGE

Theodore Roosevelt famously said “In any moment of decision, the best thing you can do is the right thing. The worst thing you can do is nothing”. This could possibly never be truer than the situation at hand during the lockdown. It was difficult to get precise Agricultural data owing to paucity of time at hand as well as time span during which this strategy report was prepared (during the lockdown). We had the choice to wait for perfectness which could have taken more time or get a good report in 2-3 weeks’ time based on extrapolation, approximations within the framework of acceptable modeling techniques, we choose the latter as we felt that was the need of the hour.

The impact assessment of COVID-19 situation on the Agricultural & Allied sector of Assam was carried out through Causal, Time Series & Qualitative Analyses leveraging KPMG’s global yet local experience. The recommendations have been crafted keeping in mind the unique geo-economic position of Assam, insights gained from the impact analysis and the strategic consultations with leading luminaries in the field of Agricultural & Allied sector of Assam. We are thankful to the KPMG team for their hard work and dedication

We are also thankful to the Directorate of Economics & Statistics, Directorate of Animal Husbandry & Veterinary, Government of Assam, Assam Agricultural University- Guwahati & Jorhat, Assam Livestock and Poultry Corporation Ltd., OKDISCD, VET Helpline India Pvt. Ltd. and other key stakeholders for their inputs and data in bringing out this report.

  
(Dipok Kr. Barthakur)



**Rajiv Kumar Bora, IAS**  
**Additional Chief Secretary**  
&  
**Chairman,**  
**Assam Administrative Tribunal,**  
**Guwahati**



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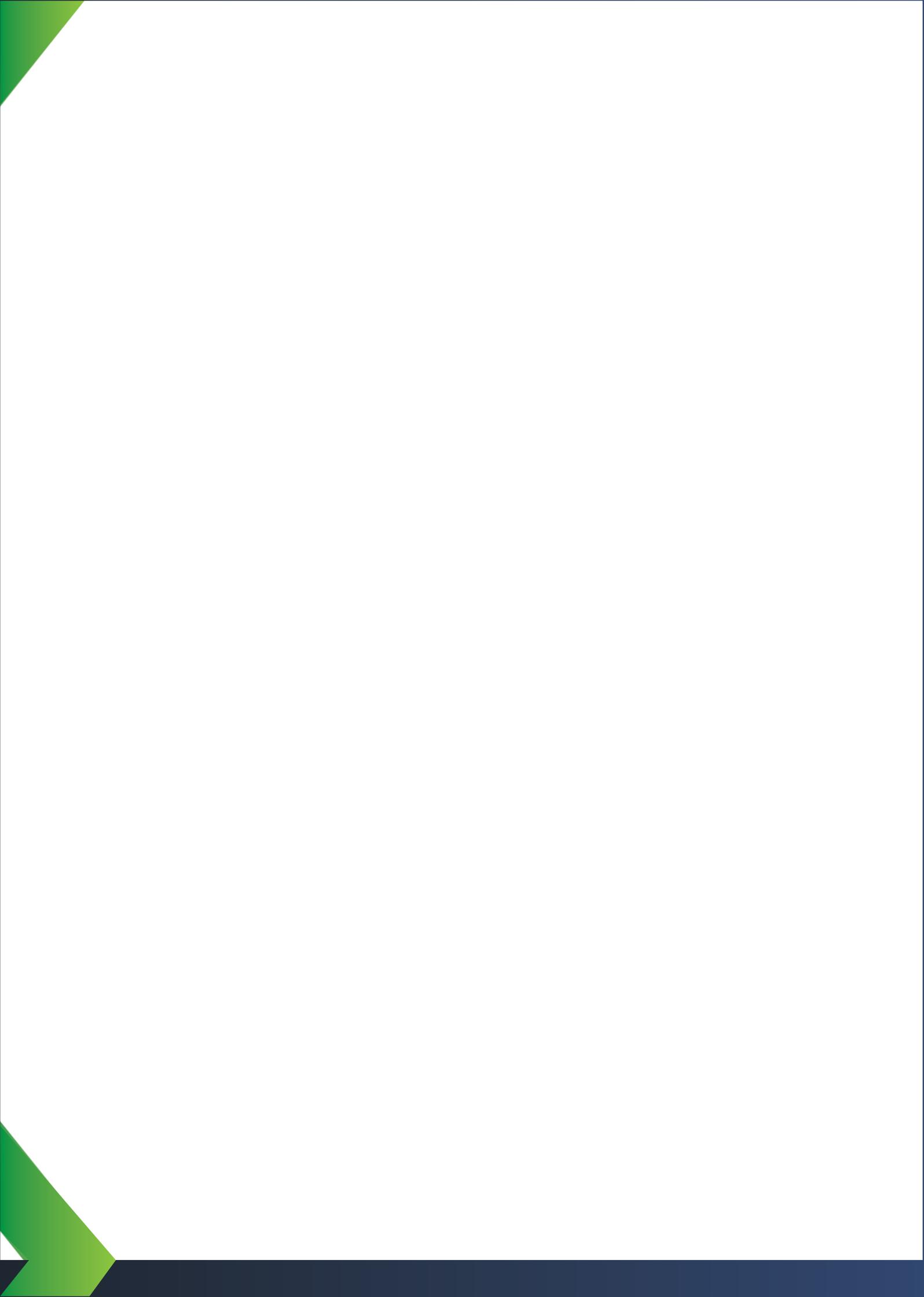
### **MESSAGE**

As one of the founding fathers of USA, Benjamin Franklin said – “Out of adversity comes opportunity”, during these trying times of today, I am confident that with our commitment to overcome the impact of COVID – 19 pandemic, we will for sure emerge stronger and better.

The recommendations provided in this report are expected to help the Government of Assam to intervene and re-start the economic activities in Agriculture and Allied sectors. I believe that for the Agriculture based economy of Assam to bounce back and flourish, it would be imperative for the government departments and other agencies to join hands and implement the recommendations provided in this report in a strategic and planned manner. The unique geo-economic position of Assam and its abundance of ecological resource will be poised to cater to the demands not only from other states but also from other countries

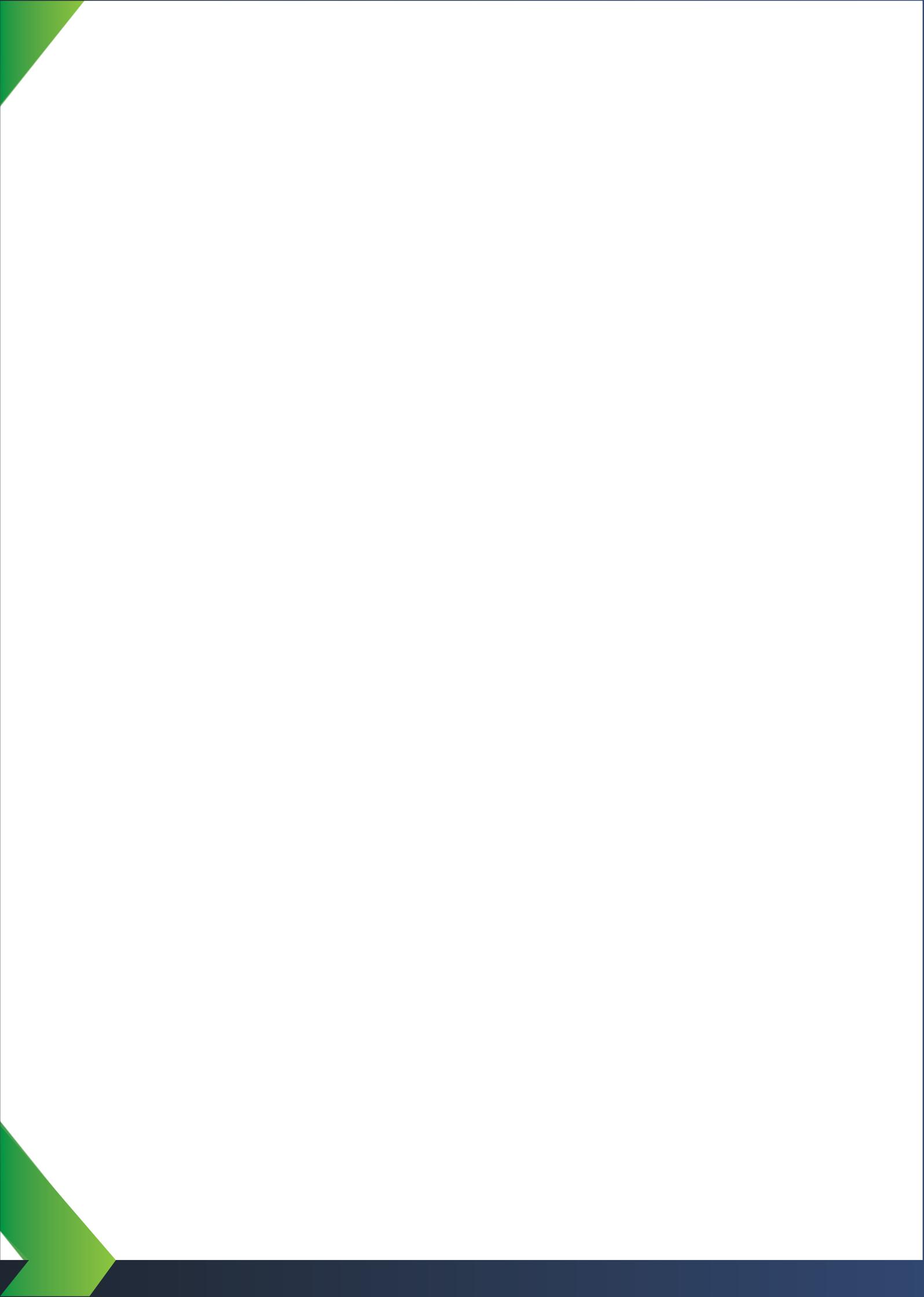
I would like to convey my heartiest congratulations for bringing out this report titled “Revival Strategy of Agriculture and Allied Sectors in Assam” and hope that this becomes an action charter for the departments of Agriculture and Allied sectors to utilize the recommendations of this report for the short-term relief and future agro-economic progress of Assam.. We appreciate the energetic KPMG team for supporting State Innovation & Transformation Aayog (SITA) in preparation of this report.

  
(Rajiv Kr. Bora)



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KEY INSIGHTS  
OF THE REPORT

## KEY INSIGHTS OF THE REPORT

The COVID-19 outbreak is leaving an indelible mark on all sectors globally. Such an unprecedented global health emergency has left sectors such as agriculture, trade & commerce in a limbo. Gross Domestic Product (GDP) of many countries have undergone revisions and the GDP figures may continue to decline in the foreseeable future. India was already reeling under a moderate economic contraction when the COVID outbreak happened. The outbreak has brought to a standstill the leading industries including manufacturing, IT, mining, trade, etc. Leading rating agencies such as CRISIL and Moody's Standard & Poor (S&P) have already forecasted lower GDP growth rate ranging from 0.2 per cent to 1.8 per cent for India. Notably International Monetary Fund (IMF) has revised India's GDP for the year 2020 down to 1.9 per cent from around 5.8 per cent.

In such a scenario it has become imperative for Central & State Governments to redraw their strategies for coping with this emergency and preparing a revival plan post COVID to immediately re-energize the economic machinery of countries and states.

In this regard, State Innovation & Transformation Aayog (SITA), Government of Assam has embarked on a plan to prepare a revival strategy for Agriculture & Allied sector in the backdrop of COVID scenario. To prepare this report, SITA has taken the help of the leading consulting firm in India, KPMG supported by experts from institutions such as Assam Agricultural University (AAU), Tezpur University, Omeo Kumar Das Institute of Social Change and Development (OKDISCD) including advisors and entrepreneurs in Agriculture & Allied sectors. The approach adopted to prepare the strategy report has been based on a hybrid of both quantitative and qualitative information acquired from various sources including Governments such as Department of Economics & Statistics, Department of Agriculture, Department of Horticulture, Directorate of Animal Husbandry & Veterinary, Assam Livestock and Poultry Corporation (ALPCo) and its analysis.

The report has been prepared by undertaking an As-Is analysis based on key economic factors, production data of various crops and commodities of the state, infrastructure readiness of the state followed by an understanding of the existing various schemes and policies at Central & State level which can be leveraged to create an exigency plan to come out of the situation including the revival strategy.

In Assam, Agriculture & Allied sectors contribute close to 16 per cent of the state GDP. As per the estimates, it contributed around Rs. 51,000 crores in FY 2018-19. Close to 70 per cent of the state's population is dependent on the sector and it is backbone of Assam's economy. In Assam, farmers grow crops mainly in two seasons i.e. kharif and rabi season. The major kharif crops are autumn rice, winter rice, maize, pulses, kharif oilseeds like

sesamum, castor, soybean, groundnut, kharif vegetables etc. There are some nonfood crops like jute, mesta, cotton etc. also grown in some extent by the farmers in the kharif season. On the other hand, major rabi crops cultivated are summer rice, cereals, wheat, grams, rape & mustard, various rabi oilseeds, rabi vegetables, potato etc. Understanding of the cropping patterns and seasonality is essential to preparing a revival plan. Based on this understanding, the Government can formulate its multiple initiatives including fiscal initiatives, infrastructural requirements, subsidies & schemes and any long-term policies which should be formulated to be in a state of preparedness in future in case of such a situation. Agricultural census 2010-11 revealed that there were 27.2 lakh operational holdings in Assam covering an operated area of 29.99 lakh hectares as against 27.5 lakh operational holdings covering an operated area of 30.49 lakh hectares in 2005-06. The decline is largely attributed to various factors like soil erosion of ever widening Brahmaputra river, urbanization, industrialization, expansion of roadways, conversion of agricultural land for residential and industrial uses etc. Paddy (Rice) continues to be the mainstay of Assam's agriculture. The total production of paddy for 2018-19 stands at 54.37 lakh tonnes. The state has witnessed major growth in maize at a CAGR of 5 per cent. The total production of wheat and maize in 2018-19 stands at 1.31 lakh tonnes. Traditionally Assam is a horticultural state Banana, Pineapple, Orange, Papaya, Potato, Sweet Potato, Tapioca, Onion, Chilies and turmeric are some of the key horticulture produces of Assam. It has produced around 25 lakh MT of F&V in 2018-19. Please refer to **Chapter 1: Agriculture and Allied Sectors Overview** for details.

The ancient Greek physician Hippocrates in his Aphorisms mentioned, "For extreme diseases, extreme methods of cure, as to restriction, are most suitable." In congruence of this doctrine, Governments around the world including Assam have swung into actions since the Corona virus attack created an unprecedented situation. India declared a three-week nation-wide lockdown from 25th March 2020 till mid-April in the initial phase, which has subsequently been extended till 3rd May 2020 for achieving satisfactory containment of the virus spread. The socio-economic impact of COVID 19 on the Agriculture and Allied Sector has been negative. The impact in this report has been estimated in production volumes because of limited availability of data on market prices and arrivals.

As per Harvard Business Review<sup>1</sup> there exists three types of forecasting — Causal, Time Series & Qualitative Analyses. Following this principle, we have exercised all these three types of projection techniques for computing the impact of COVID 19 pandemic induced 40 days lockdown in the special geo-economic setting of Assam. Causal Analysis has been done to identify macro-economic stress in Agriculture & Allied Sector keeping in mind the loss in farmers' earning due to complete or partial paralysis of supply chain caused by the lockdown protocols prohibited movement of people and community. There is subsequent wastage due to inadequate storage infrastructure. As mentioned earlier, there is a gap of

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<sup>1</sup> <https://hbr.org/1971/07/how-to-choose-the-right-forecasting-technique>

0.08 ton of storage capacity for each ton of horticultural produce in Assam.

Interventions undertaken by Central and State governments to curtail the loss in the agriculture sector are covered in **Chapter 1.5-1-7**.

Subsequently, through Time Series Analysis we have estimated the net loss to the State Gross Domestic Product (GSDP) of Assam during the 6 weeks lockdown by calculating the monthly contribution of various sub-sectors from a historical data - Annual Production Report available in the Economic Survey of Assam 2018-19. Both the supply side & demand side impacts were derived and discounted for calculating the net loss in value to the GSDP per representative commodity of Agri & Allied sub-sector. According to findings of impact analysis, Horticulture is worst impacted sub-sector followed by Animal Husbandry & Dairy which all need aggressive economic intervention from the Government for rejuvenation. The Qualitative Analysis comprised of strategic consultation with Directorate of Economics & Statistics, Directorate of Animal Husbandry & Veterinary, Government of Assam, top Academicians from Assam Agricultural University, Farmer Producer Organizations, Private agencies, State Public Sector Enterprises of Assam in the field of Agricultural & Allied sector for assessing overall Socio-Economic impact of COVID 19 on the various sub-sectors of the Agri & Allied Sector of Assam. Details on impact assessment can be found in **Chapter 3: Impact Analysis on Agri & Allied Sector of Assam due to COVID 19**.

Following is the outcome of Quantitative & Qualitative Impact Analysis:

Causal Analysis Results			Time Series Analysis Results
Sub-sectors	Heat Map Zone	Impact Order	Projected % age loss in volume contribution
Horticulture	Critical (Needs Critical Intervention)	1	5.76 %
Animal Husbandry	Critical (Needs Critical Intervention)	2	4.32 %
Dairy	Critical (Needs Critical Intervention)	3	4.32 %
Agriculture	Moderate (Needs Moderate Intervention)	4	1.37 %
Fishery	Moderate (Needs Moderate Intervention)	5	1.73 %

The recommendations provided is expected to help Govt. of Assam to intervene and re-start the economic activities in Agriculture and Allied sectors. The key objectives of the recommendations are to pull the farmer out of COVID Distress by identifying market opportunities through long term focus on unleashing the potential of technology.

For framing the final set of recommendations, (a) the common problems affecting multiple sub-sectors and (b) varied recovery elasticity of sub-sectors have been identified which forms the basis of the approach and tenet adopted for State interventions. For example, sectors that can re-bound back to normal early, the duration of State interventions should be shorter, while for sectors that take longer time for recovery, the duration of State interventions should be longer. For the State to action out recovery strategy, resilience of each sector and role identification among value chain actors has been chalked out into three types - Perishable (Perennial), Perishable (Seasonal) & Non-Perishable (Seasonal). Detailed recommendations are covered in **Chapter 4: Key Recommendations**.

<b>Interventions based on the approach and methodology of this report.</b>		
<b>Type 1 Agriculture Sector</b>	<b>Type 2 Horticulture</b>	<b>Type 3 Dairy, Animal Husbandry, Fisheries</b>
Put money in-hand of Farmer through KCC/DBR	Add value to primary crop at food processing centers	Dairy •Improve Cold Storage Facility
Purchase Harvested Produce and link to food security schemes	Assist farmers in choosing next crop to compensate loss	•Processing Plants to be ensured of constant milk supply
Provide Storage Facilities for harvested crop before arrival of rains	E-commerce players to fill end-mile delivery space	Animal Husbandry • Improve Cold Storage Facility
Facilitate farmer helpline for real-time price discovery	Focus on export of GI tagged Fruits and Vegetables	• Packaging and Processing of meat to be made export quality
Advise Farmers on next suitable crop to compensate foregone loss	Increase Railways and Ferry services for taking produce to distant Markets	Fisheries • Assist Farmer in pond de-silting • Create a food processing ecosystem

In addition to the recommendations above, Government should not lose focus on two possible blows that are expected - Floods in Assam during the Rainy Season & a Second wave of Pandemic. In either case, as migrant laborer and landless farmers, will not be able to lose income any further, hence the recommendation for the state government to prepare SOPs and be ready to streamline the logistic operations has been provided. **And finally, the Agri-digital interventions like GIS and Drones, Data management of Agriculture with latest AI technology can always be considered for future improvements. Developing warehouse as marketplace is also great concept which can be implemented in Assam.**

Finally, we would like to summarize how the recommendations would be implemented by various agencies in their respective varied capacity and scope. Our research clearly shows that the lockdown due to COVID19 has impacted almost all the sectors including various subsectors of Agriculture and its allied activities, albeit differently. The quantum and duration of impact, however, will vary for different stakeholders in every sector viz. Agriculture, Horticulture, fishery, Dairy, Poultry, Animal Husbandry. Looking into this situation, as suggested by most of the stakeholders we interacted with, we are also of the opinion government will have to take a multi-prong approach to address this issue. Sector specific intervention will be required at different time for next year.

We have provided our recommendations which can be bracketed based on their timing, as under:

- Short term – Within a Month after lockdown
- Medium term – within two to three months after lockdown
- Long term – within six to twelve months after lockdown

The recommendations have been proposed with aim to

- Minimize the losses of various stakeholders, be it farmer or people engaged in agriculture related activities. The major source of losses being opportunity loss due to no work, less demand, compulsion to sell their produce at throw away prices
- Restart various operations, which came to stand still due to lock-down such as, transportation, procurement of Agri-produces, distribution of Agri-inputs, processing of Agri-produces, particularly the perishable one.
- Revive Markets- Immediately after lock-down, there are chances of Agri-produce getting dumped in-to the market, particularly those got harvested during lock-down, this may result in price drop due to high amount of distress selling. This will further aggravate the problem.

**While we have presented a detailed roadmap to normalcy in chapter 5**, broadly, in the short term, ensuring proper implementation and monitoring of the suggested measures for COVID prevention, through focused communication and information dissemination

among the value chain actors is required.

Re-designing and/or shifting the existing market centers to larger spaces and incorporating measures such as social distancing, hygiene etc. considering parameters like consumer foot fall should be considered. With existing mandis crammed up and the uncertainty surrounding COVID's cure, it becomes crucial to re-design markets, to ensure social distancing is always maintained.

It is in times like these that the need to strengthen direct marketing linkages between producers and consumers becomes necessary. Some FPOs in states like Maharashtra, have been reaching out directly to the end consumers to sell their produce through postal services. Further de-regulation of the farmers producers' markets and providing direct marketing channels to producers is the need of the hour. Also, decision makers are suggested to be cognizant of additional possible blows that are expected (1) Floods in Assam during the Rainy Season (2) Second wave of Pandemic.

**We have made very detailed crop specific recommendations in Chapter 5: Roadmap to Normalcy for detailed action plan to help put implementation framework over and above recommendation detailed out in Chapter 4: Key Recommendations.**

At last, we would also like to extend our gratitude and thankfulness to Shri Manoj Kumar, IAS, Secretary, Department of Agriculture and his team who supported us with valuable insights and data. We would also like to express our gratitude to Smt. Nirupama Talukdar, Additional Director, Directorate of Economics & Statistics, Govt. of Assam for her valuable contribution of providing key data and figures. Our heartfelt gratitude to Dr. Kamal Malla Bujarbaruah, a renowned scientist, Former VC, Assam Agricultural University and currently advisor to SITA for his contribution towards preparing the set of recommendations. Finally, we would also like to thank KPMG team consisting of KPMG India team comprising of Brijendra Kumar, Srinivas, Kuchibhotla, Gopinath Konneti, Chandan Singh, Neeloy Deep Barman, Anup Kumar, Manas Jena, Harsha Vardhan Ampilli, Abhijit Pegu, Tapaj Mishra and Vishal Saraogi for assistance in preparing this report in such a short notice.

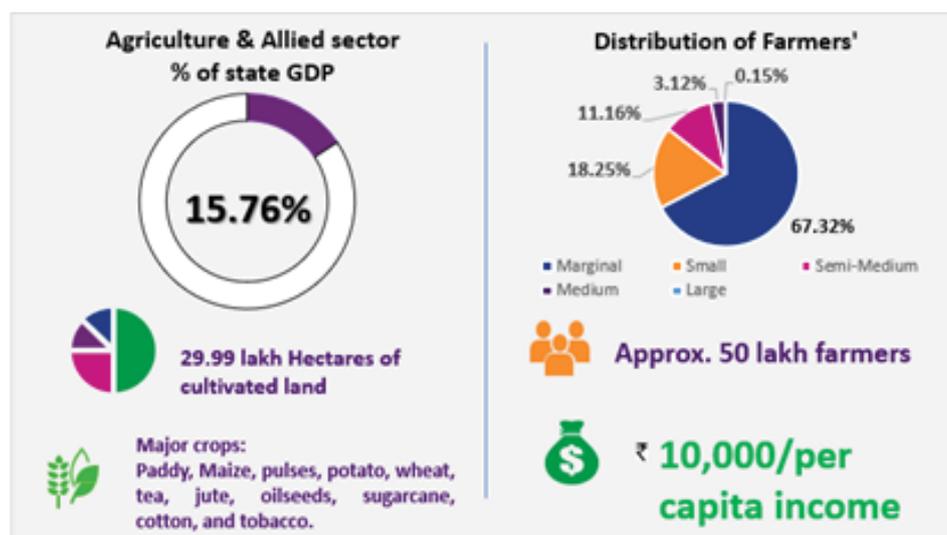


# AGRICULTURE & ALLIED SECTORS

# 1 AGRICULTURE AND ALLIED SECTORS OVERVIEW

Assam occupies an important position amongst the North Eastern states in terms of agriculture & allied activities. As per 2011 census, around 98 per cent of the land mass in the state is rural and hence more than 70 per cent of the state's population depends on agriculture & allied activities for their livelihood. This is key factor of consideration as a sector which contributes ~ 16 per cent to the state GDP but close to 70 per cent of its population depends on the sector. The total cultivated area is close to 30 lakh hectares while number of farmers and agricultural workers in state is approx. 50 lakh. Further around 85.57 per cent of them are small & marginal farmers which, however, is comparable to the all India average of 86.20 %. The major crops are paddy, maize, pulses, potato, wheat, tea, jute, oilseeds, tobacco, pineapple, banana etc. The per capita income from agriculture and allied sector at constant price (2011-12) is close to Rs. 10, 627 which is at par with the national per capita income i.e. Rs. 10, 865.

Figure 1



Source: Department of Economics & Statistics, Govt. of Assam

The major crops and their production levels for the year of 2018-19 are provided below:

<b>Rice</b> 54.37 Lakh tons	<b>Sugarcane</b> 10.94 Lakh tons	<b>Banana</b> 9.18 Lakh tons	<b>Potato</b> 7.73 Lakh tons	<b>Jute (c)</b> 7.62 Lakh tons
<b>Pineapple</b> 3.09 Lakh tons	<b>Papaya</b> 1.50 Lakh tons	<b>Pulses</b> 1.13 Lakh tons	<b>Maize</b> 1.05 Lakh tons	<b>Onion</b> 0.85 Lakh tons
<b>Arecanut</b> 0.53 Lakh tons	<b>Wheat</b> 0.24 Lakh tons	<b>Orange</b> 2.14 Lakh tons	<b>Oil Seeds</b> 1.98 Lakh tons	<b>Mesta (c)</b> 0.20 Lakh tons
<b>Turmeric</b> 0.19 Lakh tons	<b>Chilies</b> 0.19 Lakh tons			

*Source: Department of Economics & Statistics, Govt. of Assam*

Assam is blessed with a favorable climate in almost all of its districts. This enables each district to grow key major crops for its sustenance. There are 6 climatic zones which are presented in the following table:

Climatic Zone	Districts	Important Crops
North Bank	Dhemaji, Lakhimpur, Sonitpur & Darrang	Rice, rapeseed, mustard and sugarcane
Upper Brahmaputra Valley	Tinsukia, Dibrugarh, Sivsagar, Jorhat & Golaghat	Rice, rapeseed, mustard and sugarcane
Central Brahmaputra Valley	Nagaon & Morigaon	Rice, Jute, Rapeseed, pulses and mustard
Lower Brahmaputra Valley	Kamrup, Goalpara, Dhubri, Kokrajhar, Bongaigaon, Barpeta & Nalbari	Rice, Jute, Rapeseed, mustard, potato, wheat & pulses
Barak Valley	Cachar, Hailakandi, Karimganj	Rice, Sugarcane & Potato
Hills	Karbi Anglong and North Cachar Hills	Maize and Sugarcane

As per various reports, Assam has the potential to improve upon its current cropping intensity by over 150 per cent<sup>2</sup>.

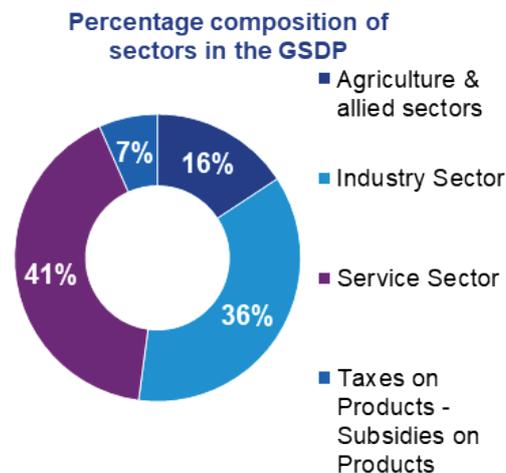
<sup>2</sup><https://advantageassam.com/assets/front/pdf/Agriculture+Food-Processing.pdf>

## 1.1 CONTRIBUTION TO GDP

Primary sector is the second most important contributor to GSDP of Assam at 27 % for the period 2018-19. Contribution of Tertiary and secondary sector during this period was 46% and 23% respectively.

It is evident from Figure 1 that contribution of primary sector remained constant at 27% as was in previous financial year, contribution of secondary and tertiary sector increased by one percent each during the same period.

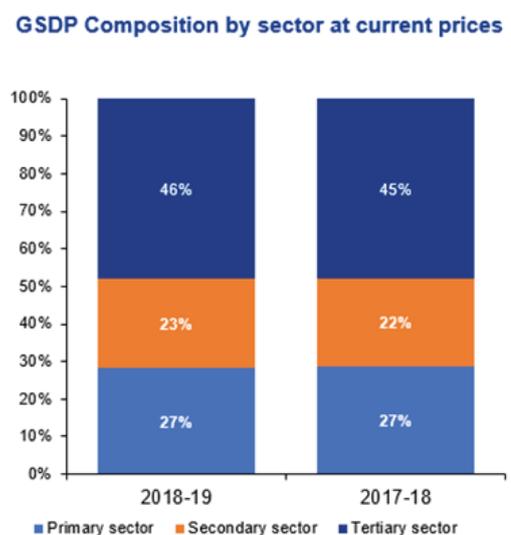
Figure 2



Source: Department of Economics & Statistics, Govt. of Assam

The primary sector consists of Crops, Livestock, Forestry & Logging, Fishing and aquaculture, Mining & Quarrying. Out of these, contribution of the agriculture & allied sector to GSDP is 16%. The largest contributor, however, is the service sector at 41 per cent. But it is clearly evident that agriculture too is a significant contributor to the GSDP. At current prices, it has contributed approx. Rs. 51, 407 crores in FY 2018-19. Moreover, the productivity of all food crops has shown an upward trend since 2012-13 at a CAGR of around 1.43 %.

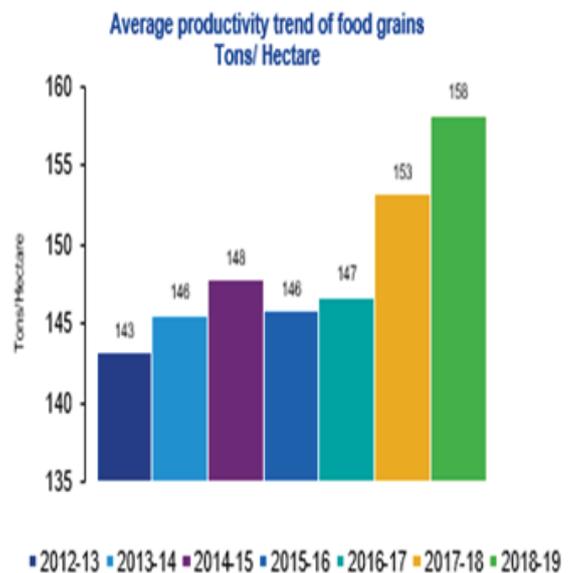
Figure 3



Source: Department of Economics & Statistics, Govt. of Assam

<sup>3</sup>Further, Assam experiences plenty of rainfall and possesses a fertile land which is extremely advantageous for agriculture. Soil, topography, rainfall and climate of the state are quite congenial for producing variety of crops in different crop seasons. But, agriculture in the state characterized by low level of productivity due to recurring natural calamities, low level of mechanization, inadequate availability of quality inputs, poor soil health, low level of assured irrigation and inadequate marketing infrastructure. About 83 percent of the total land holdings are small and marginal which is one of the major obstacles of Assam agriculture, as incentive to mechanization is minimal in case of small holdings, and small farmers are rarely in position to make investment in agriculture, required for incremental productivity growth.

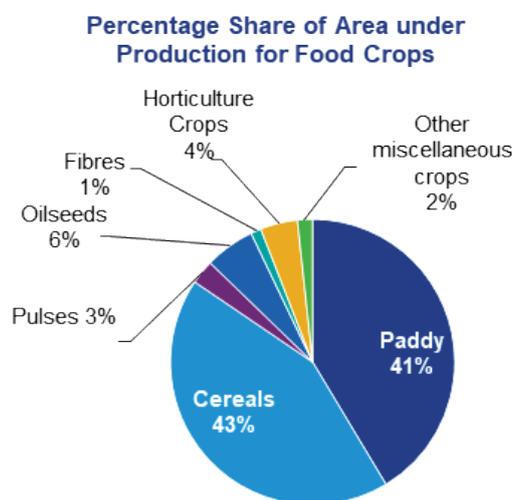
Figure 4



Source: Department of Economics & Statistics, Govt. of Assam

In Assam, farmers grow crops mainly in two seasons i.e. kharif and rabi season. The major kharif crops are autumn rice, winter rice, maize, pulses, kharif oilseeds like sesamum, castor, soyabean, groundnut, kharif vegetables etc. There are some cash crops like jute, mesta, cotton etc. also grown in some extent by the farmers in the kharif season. On the other hand, major rabi crops cultivated are summer rice, cereals, wheat, grams, rape & mustard, various rabi oilseeds, rabi vegetables, potato etc.

Figure 5



Source: Department of Economics & Statistics, Govt. of Assam

<sup>3</sup>[http://www.aau.ac.in/data/reports/Potential\\_and\\_Prospects\\_of\\_Rabi\\_Crops\\_Cultivation\\_in\\_Assam.pdf](http://www.aau.ac.in/data/reports/Potential_and_Prospects_of_Rabi_Crops_Cultivation_in_Assam.pdf)

Rice is main diet for majority of Assamese people. It predominates the rural economy of Assam providing food to more than 25 million people, in addition to generating income and employment directly and indirectly. The area under paddy cultivation stood at 24 lakh hectares in 2018-19. Similarly, the area under cereals covered approx. 25 lakh hectares, pulses covered 1.50 lakh hectares, oilseeds covered 3.09 lakh hectares, fibers covered 69 thousand hectares, Horticulture crops covered 2.60 lakh hectares and other miscellaneous crops such as coconut, sugarcane, areca nut covered around 1.19 lakh hectares in 2018-19.

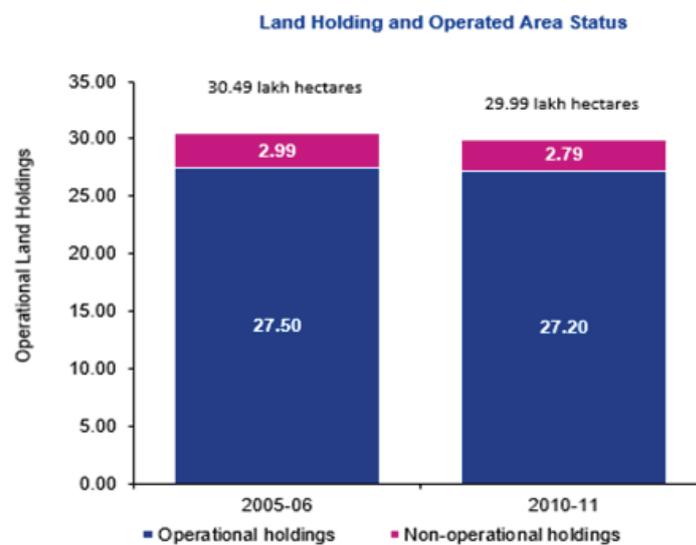
Bestowed with blessings of agro-climatic condition, Assam is natural abode of wide range of horticultural crops like fruits, vegetables, spices, plantation crops, nuts and tuber crops. The most important horticultural crops of Assam are banana, pineapple and orange which cover nearly 60 percent of production of Horticultural crops. The State produced 25 lakh MT fruits & vegetables, 7.81 lakh MT fibers in 2018-19. In the Animal Husbandry and Veterinary sector, Assam recorded a production of 9,460 lakh litres of milk, 5000 lakh number of Eggs and 50,000 ton of meat in 2018-19.

In Assam's budget of 2020-21, Rs. 1515.92 crore has been allocated to agriculture sector and Rs. 408.61 crore to the Animal Husbandry & Veterinary Department.

## Agriculture & Allied Activities

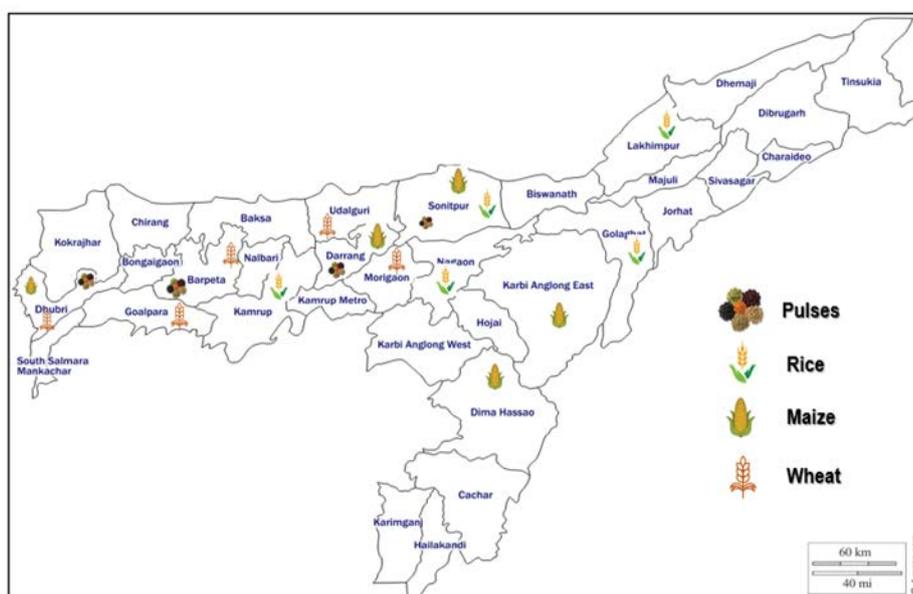
Agricultural census 2010-11 revealed that there were 27.2 lakh operational holdings in Assam covering an operated area of 29.99 lakh hectares as against 27.5 lakh operational holdings covering an operated area of 30.49 lakh hectares in 2005-06. The decline is largely attributed to various factors like soil erosion by ever widening Brahmaputra river, urbanization, industrialization, expansion of roadways, conversion of agricultural land for residential and industrial uses etc

Figure 6



Source: Department of Economics & Statistics, Govt. of Assam

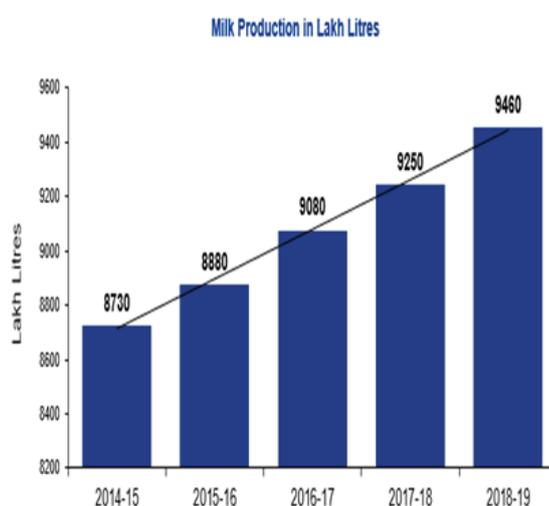
Figure 7: Map of primary food grain clusters



## Dairy, Egg and Meat Production

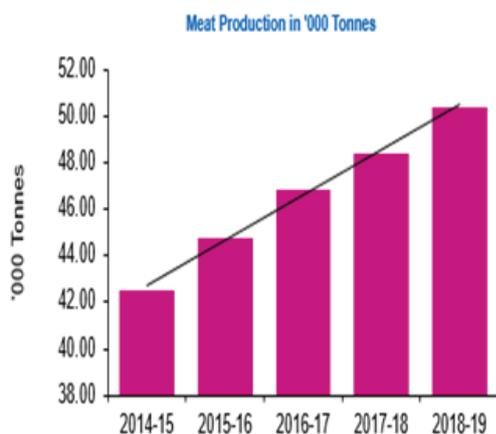
The total milk production during 2018-19 was estimated at 9470 lakh liters against 9250 lakh liters in 2017-18. The production of egg was estimated at 5010 lakh in 2018-19 against 4950 lakh in 2017-18. The meat production during 2018-19 was estimated at 50000 MT and the contribution of the animal husbandry sector to the GSDP was 0.90% in constant price and 1.20% in current price. In case of milk production there has been a CAGR of 1.62 %.

Figure 8



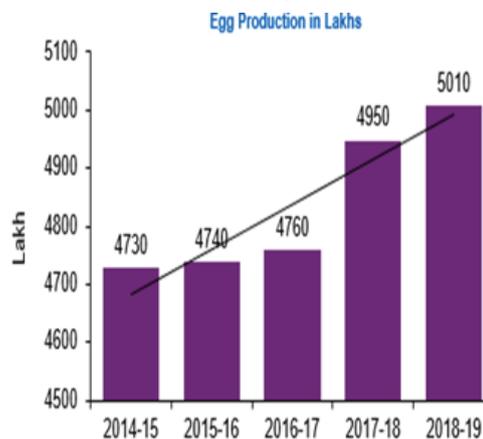
Source: Department of Economics & Statistics, Govt. of Assam

Figure 9



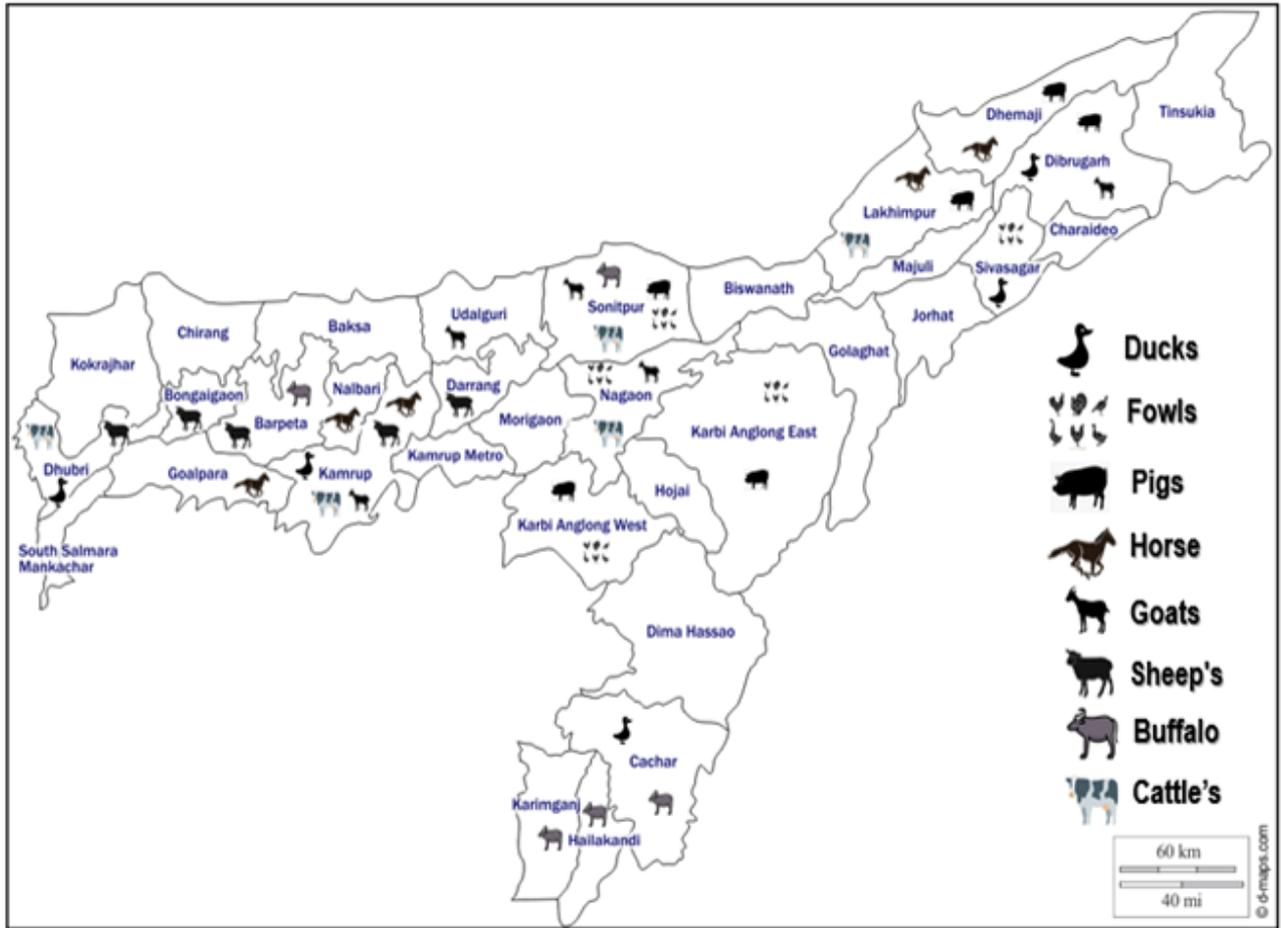
Source: Department of Economics & Statistics, Govt. of Assam

Figure 10



In case of Egg production, there has been a steady increase at a CAGR of 1.16 per cent. Similarly, in case of meat production, there has been a growth at a CAGR of 3.46 %. The primary livestock cluster including poultry and duckery are Sonitpur, Sivasagar, Nagaon, Dibrugarh, Dhubri, Kamrup, Udalguri, Karbi Anglong, Tinsukia, Lakhimpur, Barpeta, Golaghat, Jorhat, Cachar and Dhemaji

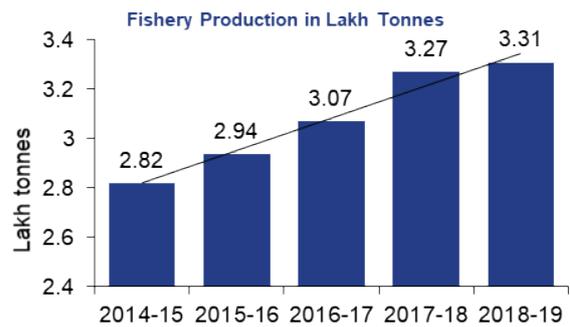
Figure 11: Map of primary livestock clusters



## Fishery

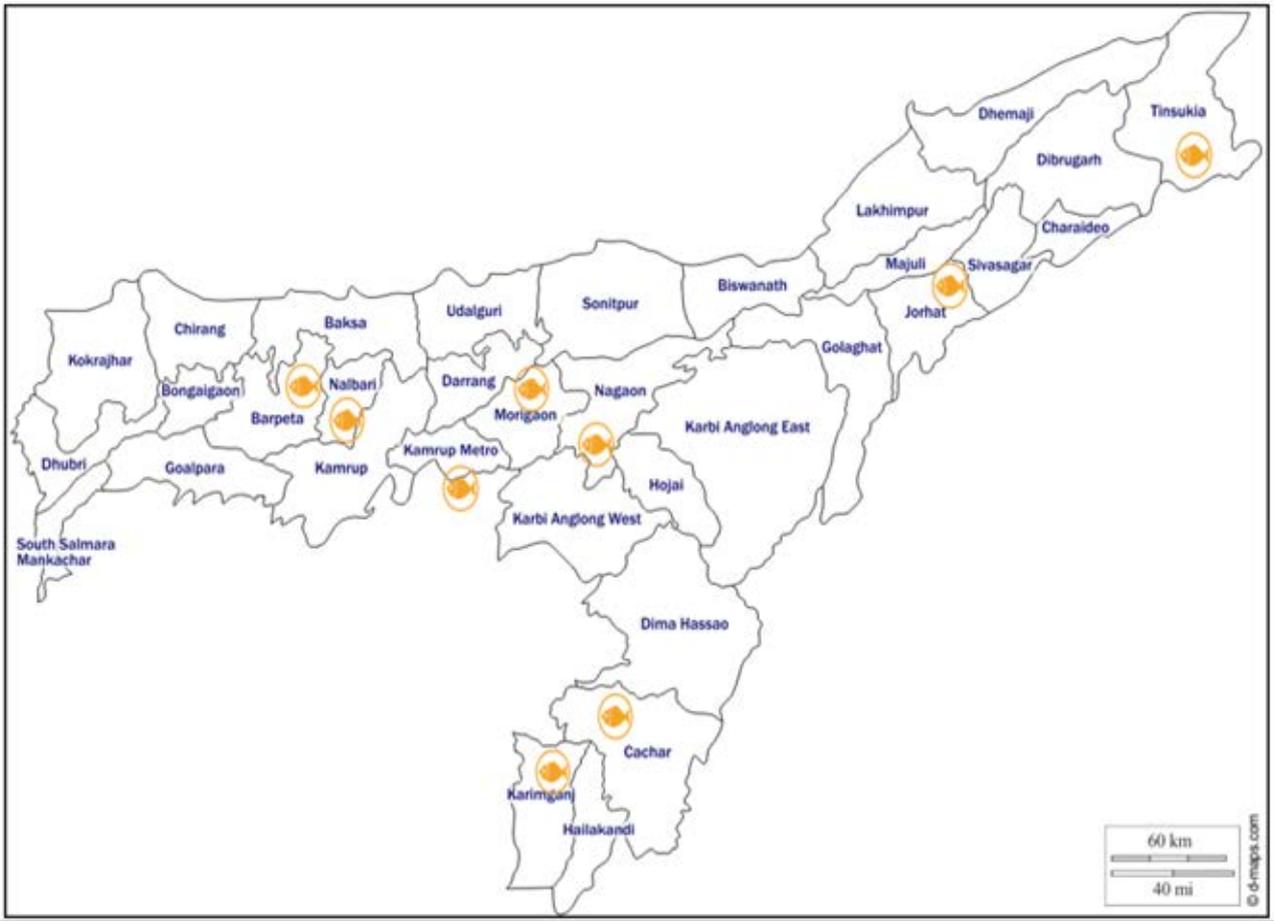
The estimated fish production in the state increased to 3.31 lakh MT in 2018-19 over 3.27 lakh MT in 2017-18. The growth rate during 2016-17 to 2018-19 is around 7 %. The primary fishery cluster in the state are Nagaon, Cachar, Kamrup, Barpeta, Jorhat, Morigaon, Dibrugarh, Tinsukia, Nalbari, Karimganj, Lakhimpur, Sonitpur districts. They account for almost 70 per cent of the fish production in the state.

Figure 12



Source: Department of Economics & Statistics, Govt. of Assam

Figure 13: Map of major fish production cluster

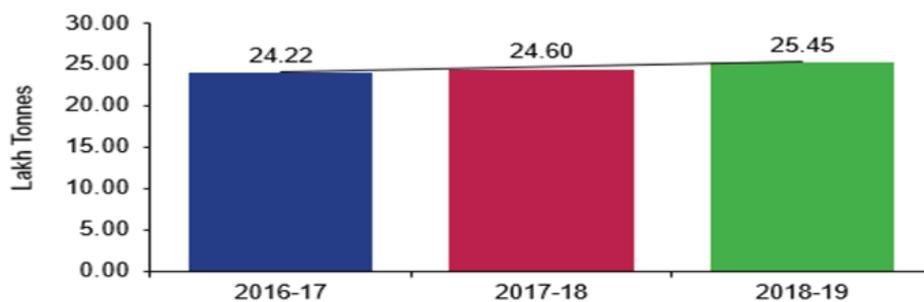


## Horticulture

Assam is a traditionally horticultural State and the socio – economic fabric of its people is largely constituted by horticultural components. Horticultural sector which includes fruits, vegetables, tuber crops, floriculture, mushroom, medicinal & aromatic plants, spices and plantation crops have proved beyond doubt to be the best diversification of agriculture for better land use. Banana, Pineapple, Orange, Papaya, Potato, Sweet Potato, Tapioca, Onion, Chilies and turmeric are some of the key horticulture produces of Assam.

Figure 14

### Horticulture Production



Source: Department of Economics & Statistics, Govt. of Assam

Figure 15: Map of primary fruit clusters

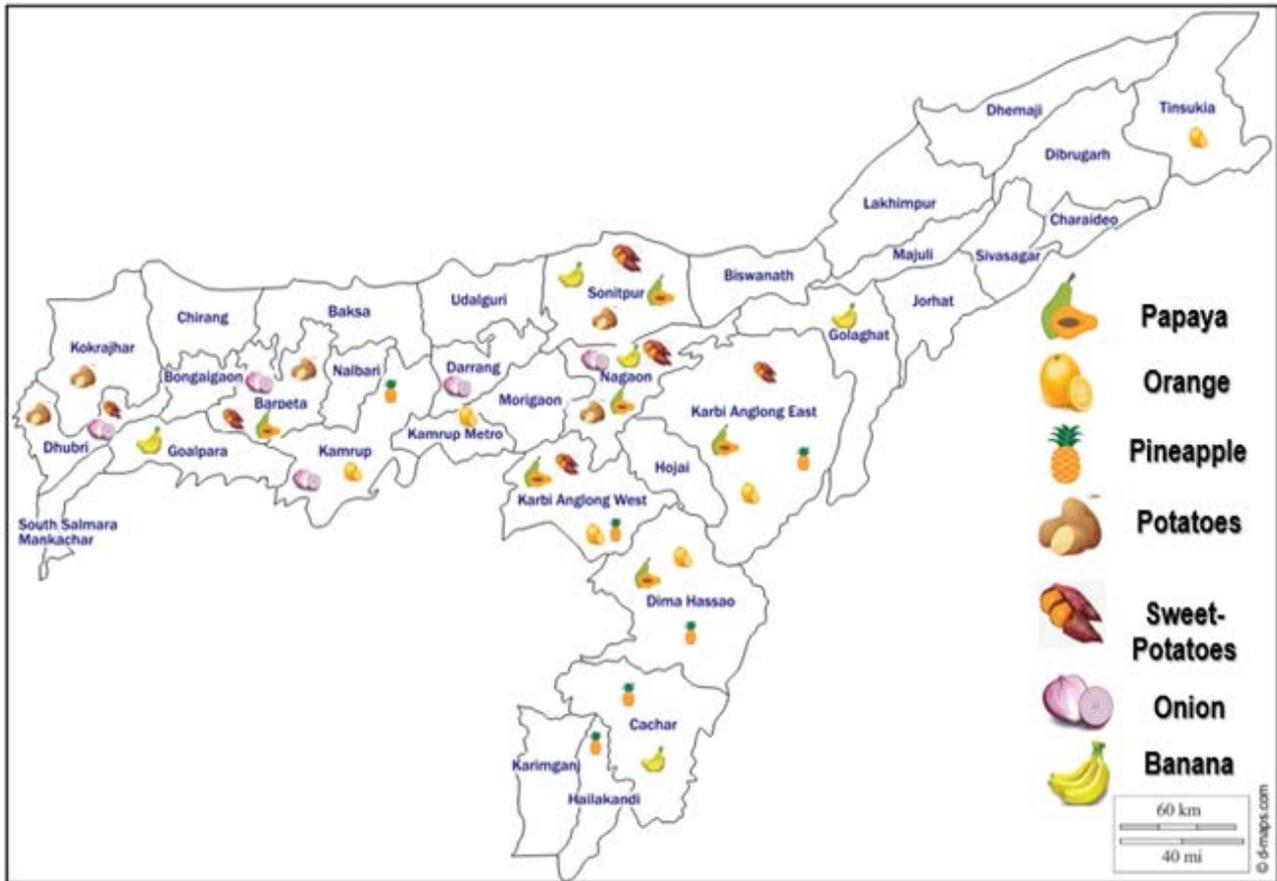
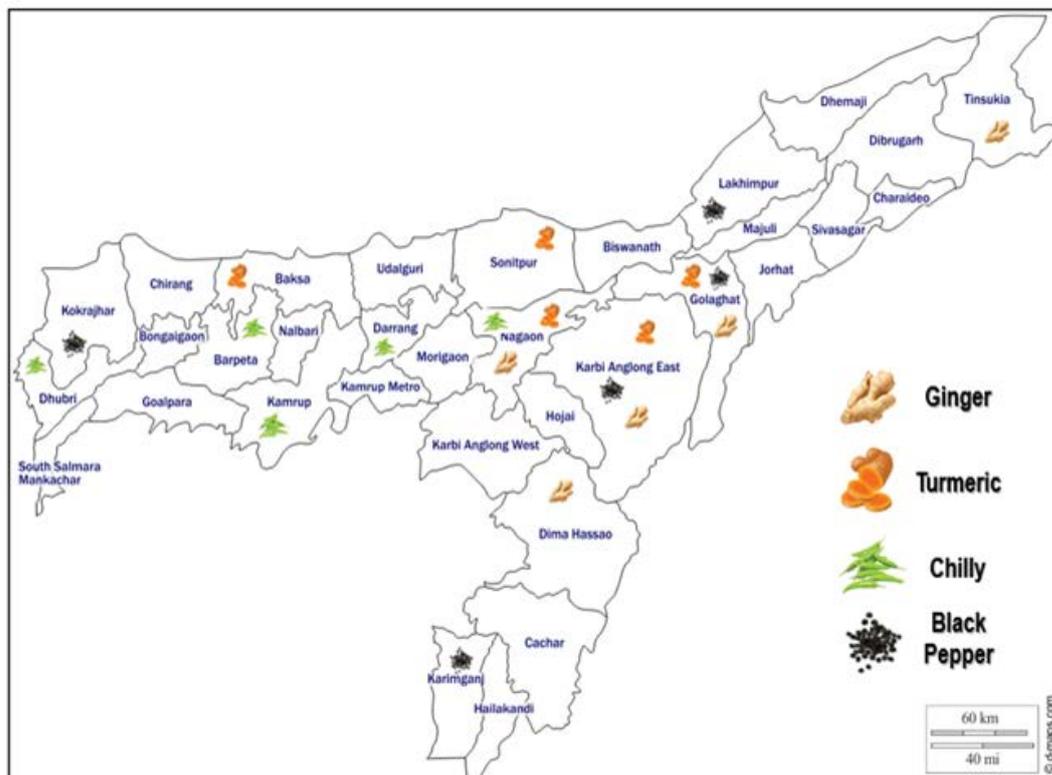


Figure 16: Map of primary spice clusters



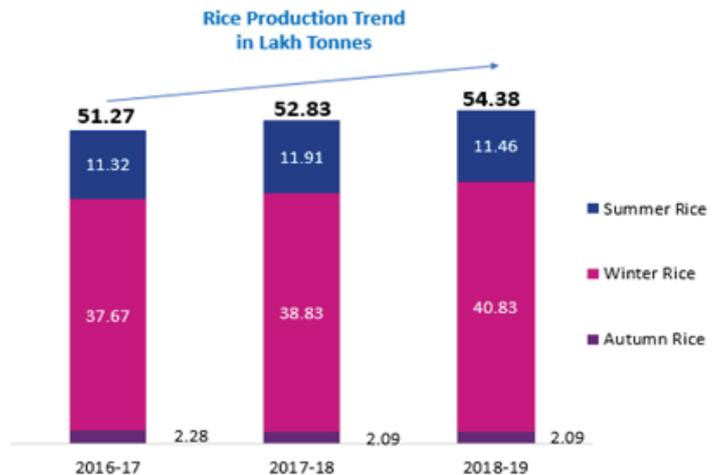
## 1.2 PRODUCTION PATTERN AND DISTRIBUTION

The production trends of important crops of Assam are analyzed in this section as per data from Department of Statistics & Economics, Government of Assam for the period of 2016-17 to 2018-19.

### Paddy

Paddy is cultivated in Assam in summer season, winter season and autumn season. The overall production of paddy has grown at a CAGR (Cumulative Annual Growth Rate) of around 2 per cent. Individually production of Autumn rice has decreased marginally while the remaining two have increased. The total production of paddy for 2018-19 stands at 54.37 lakh tonnes.

Figure 17

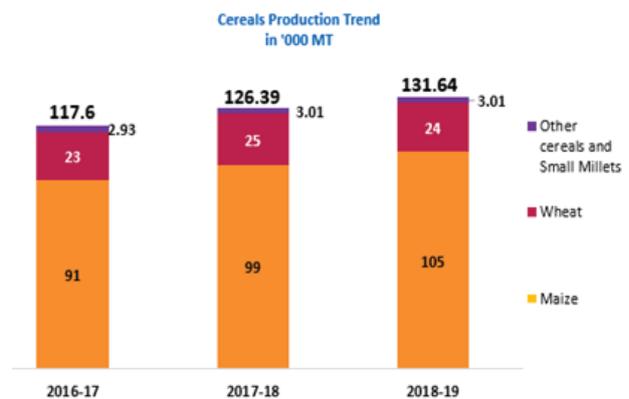


Source :Department of Economics & Statistics, Govt. of Assam

### Cereals (Wheat, Maize)

The production of cereals in Assam has grown at a CAGR of 4 per cent. The state has witnessed major growth in maize at a CAGR of 5 per cent. The total production of cereals for 2018-19 stands at 1.31 lakh tonnes.

Figure 18

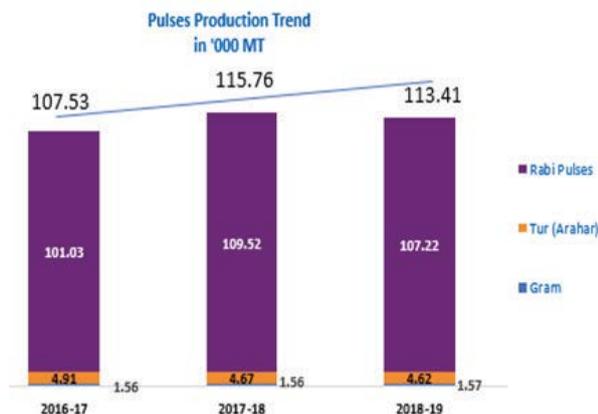


Source :Department of Economics & Statistics, Govt. of Assam

### Pulses

In case of pulses, there has been a growth of 2 per cent. Rabi pulses account for the major portion of the total pulses production and it has grown at a CAGR of 2 per cent. Tur (Arhar) and Gram has shown negative growth of 0.15 per cent and 1.95 per cent respectively. The total production of pulses for 2018-19 stands at 1.13 lakh tonnes

Figure 19



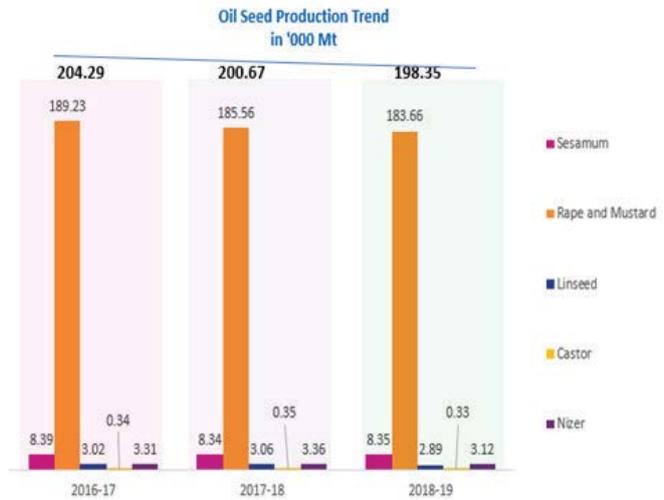
Source :Department of Economics & Statistics, Govt. of Assam

## Oilseeds

In case of Oilseeds, all of them have shown a negative trend. The overall production has decreased at a CAGR of 0.98 per cent.

Although not considered an oilseed crop, coconut production has grown at a CAGR of 6 %. The total production of coconut in the year 2018-19 stood at 1.83 lakh Tonnes.

Figure 20

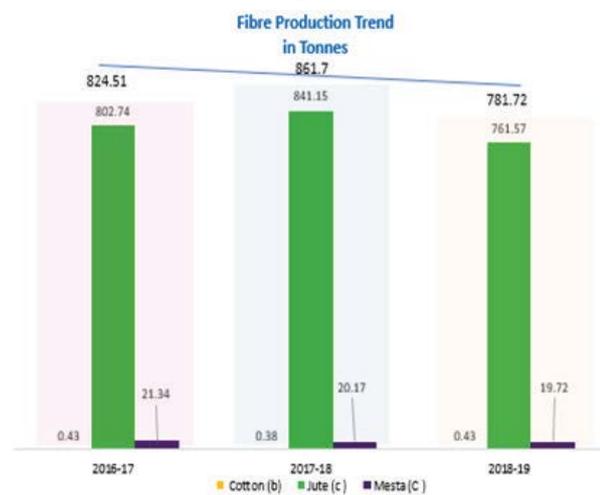


Source :Department of Economics & Statistics, Govt. of Assam

## Fibers

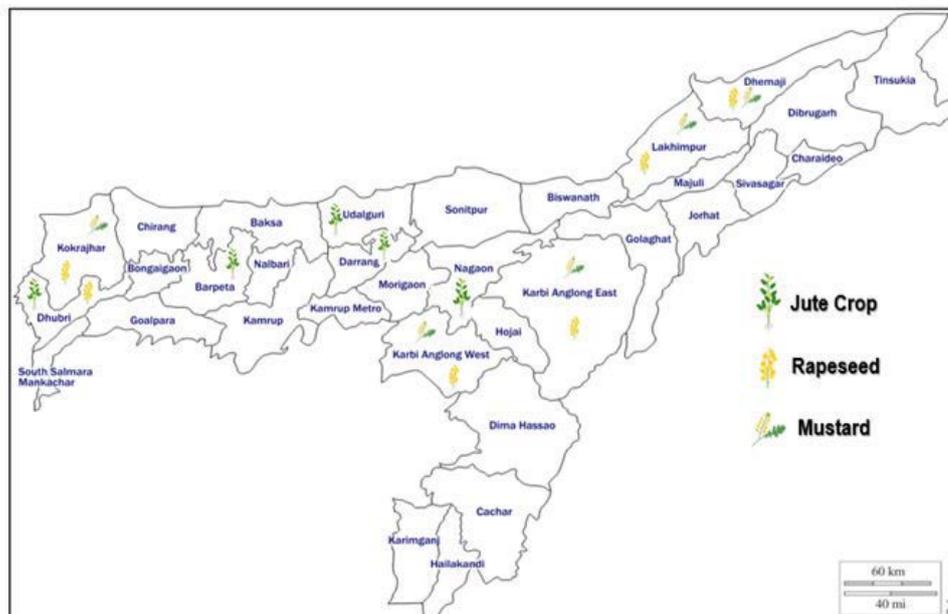
In case of Fibers, this sub section registered a negative growth trend at a CAGR of 2 per cent. Both Jute and Mesta have grown negatively at 2 per cent and 3 per cent respectively. Cotton has shown a marginal growth at a CAGR of 0.31 per cent. The total production of fibers for 2018-19 stands at 7.81 lakh tonnes

Figure 21



Source :Department of Economics & Statistics, Govt. of Assam

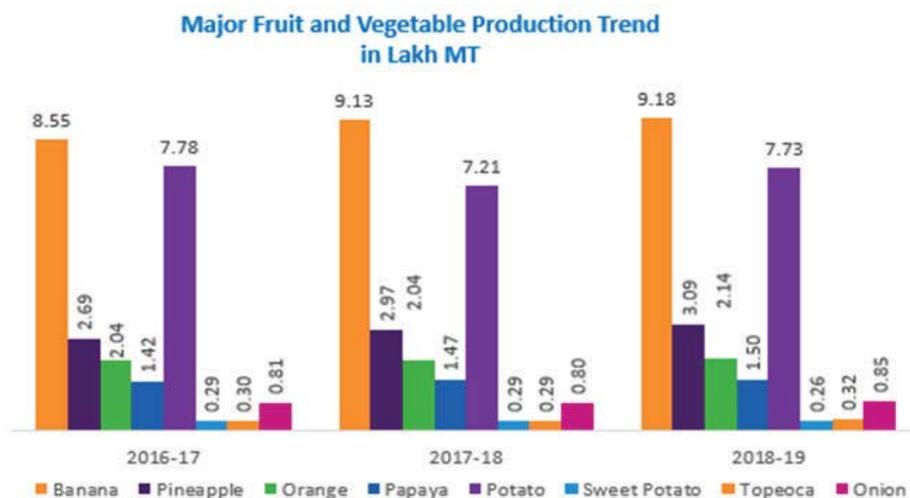
Figure 22: Map of primary oilseed and fibre clusters



## Fruits & Vegetables

The overall fruits and vegetables sector has grown at a CAGR of 2 per cent. The major contributor has been Banana and Pineapple at 2 per cent and 5 per cent respectively. In terms of volume, the production of Banana stood at 9.17 lakh tonnes followed by potato at 7.73 lakh tonnes.

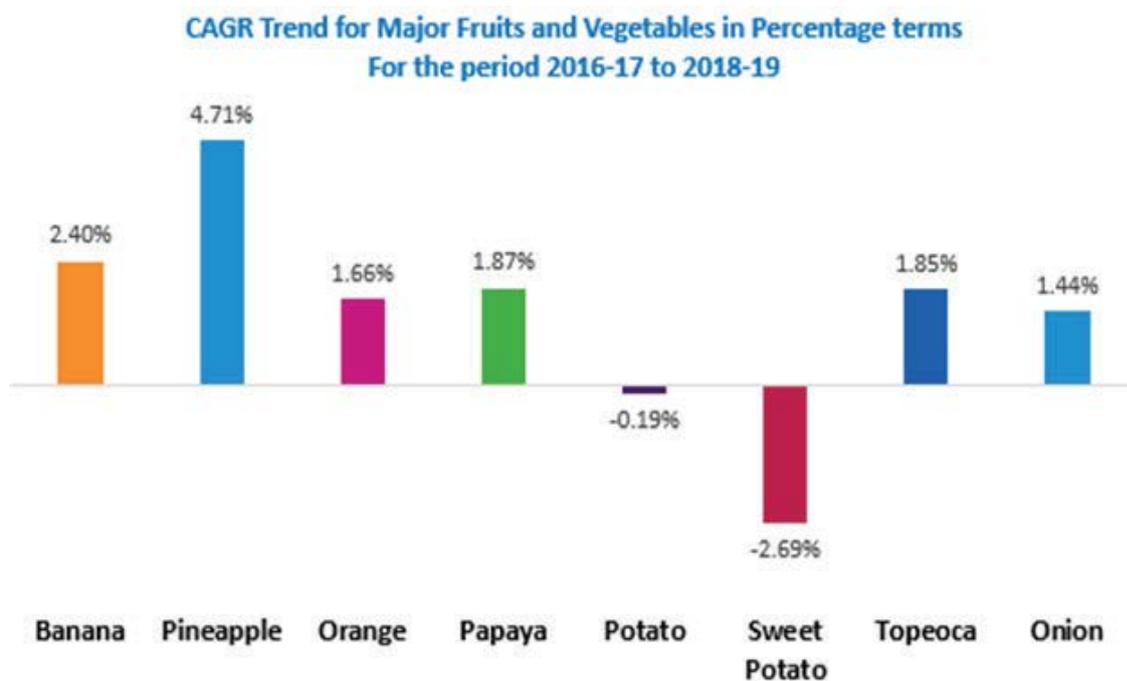
Figure 23



Source :Department of Economics & Statistics, Govt. of Assam

The total production of fruits & vegetables for 2018-19 stands at 25 lakh tonnes.

Figure 24



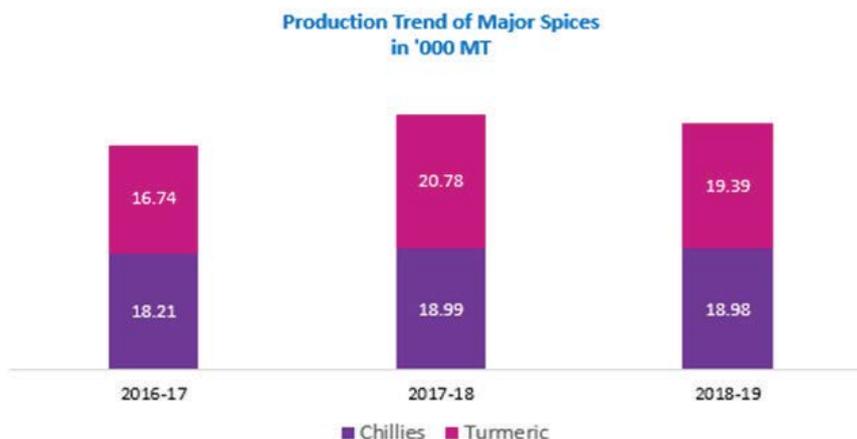
Source :Department of Economics & Statistics, Govt. of Assam

As seen in the above graph, the growth of potato and sweet potato registered a negative CAGR trend of 0.19 per cent and 2.69 per cent respectively.

## Spices

The production of spices has shown a marked improvement at a CAGR of 3 per cent. Both the major spice crops of Assam – Turmeric and Chillies have grown at a CAGR of 5 per cent and 1 per cent respectively. The total production of spices for 2018-19 stands at 39.56 thousand tonnes.

Figure 25



Source :Department of Economics & Statistics, Govt. of Assam

## Other miscellaneous crops

As can be seen in the below some of the miscellaneous crops such as areca nut, sugarcane and tobacco have also shown negative growth trend. All these three crops show a negative CAGR trend of 2 per cent, 3 per cent and 15 per cent.

Figure 26: Map of plantation crop clusters

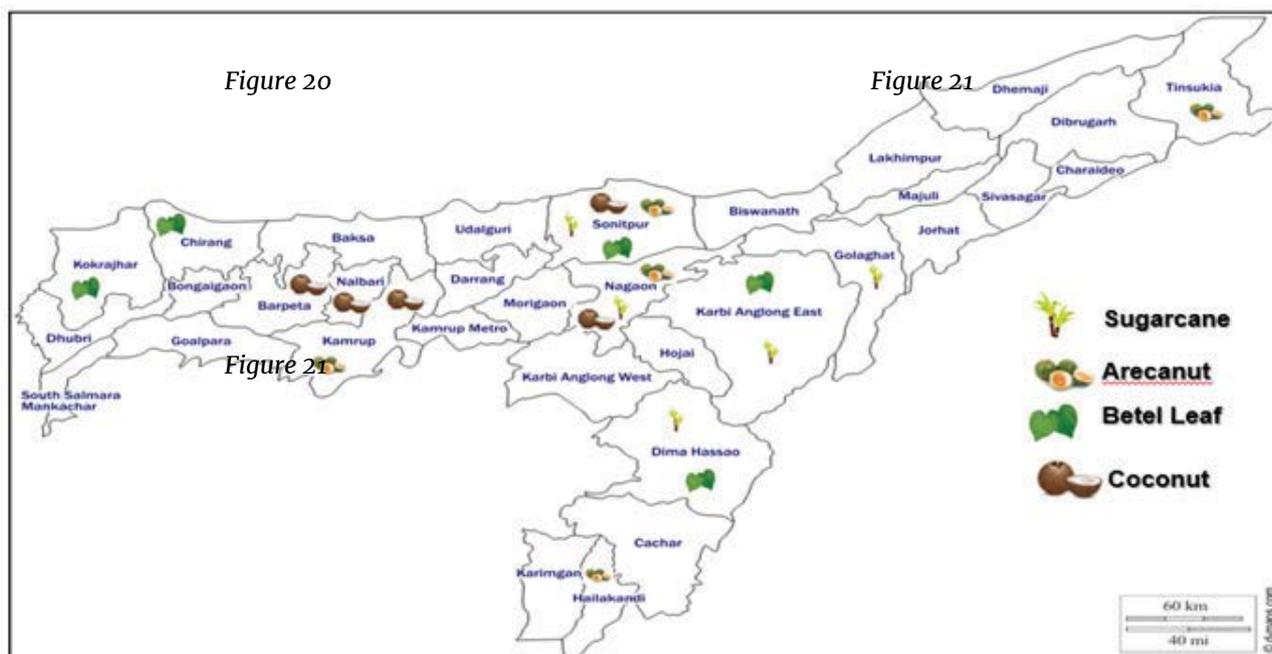


Figure 27

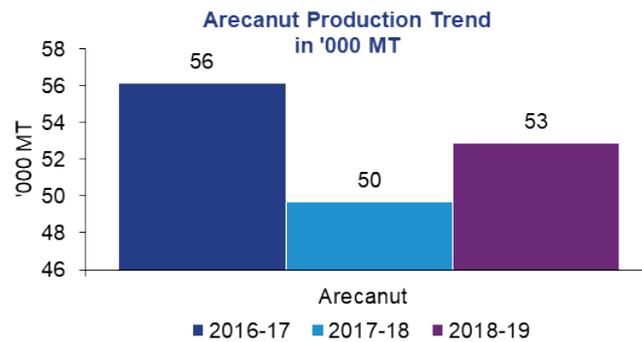


Figure 28

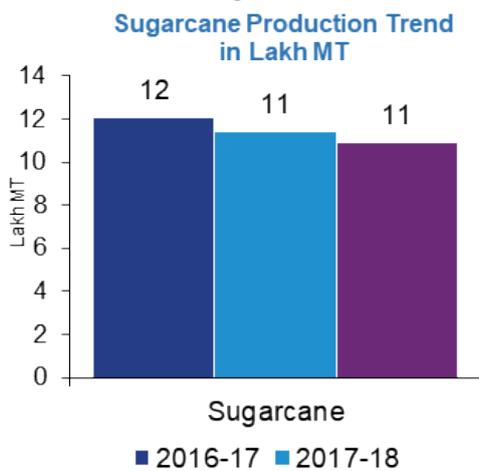
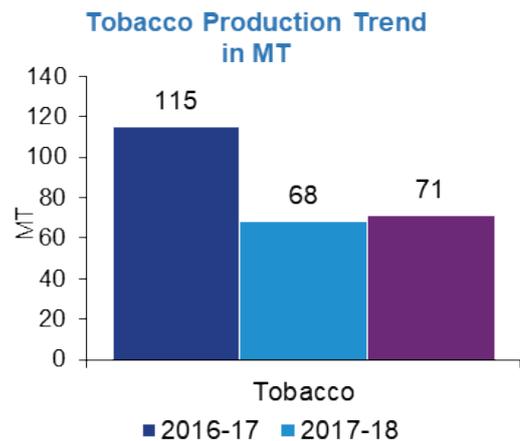


Figure 29

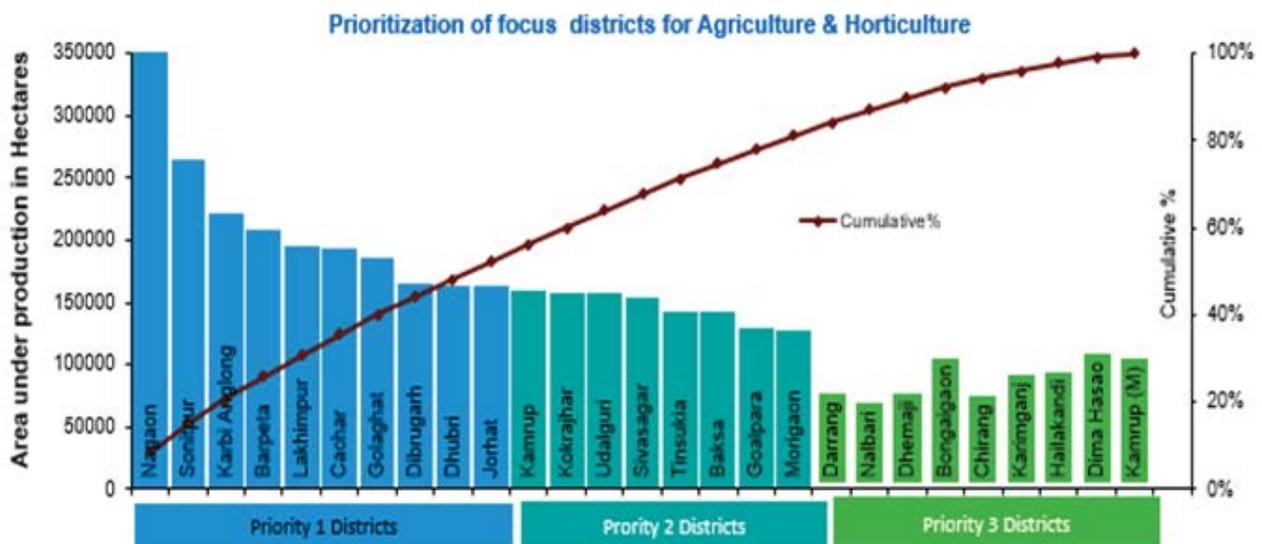


Source :Department of Economics & Statistics, Govt. of Assam

### Focus districts for Agriculture & Horticulture

The total area under production for agricultural and horticultural crops has been calculated as per the data received from Department of Statistics & Economics, Govt. of Assam i.e. for 27 districts. The top ten districts which accounts for half of the total cultivated acreage in the state are identified based on area of production:

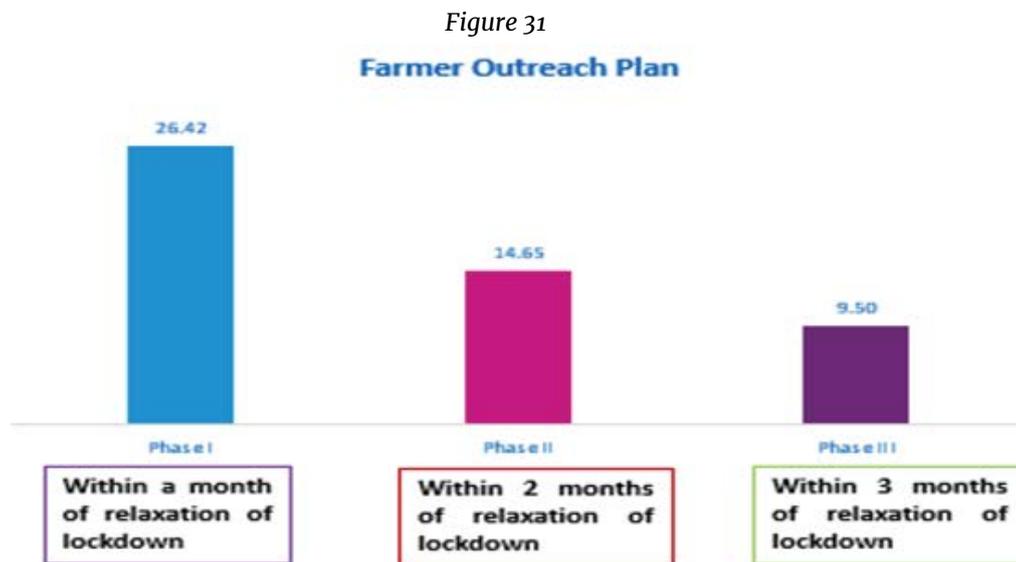
Figure 30



Source: Department of Economics & Statistics, Govt. of Assam

Such an analysis shall be helpful while determining the focus districts if assistance is planned in a category wise manner by the Government.

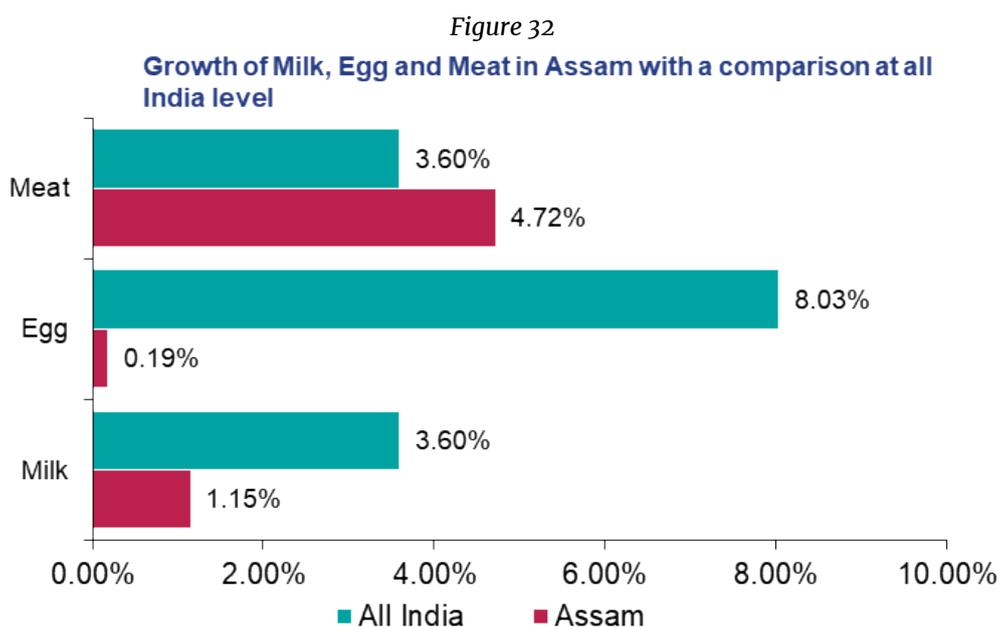
Assuming an average of 0.8 hectare (~ 6 bigha) of land holding per farmer, 26 lakh farmers should be reached in Phase I. In phase II and phase II, 15 lakh and 10 lakh farmers should be targeted respectively.



*Source: Department of Economics & Statistics, Govt. of Assam*

### Production trend of Milk, Egg & Meat sector

As per the available data provided by Department of Economics & Statistics, Govt. of Assam the production of Milk, Egg and meat in the state is projected to be 946 million litres, 501 million and 50,000 tonnes respectively in 2018-19.



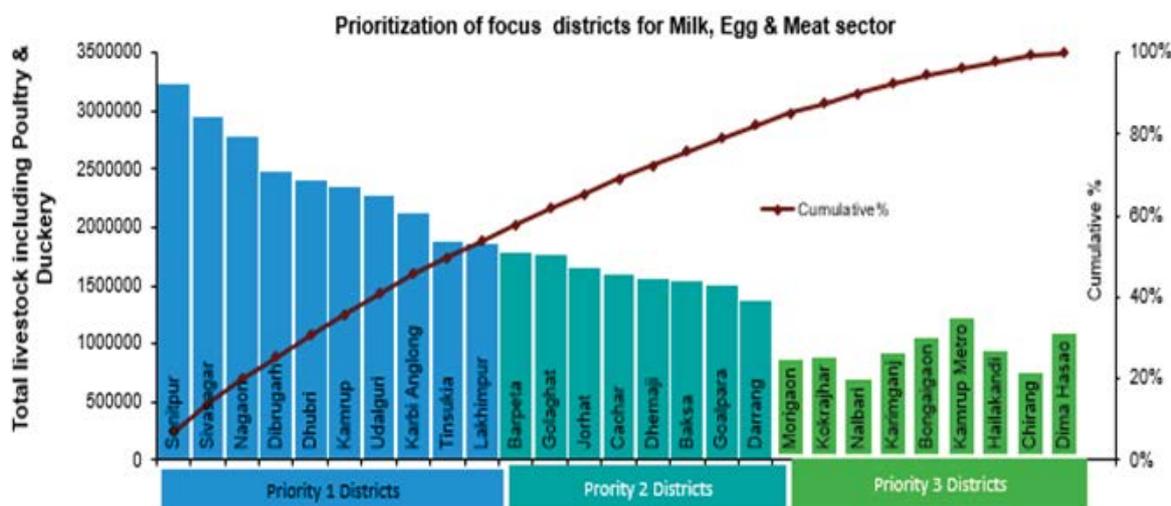
*Source: Department of Economics & Statistics, Govt. of Assam*

It may be noted that the annual growth rate of Milk and Egg in India is 3.6 per cent and 8.03 per cent respectively. Therefore, Assam is lagging substantially in these two subsectors. In case of meat, the average annual growth rate for is around 3.6 per cent which is lower than the present growth rate in the state.

### Focus districts for Milk, Egg & Meat sector

Like Agriculture & horticulture, we can use the same methodology in determining the foremost key districts for any intervention in the sub sectors. They can be classified in the following manner:

Figure 33

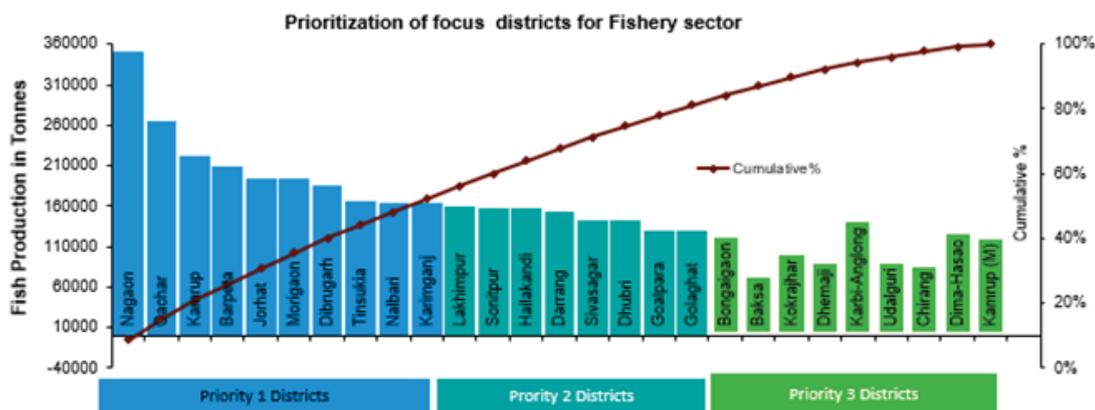


Source: Department of Economics & Statistics, Govt. of Assam

### Production of Fish and focus districts

As per data from Department of Statistics & Economic, Govt. of Assam for 26 districts, approx. 3.3 thousand lakh kgs of fish is the estimated production of fish for the period 2018-19. Out of these, approx. 203 lakh number of fishes are sent outside the state in the ornamental fish category. Using the similar methodology for selecting the focus districts in phased manner, the following may be considered:

Figure 34



Source: Department of Economics & Statistics, Govt. of Assam

## Seasonality Chart of Major Agriculture Crops<sup>4</sup>

The following table provides a snapshot of the seasonality of the major agricultural crops in the state.

Crop	Season	Months in a calendar year											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Black gram /Urd	Rabi												
	Rabi												
	Rabi												
	Summer												
Gram	Kharif												
Green gram	Rabi												
	Rabi												
Maize	Rabi												
	Summer												
Masur/ Lentil	Rabi												
	Rabi												
Pulses	Early Kharif												
	Summer												
Rice /Paddy	Early Kharif												
	Kharif												
	Kharif												
	Kharif												
Wheat	Rabi												
	Rabi												
Wheat	Rabi												
	Rabi												

As per the above chart, a major portion of sowing season is about to start in the state. Similarly, some crops such as Wheat, Masur, Gram were scheduled to be harvested during lockdown period. Government of Assam should formulate favorable policies for procurement of crops harvested during last 2 months and to made available various inputs required for crops to be shown in next two months.

<sup>4</sup><https://ascltd.assam.gov.in/frontimpotentdata/crop-calender>

### Seasonality Chart of Major Horticulture/Spice Crops<sup>5</sup>

The following table provides a snapshot of the seasonality of the major horticultural crops in the state.

Produce	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Banana			Harvesting	Harvesting	Harvesting							
Pineapple	Harvesting			Harvesting								
Citrus				Harvesting	Harvesting	Harvesting	Harvesting	Harvesting				
Papaya				Harvesting	Harvesting	Harvesting					Harvesting	Harvesting
Potato		Harvesting	Harvesting							Harvesting	Harvesting	
Sweet Potato	Harvesting	Harvesting	Harvesting		Harvesting	Harvesting			Harvesting	Harvesting	Harvesting	
Tapioca	Harvesting	Harvesting		Harvesting	Harvesting							
Onion		Harvesting	Harvesting						Harvesting	Harvesting		
Turmeric	Harvesting	Harvesting	Harvesting	Harvesting								
Ginger	Harvesting	Harvesting	Harvesting	Harvesting								
					Harvesting	Harvesting						
Black Pepper	Harvesting											Harvesting
Chillies	Harvesting		Harvesting	Harvesting	Harvesting							Harvesting

Sowing/Planting  
 Harvesting

In case of horticulture, Government must ensure operationalization of all the cold storages at the earliest possible time. In the immediate future, pineapple and citrus are would be harvested. These may require cold storage on an urgent basis.

<sup>5</sup>[https://diragri.assam.gov.in/sites/default/files/swf\\_utility\\_folder/departments/diragri\\_medhassu\\_in\\_oid\\_4/portlet/level\\_2/11%28A%29.1.pdf](https://diragri.assam.gov.in/sites/default/files/swf_utility_folder/departments/diragri_medhassu_in_oid_4/portlet/level_2/11%28A%29.1.pdf)

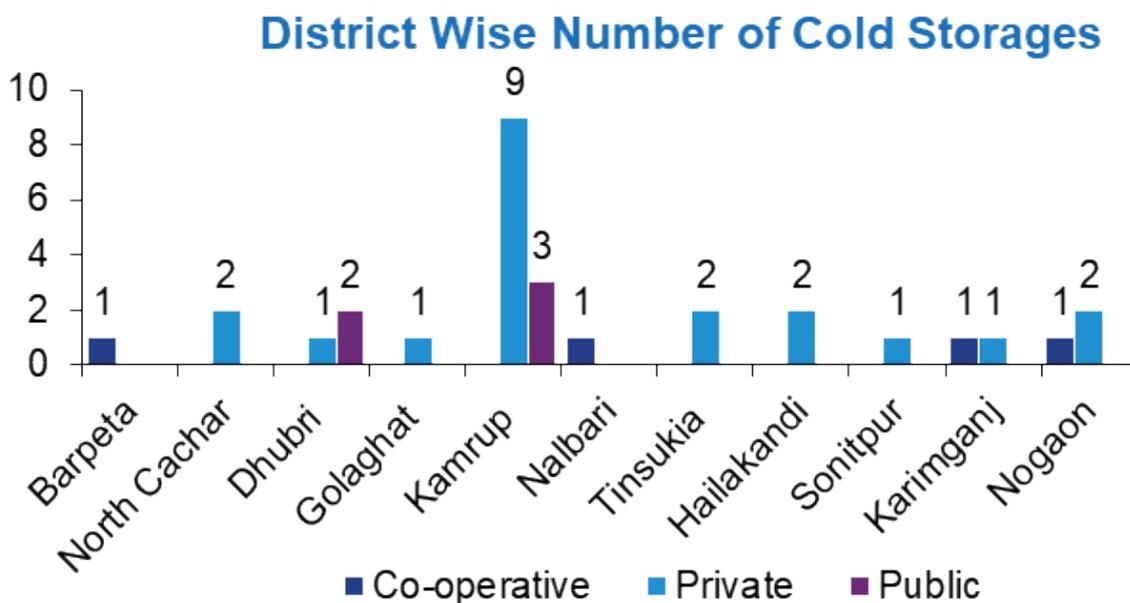
## 1.3 STATE OF INFRASTRUCTURE FACILITIES

Agricultural infrastructure has the potential to transform the existing traditional agriculture or subsistence farming into a most modern, commercial and dynamic farming system in India. It is estimated that a 1% increase in the stock of infrastructure is associated with a 1% increase in GDP across all countries. This is more pertinent in a state like Assam. Primary agricultural infrastructure can be market yards, mandis, cold storages etc.

### Status of Cold Storages<sup>6</sup>

As per the available data there are 30 numbers of cold storages across the state of Assam. The total reported capacity of these cold storages is around 87 thousand metric tonnes. Kamrup district has the highest number of cold storages in the state at 12. Further an overwhelming 70 per cent (21 nos.) of these cold storages are owned by private parties, whereas 13 per cent (4 nos.) and 17 per cent (5 nos.) are owned by co-operatives and Govt. departments.

Figure 35



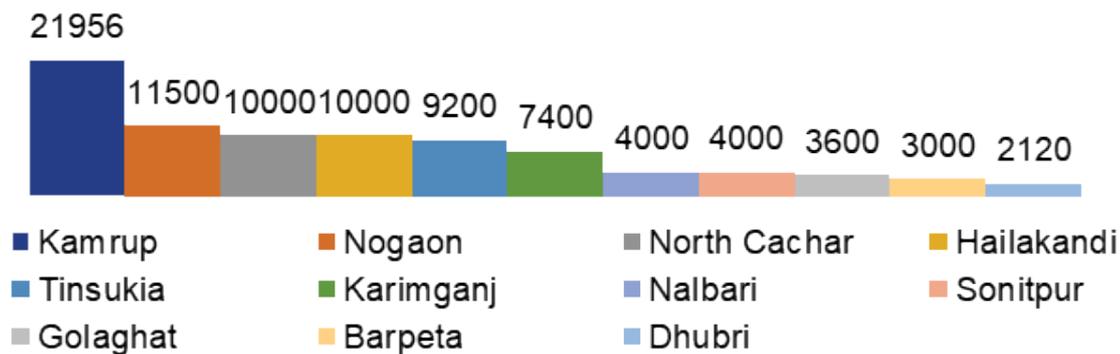
Source: APEDA

<sup>6</sup>[http://agriexchange.apeda.gov.in/Ready%20Reckoner/Cold\\_Storage/EasternRegion/Assam.aspx](http://agriexchange.apeda.gov.in/Ready%20Reckoner/Cold_Storage/EasternRegion/Assam.aspx)

Capacity wise also Kamrup district leads the state with a storage capacity of almost 22 thousand metric tonnes followed by Nagaon at 11.5 thousand metric tonnes and North Cachar & Hailakandi at 10 thousand metric tonnes each.

Figure 36

### District wise Cold Storages capacity in Assam (MT)



Assessing at an all India level basis, there is a huge gap in terms of cold storage infrastructure in the state. At an all India basis, for every ton of horticulture produce, there is 0.12 ton of storage capacity; whereas for Assam for every ton of production of horticulture produce, there is 0.04 ton of storage capacity. This means that there is a requirement of 3x the present capacity in the state. Moreover, such cold storages should be developed and maintained by Co-operatives/Producer companies so that the farmers/producers can derive the maximum benefit.

#### North East Mega Food Park

A Mega Food Park has been set up in Assam under the Mega Food Parks scheme by Ministry of Food Processing industries in Tihu, Assam. The core infrastructure available at this facility is 10000 MT capacity of Dry Warehouse, 3000 Tons of cold storage along with Standard Design Factories and Quality control laboratory.

#### Market Yards

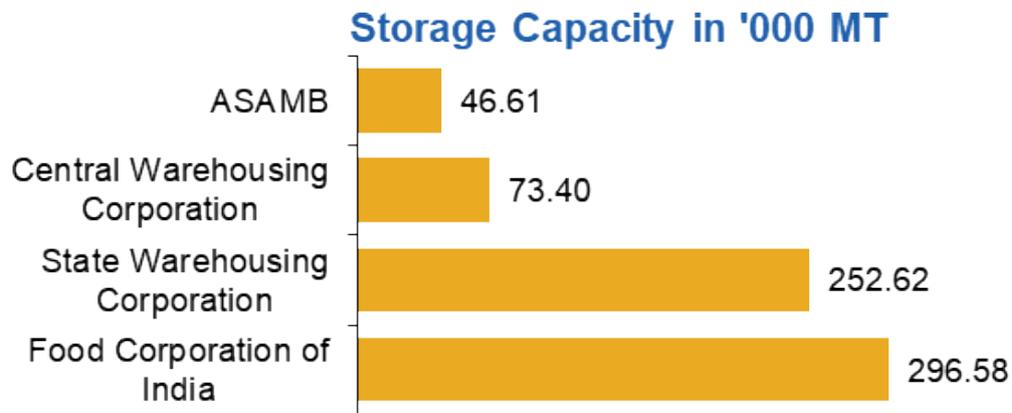
Assam State Agricultural Marketing Board through Market Committees has established modern market yards in different areas of the State, wherein scientific godowns for storage, platforms for auction of agricultural commodities, display yards, traders' shop, banks and post offices have been provided .

Sl. No.	Name of District	Regulated Market Committee	Principal Market Yards	Submarkets
1	Biswanath			
2	Majuli			
3	Charaideo			
4	West K Anglong			
5	South Salmara			
6	Hojai		Present	
7	Nagaon	Present	Present	Present
8	Sonitpur	Present	Present	Present
9	Karbi Anglong			
10	Barpeta	Present	Present	Present
11	Lakhimpur	Present	Present	Present
12	Cachar	Present		Present
13	Golaghat	Present	Present	Present
14	Dibrugarh	Present		Present
15	Dhubri	Present	Present	Present
16	Jorhat	Present	Present	Present
17	Kamrup	Present	Present	
18	Kokrajhar		Present	
19	Udalguri			
20	Sivasagar	Present		Present
21	Tinsukia	Present	Present	Present
22	Baksa		Present	
23	Goalpara	Present	Present	Present
24	Morigaon	Present	Present	Present
25	Darrang	Present	Present	Present
26	Nalbari	Present	Present	Present
27	Dhemaji	Present	Present	Present
28	Bongaigaon	Present		Present
29	Chirang	Present	Present	Present
30	Karimganj			Present
31	Hailakandi	Present	Present	Present
32	Dima Hasao			
33	Kamrup(M)	Present	Present	Present

### Food Grain Storage Capacity

Assam has a total storage-built capacity of 6.69 lakh MT, however the total food grain production is close to 56 lakh tonnes.

Figure 37



Source :Department of Economics & Statistics, Govt. of Assam

Comparing against an all India level of storage capacity of 3.91 MT for each ton of food grain production, Assam fares well with its existing capacity of 8-ton storage capacity for each ton of food grain production.

## 1.4 STATE AND CENTRAL LEVEL SCHEMES

Sector	Name of the Scheme	Funding	Objective
Agriculture/ Horticulture	National Food Security Mission	Centre	<ul style="list-style-type: none"> <li>Increasing production of rice, wheat, pulses and coarse cereals through area expansion and productivity enhancement in a sustainable manner in the identified districts of the country</li> <li>Restoring soil fertility and productivity at the individual farm level;</li> <li>Enhancing farm level economy (i.e. farm profits) to restore confidence amongst the farmers.</li> </ul>
Agriculture	Implementation of Soil Health Management component under National Mission for Sustainable Agriculture (NMSA)	Centre	<ul style="list-style-type: none"> <li>Soil Health Management (SHM) is one of the most important interventions under National Mission for Sustainable Agriculture (NMSA).</li> <li>SHM will aim at promoting location as well as crop specific sustainable soil health management, creating and linking soil fertility maps with macro micronutrient management, judicious application of fertilizers and organic farming practices.</li> <li>This component will be implemented by State Govt., National Centre of Organic Farming (NCOF), Central Fertilizer Quality Control &amp; Training Institute (CFQC&amp;TI) and sanctioned by INM division.</li> </ul>
Agriculture	National Mission on Agriculture Extension Technology (NMAET)	State & Centre	<ul style="list-style-type: none"> <li>Under this scheme it has been proposed to establish village level farm machinery bank (VLFMB), Custom Hiring Centres (CHC) and High-Tech Hubs (HTH) in order to</li> </ul>

Sector	Name of the Scheme	Funding	Objective
			facilitate easy availability of farm Implements and machineries for hiring by Farmer.
Agriculture	National Mission on Oil Seeds & Oil Palm (NMOOP)	Centre	<ul style="list-style-type: none"> <li>The Mission has two submissions: (a) Mini Mission II: Oil Seeds &amp; Mini Mission II: Oil Palm. Its main objective is to increase the production and productivity of oil crops. MM I include conventional oil seeds crops like Rape &amp; Mustard, Sesamum, Ground nut, etc. while MM II includes oil Palm. Oil Palm has been newly introduced from the year 2014-15 on pilot basis in the districts of Kamrup (M) &amp; Goalpara. New varieties of Rape &amp; Mustard have been introduced under MM I which have shown higher production in the state. Oil palm plants require 4 years to yield and farmers are adopting the crop well in the said district.</li> </ul>
Horticulture	Horticulture Mission for North East & Himalayan States (HMNEH)	Central	<ul style="list-style-type: none"> <li>Promote holistic growth of horticulture sector, including bamboo and coconut through area based regionally differentiated strategies, which includes research, technology promotion, extension, post-harvest management, processing and marketing, in consonance with comparative advantage of each State/region and its diverse agro-climatic features;</li> <li>Encourage aggregation of farmers into farmer groups like FIGs/FPOs and FPCs to bring economy of scale and scope.</li> </ul>

Sector	Name of the Scheme	Funding	Objective
			<ul style="list-style-type: none"> <li>• Enhance horticulture production, augment farmers, income and strengthen nutritional security;</li> <li>• Improve productivity by way of quality germplasm, planting material and water use efficiency through Micro Irrigation.</li> <li>• Support skill development and create employment generation opportunities</li> </ul>
Agriculture & Horticulture	Mission Organic Value Chain Development in Assam (MOVCD)	Central	<ul style="list-style-type: none"> <li>• To develop crop commodity specific organic value chain and address gaps in organic crop production, wild crop harvesting, organic livestock management and processing handling and marketing of organic agricultural products through:               <ol style="list-style-type: none"> <li>1) Developing crop specific organic production clusters with necessary infrastructural, technical and financial support.</li> <li>2) By facilitating partnerships between farmers and organic businesses: Local enterprises and/or Farmer Producer Companies based on back-to-back long-term trade relations with clients in domestic and export markets.</li> <li>3) By providing enabling environment for project initiatives and development programs with necessary support for organic value chain development and create market access.</li> </ol> </li> <li>• To empower producers with program ownership by organizing them into FIGs with the final aim to federate into farmer producer organizations/</li> </ul>

Sector	Name of the Scheme	Funding	Objective
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companies.

- To replace conventional farming/subsistence farming system into local resource based, self-sustainable, high value commercial organic enterprise.
- Developing commodity specific commercial organic value chain under integrated and concentrated approach with end-to-end facilities for production, processing, storage and marketing.
- Development of organic parks/zones with facilities for collection, aggregation, value addition, processing, storage and market-linkages for specific commodities requiring capital intensive technology.
- Develop NER products as brands/labels through brand building and facilitating stronger marketing access under the ownership of growers' organizations/ companies.
- Creating state specific lead agency (Organic Commodity Board or Organic Mission) for coordinating, monitoring, supporting and financing the development and operationalization of entire value chain.

Agriculture	Pradhan Mantri Fasal Bima Yojna (PMFBY)	State	Pradhan Mantri Fasal Bima Yojana (PMFBY) aims at supporting sustainable production in agriculture sector by way of - <ul style="list-style-type: none"> <li>• providing financial support to</li> </ul>
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Sector	Name of the Scheme	Funding	Objective
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farmers suffering crop loss/damage arising out of unforeseen events

- stabilizing the income of farmers to ensure their continuance in farming
- encouraging farmers to adopt innovative and modern agricultural practices
- ensuring flow of credit to the agriculture sector; which will contribute to food
- security, crop diversification and enhancing growth and competitiveness of agriculture sector besides protecting farmers from production risks.

Agriculture Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

State & Central

- Achieve convergence of investments in irrigation at the field level (preparation of district level and, if required, sub district level water use plans).
- Enhance the physical access of water on the farm and expand cultivable area under assured irrigation (Har Khet ko pani) Integration of water source, distribution and its efficient use, to make best use of water through appropriate technologies and practices.
- Improve on-farm water use efficiency to reduce wastage and increase availability both in duration and extent.
- Enhance the adoption of precision-irrigation and other water saving technologies (More crop per drop).

Sector	Name of the Scheme	Funding	Objective
			<ul style="list-style-type: none"> <li>• Enhance recharge of aquifers and introduce sustainable water conservation practices</li> <li>• Ensure the integrated development of rainfed areas using the watershed approach towards soil and water conservation, regeneration of ground water, arresting runoff, providing livelihood options and other NRM activities.</li> <li>• Promote extension activities relating to water harvesting, water management and crop alignment for farmers and grass root level field functionaries.</li> <li>• Explore the feasibility of reusing treated municipal wastewater for peri-urban agriculture, and Attract greater private investments in irrigation.</li> </ul>
Agriculture	Rashtriya Krishi Vikas Yojana (RKVY)	State & Central	<ul style="list-style-type: none"> <li>• To incentivize the states so as to increase public investment in Agriculture and allied sectors.</li> <li>• To provide flexibility and autonomy to states in the process of planning and executing Agriculture and allied sector schemes.</li> <li>• To ensure the preparation of agriculture plans for the districts and the states based on agro-climatic conditions, availability of technology and natural resources.</li> <li>• To ensure that the local needs/crops/priorities are better reflected in the agricultural plans of the states.</li> <li>• To achieve the goal of reducing the</li> </ul>

Sector	Name of the Scheme	Funding	Objective
			<p>yield gaps in important crops, through focused interventions.</p> <ul style="list-style-type: none"> <li>• To maximize returns to the farmers in Agriculture and allied sectors.</li> <li>• To bring about quantifiable changes in the production and productivity of various components of Agriculture and allied sectors by addressing them in a holistic manner.</li> </ul>
Fisheries	"Matsya Jagaran –Ghare Ghare Pukhuri Ghare Ghare Maach"	State	<ul style="list-style-type: none"> <li>• Expansion of fish culture area</li> <li>• Enhancing fish production</li> <li>• Socio-economic uplift of the rural people</li> <li>• Creating self-employment opportunity</li> </ul>
Fisheries	Seed Bank Programme	State	<ul style="list-style-type: none"> <li>• Making fish seed available in the form of fingerlings for enhancing fish production</li> <li>• Expansion of fish seed rearing area</li> <li>• Socio-economic uplift of the rural people</li> <li>• Creating self-employment opportunity</li> </ul>
Fisheries	Majuli Development Programme	State	<ul style="list-style-type: none"> <li>• 3-A: Construction of New Individual Ponds for Fish Seed Rearing</li> <li>• 3-B: Fish cum pig culture in existing pond</li> </ul>
Fisheries	Assistance To Women Shgs For Production Of Value Added Fish Products	State	<ul style="list-style-type: none"> <li>• Entrepreneurship in fisheries post-harvest activities</li> <li>• Women empowerment</li> <li>• Promotion of value-added fish products</li> </ul>

Sector	Name of the Scheme	Funding	Objective
Animal Husbandry	Livestock Health and Disease Control (LH&DC) Programme	Centre & State	<ul style="list-style-type: none"> <li>• Assistance to States for Control of Animal Diseases (ASCAD)</li> <li>• National Project on Rinderpest Eradication (NPRE).</li> <li>• Professional Efficiency Development (PED)</li> <li>• National Animal Disease Reporting System (NADRS)</li> <li>• Establishment &amp; Strengthening of Veterinary Hospital and Dispensaries (ESVHD)</li> <li>• Foot and Mouth Disease Control Program (FMD-CP)</li> <li>• Peste-des- Petis Ruminants control Program (PPR-CP)</li> <li>• Brucella-Control Program</li> <li>• Classical Swine Fever Control Programme (CSF-CP)</li> </ul>
Animal Husbandry	Rural Backyard Poultry Development (RBPD) Programme	Centre	<ul style="list-style-type: none"> <li>• Suitably strengthen the farms in terms of hatching, brooding and rearing of the birds.</li> <li>• Income generation</li> <li>• Rural backyard poultry provides nutrition supplementation in form of valuable animal protein and empowers women.</li> </ul>
Animal Husbandry	100% Assistance to State Poultry Farms	Centre	<ul style="list-style-type: none"> <li>• The objective is to assist State Poultry/Duck Farms for strengthening them in terms of hatching, brooding and rearing of the birds with provision for feed mill and their quality monitoring and in-house disease diagnostic facilities.</li> </ul>

Sector	Name of the Scheme	Funding	Objective
Animal Husbandry	Integrated Sample Survey (ISS)	State/ Centre	<ul style="list-style-type: none"> <li>The main objective of the scheme is to estimate the production of milk, egg, wool and meat in the state. The Central Government provides grant-in-aid to the States on 90:10 for North-East states for the implementation of the scheme</li> </ul>
Animal Husbandry	Rashtriya Krishi Vikash Yojana (RKVY)	Centre	<ul style="list-style-type: none"> <li>The objective is to increase production of agricultural crops and farm income by a minimum 4% annual growth</li> </ul>

## 1.5 RELIEF MEASURES TAKEN BY CENTRAL GOVERNMENT

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The 21-day lockdown has coincided with the time of harvesting of Rabi crops and has hit farmers and agriculturalists both directly and indirectly. The pandemic is impacting global as well as domestic food systems, disrupting regional agricultural value chains, and posing risks to household food security. The further extension of this lockdown would have adversely impacted this harvesting season had it not been for the timely action undertaken by the central as well as various state governments. Following are some measures undertaken by Central Govt. in this regard:

- (i) Ease of lockdown in selectively rural areas to allow harvesting of Rabi crops.
- (ii) Based on the policy directions of the Indian government, various Ministries/ Departments of state governments have issued implementation guidelines to facilitate continuation of activities related to agriculture and its allied sectors.
- (iii) Indian Council of Agricultural Research (ICAR) has also issued an agro-advisory to maintain hygiene and social distancing among farmers working on their fields.
- (iv) The Government of India has announced that the first instalment of the PM-Kisan Yojana payment to farmers, i.e., Rs. 2,000 will be paid up front to farmers, benefitting over 8.7 crore Indian farmers. It has also announced that the wages under MGNREGS will be raised from Rs. 182 to Rs. 202 per day.
- (v) The Reserve Bank of India (RBI) has announced a moratorium on agricultural term loans (including crop loans) for a period of three months.
- (vi) The Indian Railways has been roped into ease transport logistics of agricultural produce.
- (vii) The government has initiated a dialogue with the exporters of agri and allied commodities to gain a first-hand account of the problems being faced by the exporters of such commodities and initiate necessary steps by making meaningful interventions for early redressal of their problems.
- (viii) The common issues highlighted by exporters of all agri commodities related to availability and movement of labour, inter-state transport bottlenecks, shortage of raw materials due to closure of mandis, phyto-sanitary certification, closure of courier services thereby, hampering movement of shipping documents, availability of

freight services, access to ports/yards and clearance of goods for imports/exports is being worked out across levels.

(ix) Under the Pradhan Mantri Garib Kalyan Yojana (PM-GKY) about 5,516 MT of pulses has been dispatched for delivery to the States/UTs.

(x) Under Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) Scheme, during the lockdown period from 24.3.2020, about 8.31 crore farmer families have been benefitted and an amount of Rs. 16,621 crore has been released so far.

(xi) The States have been requested to promote the concept of 'Direct marketing' to facilitate farmers/ group of farmers/FPOs/ Cooperatives in selling their produce to bulk buyers/big retailers/processors etc.

(xii) In order to decongest wholesale markets & to boost the supply chain, following two modules under National Agriculture Market (e-NAM) have been introduced:

- FPO Module: FPOs can directly trade with e-NAM portal. They can upload produce details from collection centers with picture/quality parameter and avail the bidding facility without physically reaching to the mandis.
- Warehouse Based Trading Module: Farmers can sell their produce from Warehousing Development and Regulatory Authority (WDRA) registered warehouses notified as deemed market, and do not physically bring the produce to the nearest mandis.

(xiii) The Cabinet approves extension of relaxation of mandatory requirement of Aadhaar seeding of data in respect of beneficiaries of the States of Assam and Meghalaya and UTs of J&K and Ladakh for one-year w.e.f. 1st April, 2020 under the Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) Scheme.

(xiv) The Ministry of Agriculture and Farmers' Welfare launched an app on 17th April, 2020, called the Kisan Rath App to facilitate transport of produce. Traders and farmers can select transport facilities available on the app and use it to transport produce. This innovation will help with the transportation especially of perishable commodities, as well as maintain uninterrupted supply linkages.

## 1.6 RELIEF MEASURES TAKEN BY STATE OF ASSAM

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- (i) The Assam government has formed state and district level committees to monitor the procurement and supply of agricultural produce.
- (ii) The state government is helping the farmers through a direct cash transfer of Rs 2,500 into their bank account.
- (iii) Through PM Kisan scheme Rs 2500 has been transferred through DBT for farmers' benefit.
- (iv) Assam Govt is planning to provide a helpline for consultation by farmers which will be available from 6 am to 6 pm.
- (v) Assam State has started home delivery of vegetables.
- (vi) Procurement of rice is in process in the state and necessary measures have been taken to spray disinfectants in the fields.
- (vii) The State Govt has regularized the supply of egg, meat and Milk.
- (viii) The State Govt is in the process to operationalize the feed mills once the raw material is available, so that food for poultries is adequately provided.
- (ix) The State Govt has exempted Fertilizer shops from the lockdown and farmers can also collect petrol and diesel for running agricultural machineries. Any problem faced in this regard could be informed on the helpline that is to be provided.



STATE  
COMMITMENTS  
BEFORE  
PANDEMIC

## 2. STATE COMMITMENTS IN CURRENT FISCAL

### 2.1 AGRICULTURE DEPARTMENT INCLUDING HORTICULTURE

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- **Total budgetary allocation of Rs. 1515.92 Crore in 2020-21**
- The Government of Assam has adopted several initiatives for uptake of scientific techniques in crop production in order to double farmer's income by 2022. A novel Scheme in this regard has been the introduction of Soil Cards. The department is planning to issue another 3.5 Lakh Health Card in 2020-21.
- During Kharif 2019, a total of 1,90,905 of farmers have been covered under Pradhan Mantri Fasal Bima Yojana (PMFBY) with an area of 1,18,536.8 hector of land while during Rabi, 2019-20, a total of 11,450 farmers have been covered with an area of 9,451.84 hector of land under the said Yojna. The department has proposed to cover an additional 5 lakh farmers as a target to be achieved FY 2020-21.
- Under the Chief Minister's Samagra Gramya Unnayan Yojana (CMSGUY), 114,62 Nos. tractors with a capital subsidy of Rs. 701 Crore has been distributed benefitting around 2,24,470 farmers so far. In the FY2020-21 8550 additional tractors will be distributed across the State under the same scheme in order to cover the entire 23,000 revenue villages of the State.
- In addition to the mechanization of agriculture, the Department will also distribute 69,450 Nos. shallow tube wells which will be operable by both solar and diesel pumps so that water for irrigation will be available for our farmers throughout the year.
- Under the World Bank funded "Assam Project on Agribusiness and Rural Transformation" (APART), demonstrations on 'Zero Tillage Potato Farming' using Potato Planters and Potato Harvesters are being delivered for the benefit of farmers.

## 2.2 ANIMAL HUSBANDRY & VETERINARY DEPARTMENT

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- **Total budgetary allocation of Rs. 408 Crore in FY20-21**
- The Khanapara Town Milk Supply Schemes (TMSS) will be made operational by April 2020, and subsequently TMSSs at Tezpur, Lakhimpur, Dibrugarh and Silchar are proposed in FY 2020-21.
- The Department has institutionalized the departmental farms which are crucial for demonstrational activity. In addition to that, a progressive Private Sector Investment promotion policy has been launched to promote major investment in the livestock sector in the State of Assam. To leverage the use of technology in providing services in the Animal Husbandry and Veterinary Sector the department has proposed Assam DHENU, a composite of multiple suits of applications that shall allow for the end to end computerization of the operational and monitoring aspects of the Department

## 2.3 FISHERY DEPARTMENT

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- **Total budgetary allocation of Rs. 97 Crore in FY20-21**
- Matsya Jagaran – Ghare Ghare Pukhuri Ghare Ghare Maach', a major development programme of the Fishery Department with financial allocation of Rs. 100 Crore under the Rural Infrastructure Development Fund (RIDF), will be completed in the Financial Year 2020-21. Upon its completion, this scheme is expected to enable additional fish production to the tune of 5400 MT.
- The Department has prepared a directory of indigenous fish species of Assam and it will be published during the financial year 2020-21. Under the Assam Agriculture and Rural Transformation Project (APART), Fishery Department has entered into an international partnership with the World Fish Centre (WFC), Malaysia. The scope of this association includes demonstration of polyculture, paddy cum- pisciculture and Beel fisheries development.



# IMPACT OF THE PANDEMIC ON THE SECTOR

### 3. IMPACT ANALYSIS ON AGRI & ALLIED SECTOR OF ASSAM DUE TO COVID 19

The ongoing health crisis around COVID19 has affected all walks of life and therefore, Agriculture & Allied sector has also not been spared from its perils. Governments have swung into actions since the Corona virus attack created an unprecedented situation. India declared a three-week nation-wide lockdown from 25th March 2020 till mid-April in the initial phase, which has subsequently been extended till 3rd May 2020 for achieving satisfactory containment of the virus spread.

In this chapter, an attempt has been made to project the qualitative and quantitative impact of COVID 19 but only time will reveal its true nature.

Let us begin by looking at some of the challenges faced by Farmers and Allied Community in general across the value chain of the industry which might be aggravated due to the COVID 19 situation so that we understand the overall context for a deeper and meaningful analysis.

#### 3.1 CHALLENGES FACED BY FARMERS AND ALLIED COMMUNITY

Cereals and Pulses (Rabi & Kharif Crops)	
Value-Chain Element	Description of the problem
Input	<ul style="list-style-type: none"><li>• April-May is the time when paddy farmers in Assam clear weeds and manure the fields for transplanting the seedlings of the winter crop from the nursery. The process takes 35-40 days. Farm experts said the cycle, if pushed back by more than a month due to the lockdown, could impact yield as the sowing and maintenance phase would be perilously close to the time when Assam experiences floods.</li><li>• Non availability of seeds for Kharif crops due to closure of Seed processing/packaging plants and lack of transportation.</li><li>• Non-availability of Manufacturing and packaging units of Fertilizers, Pesticides and Seeds</li></ul>

## Cereals and Pulses (Rabi & Kharif Crops)

Value-Chain Element	Description of the problem
<b>Farm Production</b>	<ul style="list-style-type: none"> <li>• Difficulty in movement of farmers, farm laborers and harvesting machine is delaying the harvesting process of Rabi crops.</li> <li>• harvest of the rabi crops has been delayed due to non-availability of labor, machinery (harvesters, threshers, tractors), transport facilities and restrictions on movement.</li> <li>• Crop ripening on the field due to lack of demand</li> </ul>
<b>Post-Harvest</b>	<ul style="list-style-type: none"> <li>• Issue in taking produce to Market on time</li> <li>• To an extent the crops initiated for cultivation and/or harvested in the months of March-April-May in the state of Assam will be affected or will get affected during/after the lockdown.</li> </ul>
<b>Logistics &amp; Storage</b>	<ul style="list-style-type: none"> <li>• Farm harvests are unable to reach the mandis (market yards) for assured procurement operations due to unavailability of logistics.</li> <li>• Difficulty in making the food grains and other essential items available to consumers, both in rural and urban areas</li> <li>• Limited availability of processing centers/cold storages/warehouses</li> <li>• Lack of labor availability for operation of the processing facilities</li> </ul>
<b>Marketing the produce</b>	<ul style="list-style-type: none"> <li>• Raw materials from agriculture sectors and unable to reach the small and medium enterprises.</li> <li>• Non-functioning of agri-input shops and agro-processing centers.</li> <li>• Lack of demand due to restrictions on mandis</li> <li>• Drop in prices for the commodities due to spoilage of produce till the time produce reach market</li> <li>• A section of Rabi cultivators is not able to sell their produce, therefore in the coming season they will not have any capital, thus govt needs the support with</li> </ul>

## Cereals and Pulses (Rabi & Kharif Crops)

Value-Chain Element	Description of the problem
	<p>money to farmers so that they can cultivate paddy 15th April to end of August before first wave of flood comes in Assam.</p>

## Fruits and Vegetables

Value-Chain Element	Description of the problem
<b>Input</b>	<ul style="list-style-type: none"> <li>As a result of lockdown, farmer's income has been affected. In absence of significant relief measures, this is expected to impact the loan repayment ability of small farmers and which in turn would have a spiraling effect on sourcing fresh loans and hence procuring inputs for sowing.</li> </ul>
<b>Farm Production</b>	<ul style="list-style-type: none"> <li>Farms activities have got impacted because of limited availability of laborers.</li> </ul>
<b>Post-Harvest</b>	<ul style="list-style-type: none"> <li>Limited availability of labor has impacted post-harvest activities as well.</li> </ul>
<b>Logistics &amp; Storage</b>	<ul style="list-style-type: none"> <li>These being perishable items, with many of them having shelf lives of less than a week requires cold storage &amp; efficient supply chain facilities which are missing many a times.</li> </ul>
<b>Marketing the produce</b>	<ul style="list-style-type: none"> <li>Limited access to markets including closure of few local markets leads to price crash and unnecessary profiteering by middlemen</li> </ul>

## Dairy Industry

Value-Chain Element	Description of the problem
<b>Input</b>	<ul style="list-style-type: none"> <li>• There has been limited availability of fodder and the same has led to steep increase in their prices.</li> </ul>
<b>Farm Production</b>	<ul style="list-style-type: none"> <li>• Dairy production has been broken with little distribution. The impact on dairy farmers in Assam is more than other part of the country because Assam does not have an efficient organized procurement system e.g. co-operative or private dairy.</li> </ul>
<b>Post-Harvest</b>	<ul style="list-style-type: none"> <li>• The milk processing units here do not have adequate facility to convert raw milk to solid dairy products such as butter or milk powder for future use.</li> <li>• Inability to liquidate the stock at the right time leads to wastage.</li> </ul>
<b>Logistics &amp; Storage</b>	<ul style="list-style-type: none"> <li>• Most of the dairy producers are based in rural and suburban areas and rely on rail/ road transport for getting their produce delivered to many consumers in urban areas.</li> <li>• Dairy products being perishable, lockdown has impacted the supply chain &amp; the small producers have limited facility for preserving them. This has forced the small producers to limit the produce and even discard in certain cases.</li> <li>• High transport &amp; labor cost leading to distress sale.</li> </ul>
<b>Marketing the produce</b>	<ul style="list-style-type: none"> <li>• Most of the sweet shops, restaurants &amp; many tea shops are closed. Many premium buyers have shifted to Tetra packs (&amp; purchasing in bulk) to avoid daily contact with the milkman.</li> <li>• Decrease in consumer demand and difficulty in market access e.g. closure of sweet shops which are the largest consumer of raw milk produced in informal sector.</li> </ul>

## Eggs and Poultry

Value-Chain Element	Description of the problem
<b>Input</b>	<ul style="list-style-type: none"> <li>• Non-availability of seeds and fodder for livestock rearing</li> <li>• Issues in getting veterinary treatment for animals</li> </ul>
<b>Farm Production</b>	<ul style="list-style-type: none"> <li>• Difficulty in migration of workers from few parts to their native places has also triggered panic buttons, as they are crucial for both harvesting operations and post-harvest handling of produce in storage and marketing centers</li> </ul>
<b>Post-Harvest</b>	<ul style="list-style-type: none"> <li>• Issue in taking produce to Market on time</li> <li>• Issue in transport of raw/packed meat to market</li> </ul>
<b>Logistics &amp; Storage</b>	<ul style="list-style-type: none"> <li>• The sale of dairy products; fish; poultry, etc. has also been hit during the lockdown period as the uptake by the organized industry players has been affected due to shortage of workforce and transport issues.</li> <li>• Limited availability of processing centers/cold storages/warehouses</li> <li>• Lack of labor availability for operation of the processing facilities</li> </ul>
<b>Marketing the produce</b>	<ul style="list-style-type: none"> <li>• Raw materials are unable to reach the small and medium enterprises.</li> <li>• Lack of demand due to restrictions on mandis</li> <li>• Drop in prices for the commodities due to spoilage of produce till the time produce reach market</li> <li>• Poultry farmers have been badly hit due to misinformation, particularly on social media, that chicken are the carriers of COVID-19.</li> <li>• Egg prices crashed to an all-time low and poultry farmer were left with huge stock of unsold eggs.</li> <li>• Small dairy and poultry farmers engaged in contract farming have faced a major loss with many private contract firms refusing to lift the produce.</li> </ul>

## Fishery

Value-Chain Element	Description of the problem
<b>Input</b>	<ul style="list-style-type: none"> <li>• Supplies of Fish seed &amp; fish fodder have got impacted</li> <li>• Obtaining superior quality inputs like seed, feed etc. starting their fish farming operations in time.</li> </ul>
<b>Farm Production</b>	<ul style="list-style-type: none"> <li>• Delay in fish breeding operations.</li> <li>• Shortage of liquidity for their farming activities.</li> </ul>
<b>Post-Harvest</b>	<ul style="list-style-type: none"> <li>• From wholesale to retail every component of the supply chain is on the verge of facing disruption.</li> <li>• Uncertainty of market recovery.</li> </ul>
<b>Logistics &amp; Storage</b>	<ul style="list-style-type: none"> <li>• Because of restrictions, its is difficult to transport the produces, moreover local farmers have limited storage capabilities.</li> </ul>
<b>Marketing the produce</b>	<ul style="list-style-type: none"> <li>• Operation of local fish markets in the state have been impacted.<sup>7</sup></li> <li>• Many neighboring states like Meghalaya imposed restrictions on functioning of the local markets and has also restricted the entry of goods into their state.</li> <li>• The produce of the fish farmers/fish seed producers could not reach market in time which may prompt them for distress selling.</li> <li>• There will be negative impact on farm-gate price of the fishes which sometimes may lead to such a situation where farmers will not even able to recover their capital expenditure.</li> <li>• Unavailability of cash in consumers' hand will reduce the overall growth of the sector.</li> <li>• The retailers or sellers has been severely affected in both short and long term due to limited/restricted marketing opportunity, limited purchasing power of consumers.</li> </ul>

<sup>7</sup> <https://www.hindustantimes.com/india-news/coronavirus-update-following-mass-violations-assam-shuts-vegetable-markets/story-k7H9x8WDP305pP1u2qSwiN.html>

## 3.2 METHODOLOGY ADAPTED TO ESTIMATE THE ECONOMIC IMPACT OF COVID 19

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The socio-economic impact of COVID 19 on the Agriculture and Allied Sector has been negative. The impact shall be estimated on basis of production volumes as per available data in the Economic Survey of Assam and various Government departments in absence of market price data.

As per Harvard Business Review (<https://hbr.org/1971/07/how-to-choose-the-right-forecasting-technique>) there are three basic types—qualitative techniques, time series analysis causal models for forecasting which have been used in this chapter for estimating the impact of COVID 19 pandemic induced 40 days lockdown in the state of Assam.

The impact has been defined as the estimated loss in the GSDP of Assam arrived through the below mentioned three-fold approach.

1. Causal Analysis of Impact on Agri & Allied Produce to identify focus sectors
2. Time Series Analysis of Historical Data of the focus sectors.
3. Qualitative Analysis through Panel Discussions with SMEs

**1. Causal Analysis of Impact on Agri & Allied Produce to identify focus sectors:** A complete or partial paralysis of supply chain due to lockdown protocols prohibited movement of people and community and the subsequent wastage loss due to lack of adequate storage infrastructure in the state. The **Causal Analysis** has been done to identify stress due to these factors in sub-sectors of Agriculture & its Allied Sector. This analysis uses refined and specific information about relationships between system elements like perishability and supply chain dependence in case of COVID 19 impact analysis and is powerful enough to take special events formally into account. The Causal Analysis would tell us the degree of relative stress in each sub-sector. For example in the Dairy subsector which has production and consumption on a daily basis would rationally be more stressed in terms of loss in income and loss in wastage than Crops sub-sector which has production on a quarterly basis (Normally short duration varieties take 100-120 days, medium duration 120-140 days, and long duration 140 days or more to reach maturity, source: Rice Knowledge Bank, Assam). A heat map comprising of two axes: degree of perishability and degree of dependency on supply chain will be developed, the result of which is to arrive at the worst hit sub-sector which will help in prioritizing the delivery of relief measures post lockdown.

**2. Once the degree of relative stress or impact is understood from the Causal Analysis, an economic assessment of the net loss in value to the State Gross Domestic Product of**

Assam due to COVID-19 Lockdown is calculated via **Time Series Analysis** by computing the monthly contribution of various sub-sectors from a historical data - Annual Production Report available in the Economic Survey of Assam 2018-19 published by the Directorate of Economics & Statistics, Assam Transformation & Development Department and factoring the impact on the output value of loss in State GDP per sub-sector of Agriculture & Allied Sector of Assam. The Time Series Analysis focuses entirely on patterns and pattern changes, and thus relies entirely on historical data. Then the Heat Map Impact from the Causal Analysis will be used for calculating the Projected Minimum Effective Impact on the Agri & Allied sub-sectors through the Time Series Analysis.

**3. Qualitative Analysis through Panel Discussions with Subject Matter Experts:** This part analyses the socio-economic dimension and overall scenario of the impact of COVID 19 pandemic on the Agriculture & Allied sector of Assam through consultations with more than 30 top subject matter experts on Agriculture & Allied fields in Assam for their respective assessment and remedial measures.

The following methodology and framework have been developed for analyzing the impact of COVID 19 and its consequent lockdowns on Agriculture & Allied sector of Assam.

Methodology adapted to estimate the economic impact of COVID 19			
<b>01</b>	<b>CAUSAL ANALYSIS</b>	<b>TIME SERIES ANALYSIS</b>	<b>02</b>
Identify the causality Factors Identify relative ranking of degree of impact in sub sectors Estimate Impact% age/ subsector of Agri & Allied Industry in Assam		Analyze historical Data of GSDP of Assam Deploy Mobility Band Analysis & Impact % age to estimate loss in terms of GSDP in Agri & Allied	
<b>03</b>	<b>QUALITATIVE ANALYSIS</b>	Consultation with Subject Matter Experts (SMEs) for assessing Overall Socio Economic impact of COVID 19 on the various sub-sectors of the Agri & Allied Sector of Assam	

### 3.3 CAUSAL ANALYSIS OF IMPACT ON AGRICULTURE & ALLIED PRODUCE IN ASSAM

The impact on the Agriculture and Allied Sector is assessed in this section as per the variables based on the intrinsic characteristics of the Agriculture & Allied Produce and the economic impact on its supply chain. The impact on the earnings of farmers due to Lockdown 1.0 and Lockdown 2.0 in the state of Assam due to COVID-19 pandemic considering the 0 number of actual COVID-19 cases amongst the Agri and Allied Sector workforce, from the causal point of view, can be attributed to the degree of two major variables based on the intrinsic characteristics of the produce (perishability of the produce) and the economic enabler (supply chain which in case of Agricultural & Allied sector consists generally of Inputs, Farm Production, Post-Harvest, Logistics & Storage and Marketing the Produce).

The set of Agriculture and Allied Sectors have been classified under sub-sectors of Agriculture (Rice & Pulses), Horticulture Produce (Fruits & Vegetables), Dairy Produce (Cattle Milk & Buffalo Milk), Animal Husbandry Produce (Meat & Eggs), Fishery Produce (Fish & Fish Seeds) for carrying out this analysis. Two commodities contributing highest to the individual sub-sector GSDP of Assam have been chosen as representative commodities of the sub-sector. For example, Fish & Fish Seeds are the major contributors in the GSDP contribution of Fishery sub-sector. (\* Source, Economic Survey of Assam, 2018-19). Therefore, the selection of rest of the representative commodities are based on the Economic Survey Report 2018-19.

*Table 31 Snapshot of Major Agri & Allied Produce*

<b>Fishery (Fish, Fish Seed,)</b>	<b>Production in year 2016-17 in Lakh MT</b>	<b>Production in year 2017-18 in Lakh MT</b>
Fish (in Lakh MT)	3.07	3.27
Fish Seed (in Million Numbers)	6758.00	11921.00

<b>Agriculture (Rice, Wheat, Pulses, Oilseeds)</b>	<b>Production in year 2016-17 in Lakh MT</b>	<b>Production in year 2017-18 in Lakh MT</b>
Rice	51.27	52.83
Wheat	0.23	0.24
Pulses	1.08	1.16
Oilseeds	2.04	2.01

Dairy (Cattle, Buffalo, Goat)	Production in year 2016-17 in Million Liters	Production in year 2017-18 in Million Liters
Cattle	764.87	785.62
Buffalo	120.56	121.86
Goat	18.80	18.29

Animal Husbandry (Meat, Eggs)	Production in year 2016-17	Production in year 2017-18
Meat (Thousand Tonnes)	46.86	48.43
Egg (Lakh Numbers)	4740.73	4950.75

Horticulture (Fruits, Spices, Vegetables)	Production in year 2016-17 in Lakhs MT	Production in year 2017-18 in Lakhs MT
Fruits	20.06	21.04
Spices	3.77	3.89
Vegetables	519.23	542.35

**Degree of Dependence on Supply Chain:** In Agri-economics, supply chain plays a vital role between the businesses responsible for the efficient production and supply of products from the farm level to the consumers to meet consumers' requirements reliably in terms of quantity, quality and price.

“Since the market chain or system refers to specific operations, handling, transportation and trade practices, there is a close correlation between the type and magnitude of loss incurred by a specific product and the chain or system wherein it moves.”

- Food and Agriculture Organization of the United Nations (FAO) in its report <http://www.fao.org/3/s8620e/S8620E08.htm>

This factor has been taken into consideration because the degree of dependence on supply chain reflects the amount of **loss in earning** due to the lockdown of 40 days in Assam from both the Supply and Demand perspective of the Agriculture and Allied workforce. Due to the travel restrictions imposed by the lockdown it could be easily understood that the disruption in the supply chain was in action across the value chain. For instance, the Poultry produce was not transported to the market due to a combination of factors - lack of communications initially due to lockdown and consumer buying behavior (Misinformation spread in the market that Coronavirus and other associated flu viruses spread from poultry). Due to the lack of demand in the market and bottlenecks in supply

side including import of feed from other states to Assam, 60% of domestic fowls died of starvation. (According to an estimate by an official of the Assam Livestock & Poultry Corporation (ALPCo) Ltd.). On the other hand, if we consider the case of Food grains like Rice the collection and distribution of the commodity has been well taken care of by the PDS (Public Distribution System) especially in terms of outreach to the poor population under the Indian food security system established by the Government of India under the Ministry of Consumer Affairs, Food. Thus, the degree of dependence of Poultry would be greater than Rice on an Ordinal Utility Likert Scale.

The Degree of Dependence on Supply Chain has been categorized into 5 Equidistant Likert Scale Grades of Low, Medium, Average, High, Very High depending upon their usage of Primary, Secondary & Tertiary Transport in the value chain, Schematic Interventions of Government like PDS, etc.

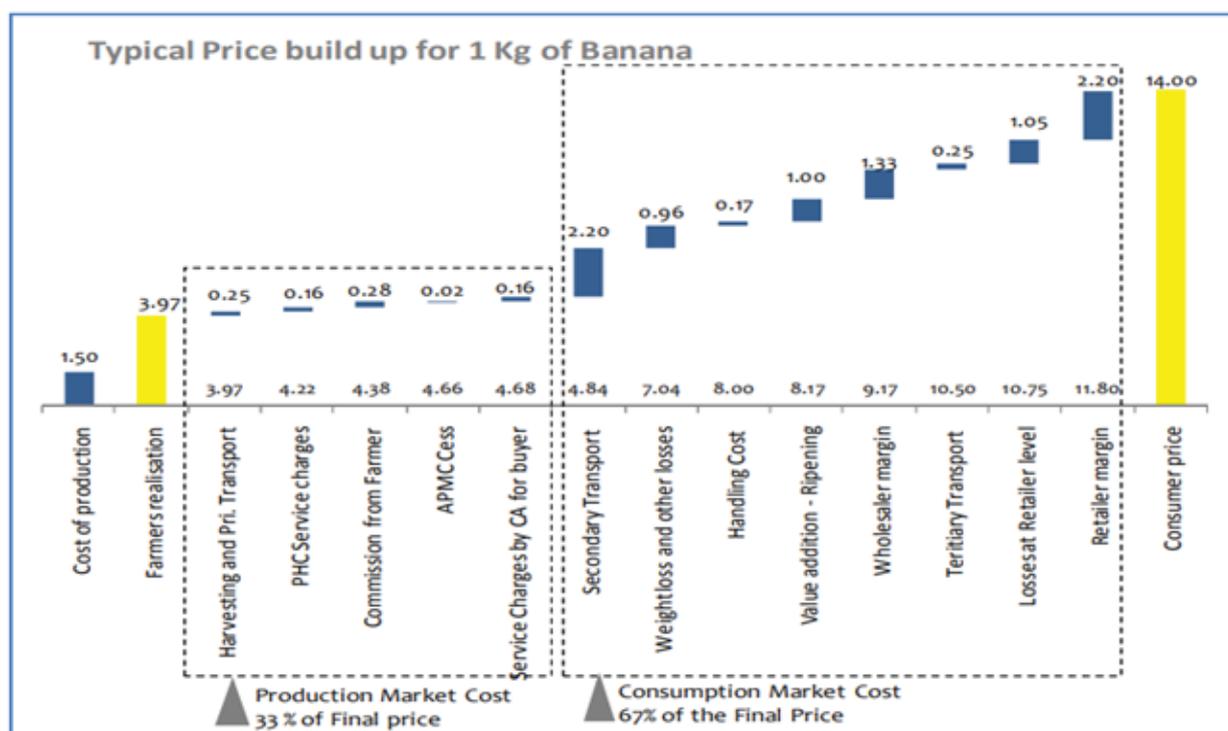
As per a study on Integrated Agri-Supply Chain Management by the **National Institute of Agricultural Extension Management, an Organization of Ministry of Agriculture, Government of India**, in a typical supply chain of Horticulture products, the dependence on Supply Chain is on all the 3 Degrees of Transport viz. Primary Transport, Secondary Transport & Tertiary Transport as can be seen from Figure 2 which exhibits a typical price build up for 1 Kilogram of Banana in India. The usage of Primary Transport is during harvesting from farms, Secondary Transport for value addition or by wholesalers. Tertiary Transport is used when the retailers collect their inventory from the Wholesalers. On the above basis, Agriculture and Allied Sectors Sub-sectors are categorized as Low, Medium, Average, High, Very High

*Table 1 Degree of Dependency in Supply Chain in Assam*

Sl No.	Agriculture and Allied Sectors Product Sub-sectors in Assam *Reasons for Degree of Supply Chain Dependency	Dependence on Supply Chain
1	<b>Agriculture (Rice &amp; Pulses)</b>  *Supply Chain Dependency: Low PDS Assist High Govt. & Medium Pvt. Sector Intervention	Average
2	<b>Fishery (Fish &amp; Fish Seeds)</b>  *Supply Chain Dependency: High Daily-market force Driven Less Govt. & More Pvt. Sector Intervention	High

Sl No.	Agriculture and Allied Sectors Product Sub-sectors in Assam *Reasons for Degree of Supply Chain Dependency	Dependence on Supply Chain
3	<b>Horticulture</b> (Fruits & Vegetables)  *Supply Chain Dependency: Very High Daily-market force Driven Less Govt. & More Pvt. Sector Intervention	Very High
4	<b>Dairy</b> (Cattle Milk & Buffalo Milk)  *Supply Chain Dependency: Very High 93% Un-organized Sector Less Govt. Intervention	Very High
5	<b>Animal Husbandry</b> (Meat & Eggs)  *Supply Chain Dependency: Very High Moderate Govt. & Major Pvt. Sector Intervention	Very High

Figure 38 Primary, Secondary & Tertiary Transport in Value Chain of Bananas



\*\*Source: NATIONAL INSTITUTE OF AGRICULTURAL EXTENSION MANAGEMENT,  
An Organisation of Ministry of Agriculture, Government of India.

**Degree of Perishability of Produce<sup>8</sup>** : A perishable commodity is a type of commodity with a limited shelf life if it's not refrigerated. Thus, the impact of degree of perishability during the COVID 19 Lockdown can be easily understood given the closure of the marketplace from the demand side i.e. the daily markets, haats, etc. in Assam.

**“Losses in perishable produce occur everywhere from the field to the ultimate consumer and depend on the degree of perishability of the produce; they are inherent in the very nature of the product.”**

- Food and Agriculture Organization of the United Nations (FAO) in its report <http://www.fao.org/3/s8620e/S8620E08.htm>

In a study conducted by Hegazy, Rashad. (2013) on Post-harvest Situation and Losses in India, the estimated losses in fruits and vegetables are higher and reached from 30 to 40 per cent annually till 2013.

(Hegazy, Rashad. (2013). Post-harvest Situation and Losses in India. 10.6084/m9.figshare.3206851.v1. (10.6084/m9.figshare.3206851.v1. TY - BOOK)

India is second largest producer of food next to China with estimated food processing industry size at US\$ 70 billion. In 2012, the production was 257 million tonnes of food grain (rice, wheat, coarse grains and pulses), 75 million tonnes of fruits and 149 million tonnes of vegetables. Out of these amounts, only 2.2 % of these are processed. In contrast, countries like USA (65%) and China (23%) are far ahead of India in reducing the wastage and enhancing the value addition and shelf life of the farm products. The losses in postharvest sector are estimated to be from 10 to 25 per cent in durables, semi-perishables and products like milk, meat, fish and eggs. **The estimated losses in fruits and vegetables are higher and reached from 30 to 40 per cent.** These percentages are not acceptable and adversely affect the Indian economy. To prevent such amount of losses, different organizations in India have been trying to find solution for serious issue related to post-harvest. Some efforts came with progress and achievements, other work didn't reflect to visible success as expected. So, in this study, our aim is to address and discuss the important ramified issues in post-harvest in India with focusing on the rules or constructions of most postharvest contributory. As noticed from the comprehensive literature review, India has well established postharvest institutions supported by government, public and private sector. The national-scale surveys and studies have been carried out mainly by the government and in few cases international organization, while, case studies and district/level research mostly carried out by local research institutions and universities. There are many remarkable technologies distributed successfully and reached the end-users/farmers in some places. However, the continuous impact and follow up stages of them haven't been covered by literature review. The rules of

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<sup>8</sup>Perishability for the purpose this report in reference Assam where dominant consumption of fish is in the form live fish and not frozen processes fish meat. Hence the perishability concept is used in reference of live fish i.e. the fishes alive in water bodies.

national/international non-governmental organizations varied and concentrated on specific areas. The economic losses reported either in districts or national level and the figures of losses didn't match for some cases. The role of women and their suited technology in post-harvest clearly highlighted, but the procedures of engaging them in postharvest losses reduction strategies still not clear),

This factor has been taken into consideration because its degree reflects spoilage of the Agriculture and Allied produce which will have a compound effect along with loss in earning of the sector. Due to the travel restrictions imposed by the lockdown the agricultural and allied produce of the small and marginal farmers can be understood to be at hands of the atmospheric conditions without any Cold Storage facilities (as 70% of Cold Storage facilities in Assam are currently either non-functional or in a dilapidated condition) natural state. Hence, it becomes important to consider the natural perishability of the produce keeping in mind the lockdown time window of 41 days.

Table 2 shows the degree of perishability of Agriculture and Allied Sectors - Agriculture (Cereals & Pulses), Horticulture Produce (Fruits & Vegetables), Dairy Produce (Milk & Milk Products), Animal Husbandry Produce (Meat & Poultry), Fishery Produce (Fish & Fish Seeds).

*Table 2 Degree of Perishability*

Sl No.	Agriculture and Allied Sectors Product Baskets	Degree of Perishability (from the 41 Days Lockdown point of view)
1	<b>Agriculture</b> (Cereals & Pulses)	Low (goes bad in 6-12 months)
2	<b>Fishery</b> <sup>9</sup> (Live Fish) 1-3 months	Low (goes bad in 1-3 months)
3	<b>Horticulture</b> (Fruits & Vegetables) 14 days	High (goes bad in 1-3 weeks)
4	<b>Dairy</b> (Milk & Milk Products) < 24 hours @ NTP	Very High (goes bad in few hours)
5	<b>Animal Husbandry</b> (Poultry & Meat) < 24 hours @ NTP	Very High (goes bad in 12 hours)

We may consider the impact of Covid-19 on Agriculture and Allied Sectors Product Baskets as Earning Impact Function,  $y$  as a function of variables: Dependence on Supply Chain (say  $x_1$ ), Perishability of Produce (say  $x_2$ ).

<sup>9</sup>Perishability for the purpose this report in reference Assam where dominant consumption of fish is in the form live fish and not frozen processes fish meat. Hence the perishability concept is used in reference of live fish i.e. the fishes alive in water bodies.

A heat map comprising of two axes: **degree of perishability** and **degree of dependency** on supply chain has been developed, the result of which is to arrive at the worst hit sub-sector which will help in prioritizing the delivery of relief measures post lockdown. Though **\*\*\*"Heat map"** is a relatively new term, but the practice of shading matrices has existed for over a century.

*Table 3 Heat Map Impact Model*

5	Very High	Degree of Perishability of Produce (x2)	Moderate	Major	Critical	Critical	Critical
			Moderate	Major	Major	Critical	Critical
			Moderate	Moderate	Major	Major	Critical
			Minor	Moderate	Moderate	Major	Critical
			Minor	Minor	Moderate	Moderate	Major Cell (5,1)
			Dependence on Hyperlocal Supply Chain (x1)				
			Low	Medium	Average	High	Very High
			1	2	3	4	5

Impact Types	Minor	Moderate	Major	Critical
Minimum % age Impact	15%	30%	50%	75%
Perishability Characteristics	Perishability < 3 to 6 months	Perishability < 1 to 3 months	Perishability < 24 Hours to 2 Weeks	Perishability < 24 Hours
Supply Chain Characteristics	No Tertiary Transportation Blockage	Tertiary Transportation Blockage	Secondary & Tertiary Transportation Blockage	Primary, Secondary & Tertiary Transportation Blockage

The above table represents a heat map for identification of the worst hit sub-sector within the Agri & Allied Sector which contains the degree (labeled from 1 to 5) of Dependency on Supply Chain on x-axis with increasing order towards the right and the degree (labeled from 1 to 5) of Perishability of Produce on y-axis with increasing order upwards. For instance, Agriculture has an average dependency on supply chain and low perishability from the point of view of a 40-day lockdown in comparison to milk.

\*\*\*(*Wilkinson, Leland; Friendly, Michael (May 2009). "The History of the Cluster Heat Map". The American Statistician. 63 (2): 179- 184. CiteSeerX 10.1.1.165.7924. doi:10.1198/tas.2009.0033.*)

### 3.3.1 CAUSAL ANALYSIS OF IMPACT ON AGRI & ALLIED PRODUCE IN ASSAM RESULTANT CAUSAL HEAT MAP OF COVID-19 IMPACT ON AGRI & ALLIED SECTOR

Thus, plotting according to the matrix obtained from Table 1 & Table 2 we find the following impact on the sub-sectors of Agri & Allied Sector in Assam.

Each of the baskets described earlier have been categorized based on their intrinsic and economic characteristics respectively and then their intersection would result in the identification as Minor < 30% Hit (mostly comprising of essential services), Moderate 30%- 50% Hit (mostly comprising of semi-essential services), Major 50% - 75% Hit or Critical > 75% Hit impact type. The x-axis or Dependency on Supply Chain has been given more weightage of 1 cell i.e. cell (5,1) due to the very nature of the COVID 19 Lockdown paralyzing all mobility

*Table 4 Coordinates of the sub-sectors on the Heat Map*

Sl No.	Sub-sectors (Dependence on Supply Chain, Degree of Perishability)	Heat Map Zone
1	<b>Agriculture</b> (Average, Low)	Moderate (Needs Moderate Intervention)
2	<b>Fishery:Live Fish</b> (High, Low)	Moderate (Needs Moderate Intervention)
3	<b>Horticulture</b> (Very High, High)	Critical (Needs Critical Intervention)
4	<b>Dairy</b> (Very High, Very High)	Critical (Needs Critical Intervention)
5	<b>Animal Husbandry</b> (Very High, Very High)	Critical (Needs Critical Intervention)

Table 5 Resultant Heat Map of the Agri & Allied Sector

Very High (5)	Degree of Perishability				Animal Husbandry 	Dairy 
High (4)						Horticulture 
Average (3)						
Medium (2)						
Low (1)				Agriculture 	Fishery (Live Fish) 	
Dependence on Supply Chain (x1)						
		Low (1)	Medium (2)	Average (3)	High (4)	Very High (5)

Certain insights on the supply chain dependency and degree of perishability of the Agriculture and Allied Sectors Product Baskets/ Sub-sectors acting as the prime causal agents for their COVID 19 Heat Map allocation.

Perishability for the purpose this report in reference Assam where dominant consumption of fish is in the form live fish and not frozen processes fish meat. Hence the perishability concept is used in reference of live fish i.e. the fishes alive in water bodies.

Table 6: Prime Causal Agents Insights for Heat Map Zone Allocation of sub-sectors of Agri & Allied Sector

Agriculture and Allied Sectors Product Sub-sectors	Heat Map Impact of COVID 19
<p><b>Agriculture (Cereals &amp; Pulses)</b></p> <p><b>*Supply Chain Dependency: Low</b> PDS Assist High Govt. &amp; Medium Pvt. Sector Intervention</p> <p><b>**Perishability Degree: Medium</b> 6-12 months</p>	<b>Moderate</b>
<p><b>Fishery (Live Fish)</b></p> <p><b>*Supply Chain Dependency: High</b> Daily-market force Driven Less Govt. &amp; More Pvt. Sector Intervention</p> <p><b>**Perishability Degree: Average</b> If not harvested, 1-3 months (Usually Consumed Fresh in Assam) High survival in natural feed.</p>	<b>Moderate</b>
<p><b>Horticulture (Fruits &amp; Vegetables)</b></p> <p><b>*Supply Chain Dependency: Very High</b> Daily-market force Driven Less Govt. &amp; More Pvt. Sector Intervention</p> <p><b>**Perishability Degree: High</b> Lack of Cold Storage Facilities in Assam (60% Non-Functional) 5-10 days</p>	<b>Critical</b>
<p><b>Dairy (Milk &amp; Milk Products)</b></p> <p><b>*Supply Chain Non-Dependency: Very High</b> 93% Un-organized Sector Less Govt. Intervention</p> <p><b>**Perishability Degree: Very High</b> &lt;24 Hours</p>	<b>Critical</b>
<p><b>Animal Husbandry (Poultry &amp; Meat)</b></p> <p><b>*Supply Chain Non-Dependency: Very High</b> Moderate Govt. &amp; Major Pvt. Sector Intervention</p> <p><b>**Perishability Degree: Very High</b> Lack of Cold Storage Facilities in Assam (60% Non-Functional) Around 60% Feed is dependent on imports &lt;24 Hours</p>	<b>Critical</b>

### 3.3.2 CUMULATIVE EFFECT ASSESSMENT ON ASSAM AGRICULTURE & ALLIED SECTOR BASKETS IN ASSAM FROM CAUSAL ANALYSIS POINT OF VIEW

The final impact assessment on Agriculture & Allied Sector has been calculated considering some Ordinal Scales given the variety in % age contribution to the State GDP and order of Workforce Employment of the sub-sectors. The M1 & M2 Ordinal Scale are 5 Point Ordinal Equidistant Likert Scale Grading whereas M3 Ordinal Scale is a 4 Point Ordinal Un-Equidistant Likert Scale Grading because the COVID-19 situation has no “Safe” or “No-impact” zone.

% age GSDP Contribution	Ordinal Scale M1
Very High	2
High	1.8
Average	1.6
Medium	1.4
Low	1.2

Order of Workforce	Ordinal Scale M2
Very High	2
High	1.8
Average	1.6
Medium	1.4
Low	1.2

Impact Types	Ordinal Scale M3
Minor < 30% Hit	1
Moderate 30%-50% Hit	2
Major 50% - 75% Hit	3
Critical >75% Hit	4

**GSDP Contribution % age (M1):** This scale has been taken into consideration given the contribution of the baskets or sub-sectors between 1.2 to 2.0 in order of their respective contribution to the GSDP of Assam.

**Order of Workforce Employment (M2):** This scale reflects the order of Workforce engaged in Assam and hence the impact distributed between 1.2 to 2.0 in order of their respective Workforce Employment in Assam.

**Impact Types (M3):** This scale corresponds to the degree of impact based on the heat map (Perishability Vs Supply Chain Dependency) analysis in the previous section.

Thus, the **Cumulative Impact, CI** is calculated to arrive at the **Rank** of the highest to lowest points of impact basket or sub-sector.

**Cumulative Impact, CI =**

$$\sum_{i=1}^3 M_i$$

The following Table 6 shows the Ranks of the sub-sectors based on points of impact arrived by M1, M2 & M3 Ordinal Scale which as Ordinal Likert Scale Grades.

*Table 7 Cumulative Impact Assessment on Ranking of Agri & Allied sub-sectors based on highest impact*

Sub-sectors	Ordinal Scale M1	Ordinal Scale M2	Ordinal Scale M3	Cumulative Score of Impact (M1 + M2 + M3)	Rank based on Ordinal Scores of impact
Agriculture	2	2	2	6	4
Fishery	1.2	1.2	1	3.4	5
Horticulture	1.8	1.8	4	7.6	1
Animal Husbandry	1.6	1.6	4	7.2	2
Dairy	1.4	1.4	4	6.8	3

\*M1 & M2 Ordinal Scales are 5 Point Ordinal **Equidistant** Likert Scale Grading. M3 scale is a 4 Point Ordinal **Un-Equidistant** Likert Scale Grading because the COVID-19 situation has no “Safe” or “No-impact” zone.

### 3.4 TIME SERIES ANALYSIS OF HISTORICAL DATA ON AGRI & ALLIED PRODUCE IN ASSAM

In the previous section we have arrived at the Ordinal Score of Impact of COVID-19 on the various sub-sectors of Agriculture & Allied sector of Assam. The result of which was an estimation of the order of impact: Horticulture was the most hit followed by Animal Husbandry. Dairy sub-sector was the 3rd most impacted sub-sector followed by Agriculture and Fishery.

In this section through time series analysis we have estimated the net loss in value to the State Gross Domestic Product of Assam during the 5 weeks lockdown from 25th March 2020 till 3rd May 2020 by calculating the monthly contribution of various sub-sectors from a historical data - Annual Production Report available in the Economic Survey of Assam 2018-19 published by the Directorate of Economics & Statistics, Assam Transformation & Development Department. The assessment of impact types in the previous section and mobility band in the forthcoming paragraphs will be used to discount the statistical result for a more realistic output.

It is assumed that the dispersion of the Annual Production Value is equally distributed among each quarter of the year assuming the absence of any unnatural phenomenon like COVID 19. The unprecedented event of the COVID 19 lockdown period of 40 days has been factored in after arriving at a data equivalent to a quarter of the year which represents an acceptable economic window.

Then, a **Mobility Impact Band Analysis** is conducted as the 40 days lockdown period cannot be evenly impacted and every passing week brought in a gradual but not stagnant movement of basic economic activities as can be seen from the \*Google COVID-19 Community Mobility Reports.

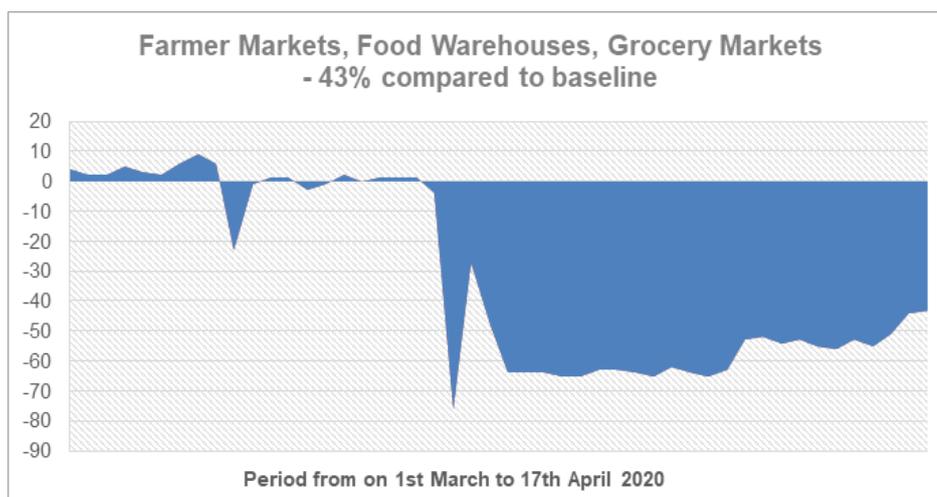
We have estimated the production in the years 2018-19 & 2019-20 based on the Year on Year Growth of 2016-17 & 2017-18 due to lack of authentic data approved by Government of Assam. Then the Heat Map Impact from the causal analysis from the previous section have been super-imposed on the Effective Quarterly Losses in the State GDP derived from the time series analysis to arrive at the Projected Minimum Effective (PME) Quarterly Loss in each sub-sector of the Agri & Allied Sector of Assam and ultimately the PME Loss during the 40 Days

**Demand Side Mobility Impact Bands of COVID 19 Lockdowns from indirect sources:**

The impact of the COVID 19 Lockdowns on the economic activities of general population of India has been interpreted indirectly from the mobility trends for places like grocery markets, food warehouses, farmers markets, specialty food shops, etc. published in the \*Google COVID-19 Community Mobility Reports. The mobility trends extracted from Google COVID-19 Community Mobility Reports for places like grocery markets, food warehouses, farmers markets, specialty food shops, etc. which show how visits and length of stay at different places change compared to a baseline, has been assumed, in the wake of lack of other available data, to bear the closest correlation with the consumption pattern of most urban households which is a key indicator for sale of Agri & Allied products in turn affecting the earning of the farmers. The reports Google has calculated these changes using the same kind of aggregated and anonymized data used to show popular times for places in Google Maps. The changes for each day are compared to a baseline value for that day of the week.

The baseline is the median value, for the corresponding day of the week, during the 5-week period Jan 3–Feb 6, 2020. The reports show trends over several weeks with the most recent data representing 17th April 2020.

**Table 8 Mobility Trends for places like grocery markets, food warehouses, farmers markets**



*\*Source: Google LLC "Google COVID-19 Community Mobility Reports."  
<https://www.google.com/covid19/mobility/> Accessed: 25th April 2020.*

It could be seen from the above trend that there was a sharp drop in mobility of communities in excess of - 70% on 22nd March 2020 due to the Janata Curfew announced by the Central Govt. of India.

The oncoming lockdown apprehension among the people led to a sudden rise in mobility the next day which again plummeted on announcement of the 21 days Lockdown 1.0 till 14th April 2020 and started to remain in excess of - 60% for 2 weeks starting 25th March 2020 onwards till 7th April 2020 as can be seen from Table 9 below. The 3rd week of the lockdown i.e. from 8th April 2020 to 14th April 2020 saw an impact band of 50 – 60%. The 4th Week from 15th to 21st April 2020 saw an impact band of 40 – 50%. Due to the 20th April onwards relaxation of community mobility across the state of Assam and India in general the impact band reduced to 30 – 40%.

The mobility impact bands have been used to discount the loss occurring from the sale of minimal commodities in the calculation of weekly loss in GDP by an average of the class.

For example, the statistical projection of loss during the lockdown period of 40 days was arrived by first projecting the GSDP value of Agriculture & Allied commodities for the year 2019-20 from the data available of 2016-17, 2017-18 & 2018-19 (minimal) and the year on year growth. During the 1st week of lockdown from 25th March 2020 to 31st March 2020, the Supply Side impact of the lockdown as developed in the previous section of Causal Analysis was utilized to discount the statistical projection of weekly loss. Then again, 65% drop in mobility occurred in India during the week and thus, the statistical projection of weekly loss was further discounted by 35% to accommodate the demand side loss contributing factors.

Table 9 COVID 19 Lockdown Mobility Impact Bands on Agri & Allied Sector

Lockdown Period	Dates	Impact Band	Demand Side Impact
1st Week	(25th to 31st March 2020)	60-70%	65%
2nd Week	(1st to 7th April 2020)	60-70%	65%
3rd Week	(8th to 14th April 2020)	50-60%	55%
4th Week	(15th to 21st April 2020)	40-50%	45%
20th April onwards Relaxation as per MHA, Govt. of India & Govt. of Assam			
5th Week Onwards	22nd April till 3rd May 2020 (Projected)	30-40%	35%

The following equation has been used to derive the **Projected Minimum Effective (PME) Lockdown Loss** of a commodity on a week to week basis considering the uneven demand side impact as found from the Google COVID-19 Community Mobility Reports in the subsequent

Statistical Quarterly Loss, QL1	= (Projected Annual GSDP Value of commodity in 2019-20) / 4
Supply Side Impact on the Quarter, QL2	= (% age Minimum Impact from Heat Map) x QL1
Weekly Loss Accommodating Supply Side Impact, SWL	= QL2/ 13
Week 1 Loss Accommodating Supply Side & Demand Side Impact, SDWL1	= (Demand Side % age impact for Week 1) x SWL
Week 2 Loss Accommodating Supply Side & Demand Side Impact, SDWL2	= (Demand Side % age impact for Week 2) x SWL
Week 3 Loss Accommodating Supply Side & Demand Side Impact, SDWL3	= (Demand Side % age impact for Week 3) x SWL
Week 4 Loss Accommodating Supply Side & Demand Side Impact, SDWL4	= (Demand Side % age impact for Week 4) x SWL
Week 5 Loss Accommodating Supply Side & Demand Side Impact, SDWL5	= (Demand Side % age impact for Week 5) x SWL
Week 5 Loss Accommodating Supply Side & Demand Side Impact, SDWL6	= (Demand Side % age impact for Week 6) x SWL

## COVID-19 Community Mobility Report of India:

Table 10 Community Mobility Report of %age change from baseline in India

Date	% Delta from Baseline	Date	% Delta from Baseline	Date	% Delta from Baseline
2/15/2020	2	3/1/2020	4	4/1/2020	-64
2/16/2020	2	3/2/2020	2	4/2/2020	-65
2/17/2020	1	3/3/2020	2	4/3/2020	-62
2/18/2020	2	3/4/2020	5	4/4/2020	-64
2/19/2020	2	3/5/2020	3	4/5/2020	-65
2/20/2020	3	3/6/2020	2	4/6/2020	-63
2/21/2020	0	3/7/2020	6	4/7/2020	-53
2/22/2020	-2	3/8/2020	9	4/8/2020	-52
2/23/2020	-1	3/9/2020	6	4/9/2020	-54
2/24/2020	0	3/10/2020	-23	4/10/2020	-53
2/25/2020	-2	3/11/2020	-1	4/11/2020	-55
2/26/2020	0	3/12/2020	1	4/12/2020	-56
2/27/2020	-1	3/13/2020	1	4/13/2020	-53
2/28/2020	1	3/14/2020	-3	4/14/2020	-55
2/29/2020	-1	3/15/2020	-1	4/15/2020	-51
		3/16/2020	2	4/16/2020	-44
		3/17/2020	0	4/17/2020	-43
		3/18/2020	1		
		3/19/2020	1		
		3/20/2020	1		
		3/21/2020	-4		
		3/22/2020	-76		
		3/23/2020	-27		
		3/24/2020	-48		
		3/25/2020	-64		
		3/26/2020	-64		
		3/27/2020	-64		
		3/28/2020	-65		
		3/29/2020	-65		
		3/30/2020	-63		
		3/31/2020	-63		

\*\*Source: Google LLC "Google COVID-19 Community Mobility Reports."  
<https://www.google.com/covid19/mobility/> Accessed: 25th April 2020

The baseline is the median value, for the corresponding day of the week, during the 5-week period Jan 3–Feb 6, 2020. The reports show trends over several weeks with the most recent data representing 17th April 2020.

### 3.4.1 TIME SERIES ANALYSIS OF PME QUARTERLY LOSS ON HORTICULTURE

Table 11 Time Series Analysis of Quarterly Loss on Horticulture

Horticulture (Fruits, Spices, Vegetables)	Production in year 2016–17 in Lakhs MT	Production in year 2017–18 in Lakhs MT	YoY Growth	Estimated Production in year 2018–19 in Lakhs MT	Estimated Production in year 2019–20 in Lakhs MT	PME Quarterly Loss in Lakhs MT
Fruits	20.06	24.14	20.34	29.05	34.96	8.74
Spices	3.77	5.57	47.75	8.23	12.16	3.04
Vegetables	519.23	542.35	4.45	566.50	591.72	147.93
Total	543.06	572.06	5.34	603.78	638.84	159.71

\*Source Yearly 2017–18 Production Figures of Horticulture from Economic Survey of Assam, Directorate of Economics & Statistics, Assam Transformation & Development Department

Horticulture sub-sector Cumulative Impact Heat Rank	1
Total Projected Quarterly Loss in Horticulture sub-sector	159.71 Lakh MT.
Heat Map Impact:	Critical i.e. Minimum 75% Impact
PME Quarterly Loss in Horticulture	119.79 Lakh MT

Table 12 Impact Bands of COVID-19 Lockdown on Fruits & Vegetables

Lockdown Period	Dates	Impact Band	PME Loss Fruits in Lakh MT	PME Loss Vegetables in Lakh MT
1st Week	(25th to 31st March 2020)	60–70% ~ 65%	0.4370	7.3966
2nd Week	(1st to 7th April 2020)	60–70% ~ 65%	0.4370	7.3966
3rd Week	(8th to 14th April 2020)	50–60% ~ 55%	0.3698	6.2586
4th Week	(15th to 21st April 2020)	40–50% ~ 45%	0.3025	5.1207
20th April onwards Relaxation as per MHA, Govt. of India & Govt. of Assam				
5th Week Onwards	22nd April till 3rd May 2020 (Projected)	30–40% ~ 35%	0.2353	3.9828
6th Week	29th April to 3rd May 2020 (Projected)	30–40% ~ 35%	0.2353	3.9828
<b>PME Lockdown Loss</b>			<b>2.0185</b>	<b>34.1379</b>

Thus, it is estimated that there will be a loss of around **2.01 Lakh MT** of Fruits & **34.14 Lakh MT** of Vegetables during COVID 19 Lockdown.

### 3.4.2 TIME SERIES ANALYSIS OF PME QUARTERLY LOSS ON ANIMAL HUSBANDRY

Table 13 Time Series Analysis of Quarterly Loss on Animal Husbandry

Animal Husbandry (Meat, Eggs)	Production in year 2016-17	Production in year 2017-18	YoY Growth	Estimated Production in year 2018-19	Estimated Production in year 2019-20	PME Quarterly Loss
Meat (Thousand Tonnes)	46.86	48.43	3.35	50.05	51.73	12.93
Egg (Lakh Numbers)	4740.73	4950.75	4.43	5170.07	5399.11	1349.78

\*Source Yearly 2017-18 Production Figures of Milk from Economic Survey of Assam, Directorate of Economics & Statistics, Assam Transformation & Development Department. \*\*Source The report on Integrated Sample Survey for Estimation of milk, egg and meat, 2016-17 and 2017-18

Note: The production of total meats & eggs has been projected to be 50 Thousand Tonnes & 501 Million Numbers for the SDP of 2018-19 Directorate of Economics & Statistics, Assam Transformation & Development Department. However, to maintain consistency of the Time Series Model, the projection of 50.05 Thousand Tonnes & 517 Million Numbers which is off by 3.19 % & 0.1% has been used.

<b>Animal Husbandry sub-sector Cumulative Impact Heat Rank</b>	<b>2</b>
<b>Total Projected Quarterly Loss in Meat &amp; Eggs sub-sector</b>	<b>12.93 Thousand Tonnes &amp; 1349.78 Lakh Numbers</b>
<b>Heat Map Impact:</b>	<b>Critical i.e. Minimum 75% Impact</b>
<b>Projected Minimum Effective Quarterly Loss in Meat &amp; Eggs sub-sector</b>	<b>9.7 Thousand Tonnes &amp; 1012.33 Lakh Numbers</b>

Table 14 Impact Bands of COVID-19 Lockdown on Meat & Eggs

Lockdown Period	Dates	Impact Band	PME Loss Meat in Thousand Tonnes	PME Loss of Eggs in Lakh Numbers
1st Week	(25th to 31st March 2020)	60-70% ~ 65%	0.4850	50.6167
2nd Week	(1st to 7th April 2020)	60-70% ~ 65%	0.4850	50.6167
3rd Week	(8th to 14th April 2020)	50-60% ~ 55%	0.4104	42.8295
4th Week	(15th to 21st April 2020)	40-50% ~ 45%	4.3647	35.0423
20th April onwards Relaxation as per MHA, Govt. of India & Govt. of Assam				
5th Week Onwards	22nd April till 3rd May 2020 (Projected)	30-40% ~ 35%	0.2611	27.2551
6th Week	29th April to 3rd May 2020 (Projected)	30-40% ~ 35%	0.2611	27.2551
<b>PME Lockdown Loss</b>			<b>6.2672</b>	<b>233.6155</b>

Thus, it is estimated that there will be a loss of around **6.27 Thousand Tonnes** of Meat & **233.62 Lakh Numbers** of Eggs during COVID 19 Lockdown.

### 3.4.3 TIME SERIES ANALYSIS OF PME QUARTERLY LOSS ON DAIRY

Table 15 Time Series Analysis of Quarterly Loss on Dairy

Dairy (Cattle, Buffalo, Goat)	Production in year 2016-17 in Million Liters	Production in year 2017-18 in Million Liters	YoY Growth	Estimated Production in year 2018-19 in Million Liters	Estimated Production in year 2019-20 in Million Liters	PME Quarterly Loss in Million Liters
Cattle	764.87	785.62	2.71	806.93	828.82	207.21
Buffalo	120.56	121.86	1.08	123.17	124.50	31.13
Goat	18.80	18.29	-2.71	17.79	17.31	4.33
Total	904.23	925.77	2.38	947.90	970.64	242.66

\*Source Yearly 2017-18 Production Figures of Milk from Economic Survey of Assam, Directorate of Economics & Statistics, Assam Transformation & Development Department

\*\*Source The report on Integrated Sample Survey for Estimation of milk, egg and meat, 2016-17 and 2017-18  
Note: The production of total milk has been projected to be 946 (P) Million Liters for the SDP of 2018-19 Directorate of Economics & Statistics, Assam Transformation & Development Department. However, due to unavailability of break up, the projection of 947.90 Million Liters which is off by 0.2% has been used.

<b>Dairy sub-sector Cumulative Impact Heat Rank</b>	<b>3</b>
<b>Total Projected Quarterly Loss in Dairy sub-sector</b>	<b>242.66 Million Liters.</b>
<b>Heat Map Impact:</b>	<b>Critical i.e. Minimum 75% Impact</b>
<b>Projected Minimum Effective Quarterly Loss in Dairy</b>	<b>181.99 Million Liters.</b>

*Table 16 Impact Bands of COVID-19 Lockdown on Dairy Cattle & Buffalo*

Lockdown Period	Dates	Impact Band	PME Loss Cattle Milk in Million Liters	PME Loss Buffalo Milk in Million Liters
1st Week	(25th to 31st March 2020)	60-70% ~ 65%	7.7702	1.1672
2nd Week	(1st to 7th April 2020)	60-70% ~ 65%	7.7702	1.1672
3rd Week	(8th to 14th April 2020)	50-60% ~ 55%	6.5748	0.9876
4th Week	(15th to 21st April 2020)	40-50% ~ 45%	5.3794	0.8081
20th April onwards Relaxation as per MHA, Govt. of India & Govt. of Assam				
5th Week Onwards	22nd April till 3rd May 2020 (Projected)	30-40% ~ 35%	4.1840	0.6285
6th Week	29th April to 3rd May 2020 (Projected)	30-40% ~ 35%	4.1840	0.6285
<b>PME Lockdown Loss</b>			<b>35.8626</b>	<b>5.3871</b>

Thus, it is estimated that there will be a loss of around **35.87 Million Liters** of Cattle Milk & **5.39 Million Liters** of Buffalo Milk during COVID 19 Lockdown.

### 3.4.4 TIME SERIES ANALYSIS OF PME QUARTERLY LOSS ON AGRICULTURE

*Table 17 Time Series Analysis of Quarterly Loss on Agriculture*

Horticulture (Rice, Wheat, Pulses, Oilseeds)	Production in year 2016-17 in Lakhs MT	Production in year 2017-18 in Lakhs MT	Production YoY Growth	Estimated Production in year 2018-19 in Lakhs MT	Estimated Production in year 2019-20 in Lakhs MT	PME Quarterly Loss in Lakhs MT
Rice	51.27	52.83	3.04	54.44	56.09	14.02
Wheat	0.23	0.24	4.35	0.25	0.26	0.07

Horticulture (Rice, Wheat, Pulses, Oilseeds)	Production in year 2016-17 in Lakhs MT	Production in year 2017-18 in Lakhs MT	Production YoY Growth	Estimated Production in year 2018-19 in Lakhs MT	Estimated Production in year 2019-20 in Lakhs MT	PME Quarterly Loss in Lakhs MT
Pulses	1.08	1.16	7.41	1.25	1.34	0.33
Total Food grains	53.53	55.25	3.21	55.93	57.69	14.42
Oilseeds (excluding Coconut)	2.04	2.01	-1.47	1.98	1.95	0.49

\*Source Yearly 2017-18 Production Figures of Agriculture from Economic Survey of Assam, Directorate of Economics & Statistics, Assam Transformation & Development Department

<b>Agriculture sub-sector Cumulative Impact Heat Rank</b>	<b>4</b>
Total Projected Quarterly Loss in Food grains & Oilseeds	<b>14.42 Lakh MT &amp; 0.49 Lakh MT</b>
<b>Heat Map Impact:</b>	Moderate i.e. Minimum 30% Impact
Projected Minimum Effective Quarterly Loss in Food Grains & Oilseeds	<b>4.33 Lakh MT &amp; 0.15 Lakh MT</b>

Table 18 Impact Bands of COVID-19 Lockdown on Rice & Oil Seeds in Assam

Lockdown Period	Dates	Impact Band	PME Loss Rice in Lakhs MT	PME Loss Oilseeds
1st Week	(25th to 31st March 2020)	60-70% ~ 65%	0.2104	0.0073
2nd Week	(1st to 7th April 2020)	60-70% ~ 65%	0.2104	0.0073
3rd Week	(8th to 14th April 2020)	50-60% ~ 55%	0.1780	0.0062
4th Week	(15th to 21st April 2020)	40-50% ~ 45%	0.1456	0.0051
20th April onwards Relaxation as per MHA, Govt. of India & Govt. of Assam				
5th Week Onwards	22nd April till 3rd May 2020 (Projected)	30-40% ~ 35%	0.1133	0.0039
6th Week	29th April to 3rd May 2020 (Projected)	30-40% ~ 35%	0.1133	0.0039
<b>PME Lockdown Loss</b>			<b>0.9709</b>	<b>0.0338</b>

Thus, it is estimated that there will be a loss of around **0.97 Lakh MT** of Rice & **0.03 Lakh MT** of Oil seeds during COVID 19 Lockdown in Assam.

### 3.4.5 TIME SERIES ANALYSIS OF PME QUARTERLY LOSS ON FISHERY

*Table 19 Time Series Analysis of Quarterly Loss on Fishery in Assam*

Horticulture (Fish, Fish Seed,)	Production in year 2016-17	Production in year 2017-18	YoY Growth	Estimated Production in year 2018-19	Estimated Production in year 2019-20	PME Projected Quarterly Loss
Fish in Lakh MT	3.07	3.27	6.51	3.48	3.71	0.93
Fish Seed in Million Numbers	6758.00	11921.00	76.40	21028.45	37093.83	9273.46

\*Source Yearly 2017-18 Production Figures of Fish & Fish Seeds from Economic Survey of Assam, Directorate of Economics & Statistics, Assam Transformation & Development Department

\*\*Department of Fisheries, Assam

Note: The production of fish has been projected to be 3.31 Lakh MT for the SDP of 2018-19 by Directorate of Economics & Statistics, Assam Transformation & Development Department. However, to maintain consistency of the Time Series Model, the projection of fish in 2018-19 of 3.71 Lakh MT has been projected which is off by 12.1 % has been used.

<b>Fishery sub-sector Cumulative Impact Heat Rank</b>	<b>5</b>
<b>Total Projected Quarterly Loss in Fishes &amp; Fish seeds (Fingerling &amp; Fry)</b>	<b>0.93 Lakh MT &amp; 9273.46 Million Numbers</b>
<b>Heat Map Impact:</b>	<b>Moderate i.e. Minimum 30% Impact</b>
<b>Projected Minimum Effective Quarterly Loss in Fishes &amp; Fish seeds (Fingerling &amp; Fry)</b>	<b>0.28 Lakh MT &amp; 2782.04 Million Numbers.</b>

Table 2o Impact Bands of COVID-19 Lockdown on Fish & Fish Seeds in Assam

Lockdown Period	Dates	Impact Band	PME Loss Fish in Lakhs MT	PME Loss Fish Seed in Million Numbers
1st Week	(25th to 31st March 2020)	60-70% ~ 65%	0.0139	139.1019
2nd Week	(1st to 7th April 2020)	60-70% ~ 65%	0.0139	139.1019
3rd Week	(8th to 14th April 2020)	50-60% ~ 55%	0.0118	117.7016
4th Week	(15th to 21st April 2020)	40-50% ~ 45%	0.0096	96.3013
20th April onwards Relaxation as per MHA, Govt. of India & Govt. of Assam				
5th Week Onwards	22nd April till 3rd May 2020 (Projected)	30-40% ~ 35%	0.0075	74.9010
6th Week	29th April to 3rd May 2020 (Projected)	30-40% ~ 35%	0.0075	74.9010
<b>PME Lockdown Loss</b>			<b>0.0642</b>	<b>642.0086</b>

Thus, it is estimated that there will be a loss of around **0.06 Lakh MT** of Fishes & **642.01 Million Numbers** of Fish Seeds during COVID 19 Lockdown in Assam.

### 3.4.6 TIME PME COVID-19 LOCKDOWN LOSS ON ALL AGRICULTURE & ALLIED SUB-SECTORS

The following table shows the Projected Minimum Effective (PME) Quarterly Loss of all the Agriculture and Allied Sectors Product Baskets/ Sub-sectors due to COVID 19 lockdown in Assam.

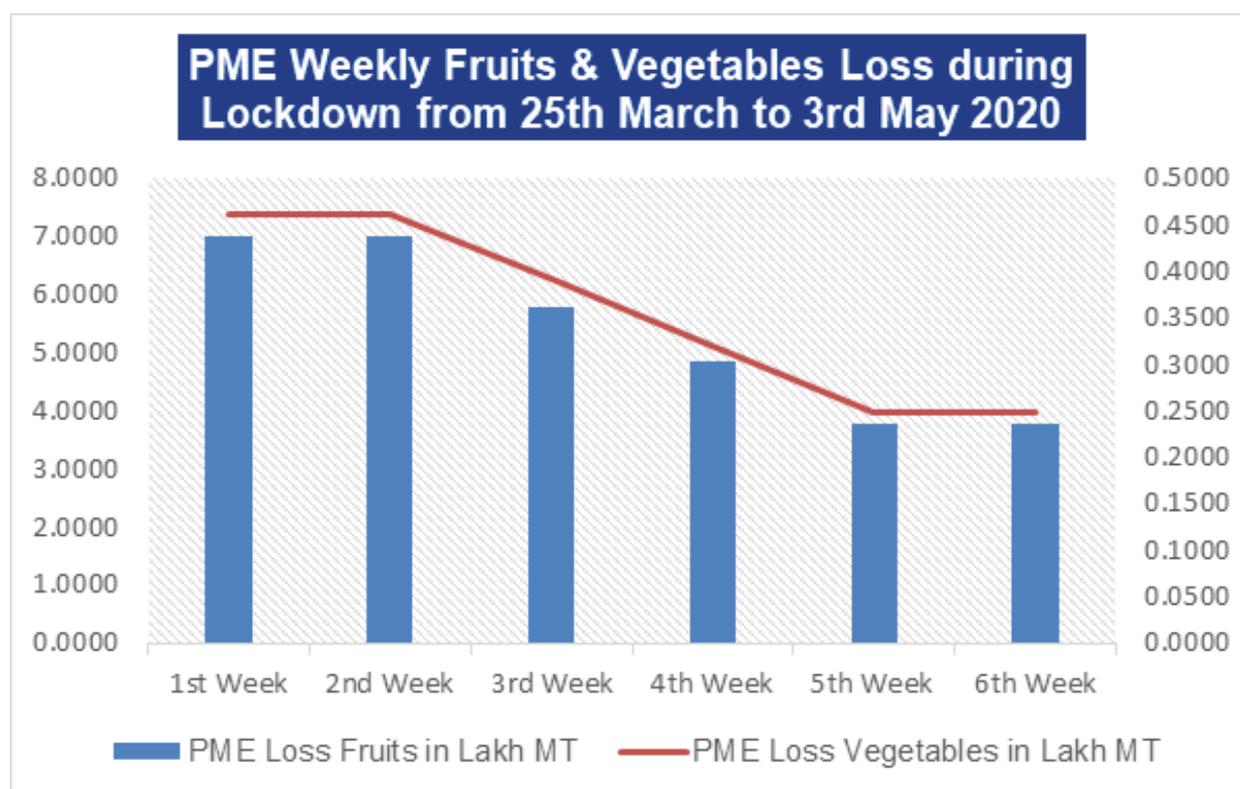
Agriculture and Allied Sectors Product Baskets/ Sub-sectors	Covid-19 Impact	PME COVID-19 Lockdown Loss
<b>Agriculture (Cereals &amp; Pulses)</b>  <b>*Supply Chain Dependency: Average</b> PDS Assist High Govt. & Medium Pvt. Sector Intervention  <b>**Perishability Degree: Medium</b> 6-12 months	<b>Moderate</b> <b>Minimum 30%</b> <b>Impact</b>	<b>0.97 &amp; 0.03</b> <b>Lakh MT</b> of Rice & Oilseeds respectively

Agriculture and Allied Sectors Product Baskets/ Sub-sectors	Covid-19 Impact	PME COVID-19 Lockdown Loss
<p><b>Fishery (Fish)</b></p> <p><b>Supply Chain Dependency: High</b> Daily-market force Driven Less Govt. &amp; More Pvt. Sector Intervention</p> <p><b>**Perishability Degree: Average</b> If not harvested, 1-3 months (Usually Consumed Fresh in Assam) High survival in natural feed.</p>	<p><b>Moderate</b> Minimum 30% Impact</p>	<p><b>0.06 Lakh MT &amp; 642.01 Million Numbers</b> of Fishes &amp; Fish Seeds</p>
<p><b>Horticulture (Fruits &amp; Vegetables)</b></p> <p><b>Supply Chain Dependency: Very High</b> Daily-market force Driven Less Govt. &amp; More Pvt. Sector Intervention</p> <p><b>**Perishability Degree: High</b> Lack of Cold Storage Facilities in Assam (60% Non-Functional) 5-10 days</p>	<p><b>Critical</b> Minimum 75% Impact</p>	<p><b>2.01 &amp; 34.14 Lakh MT</b> of Fruits &amp; Vegetables</p>
<p><b>Dairy (Milk &amp; Milk Products)</b></p> <p><b>Supply Chain Non-Dependency: Very High</b> 93% Un-organized Sector Less Govt. Intervention</p> <p><b>**Perishability Degree: Very High</b> &lt;24 Hours</p>	<p><b>Critical</b> Minimum 75% Impact</p>	<p><b>35.87 &amp; 5.39 Million Liters</b> of Cattle &amp; Buffalo Milk</p>
<p><b>Animal Husbandry (Poultry &amp; Meat)</b></p> <p><b>Supply Chain Non-Dependency: Very High</b> Moderate Govt. &amp; Major Pvt. Sector Intervention</p>	<p><b>Critical</b> Minimum 75% Impact</p>	

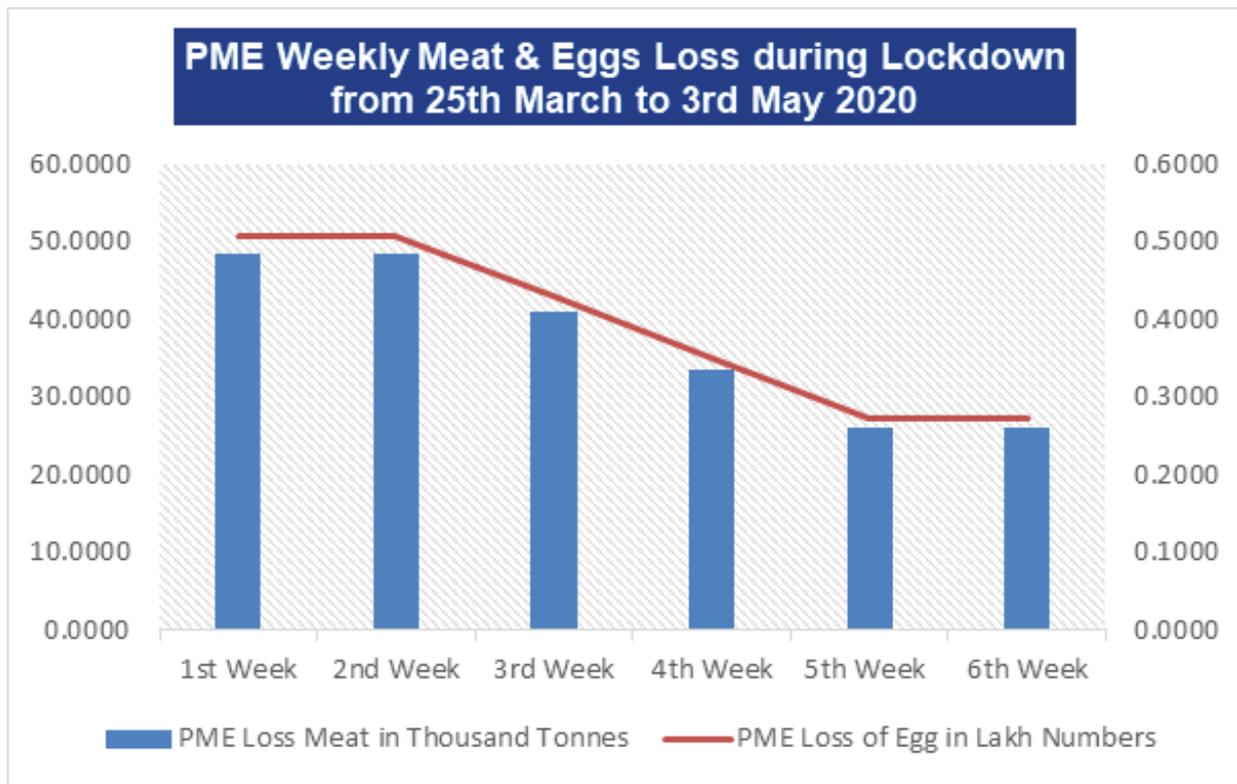
Agriculture and Allied Sectors Product Baskets/ Sub-sectors	Covid-19 Impact	PME COVID-19 Lockdown Loss
<p><b>**Perishability Degree: Very High</b>            Lack of Cold Storage Facilities in Assam (60% Non-Functional)            Around 60% Feed and Fodder dependency on Import from other state &lt;24 Hours</p>		<p><b>6.27 Thousand Tonnes &amp; 233.62 Lakh Numbers of Meat &amp; Numbers of Eggs respectively</b></p>

### 3.4.6.1 PME COVID-19 LOCKDOWN IMPACT SNAPSHOT ON AGRI & ALLIED SECTOR

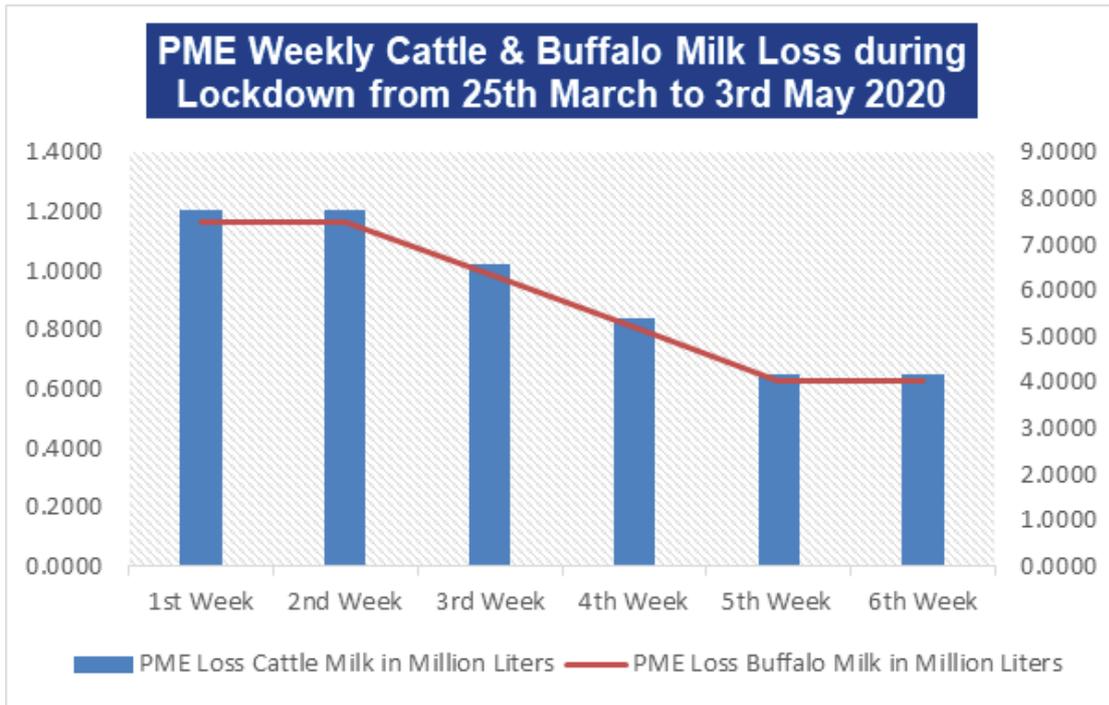
Table 22 PME COVID 19 Lockdown of 40 Days Impact Snapshot on Agri & Allied Sector in Assam



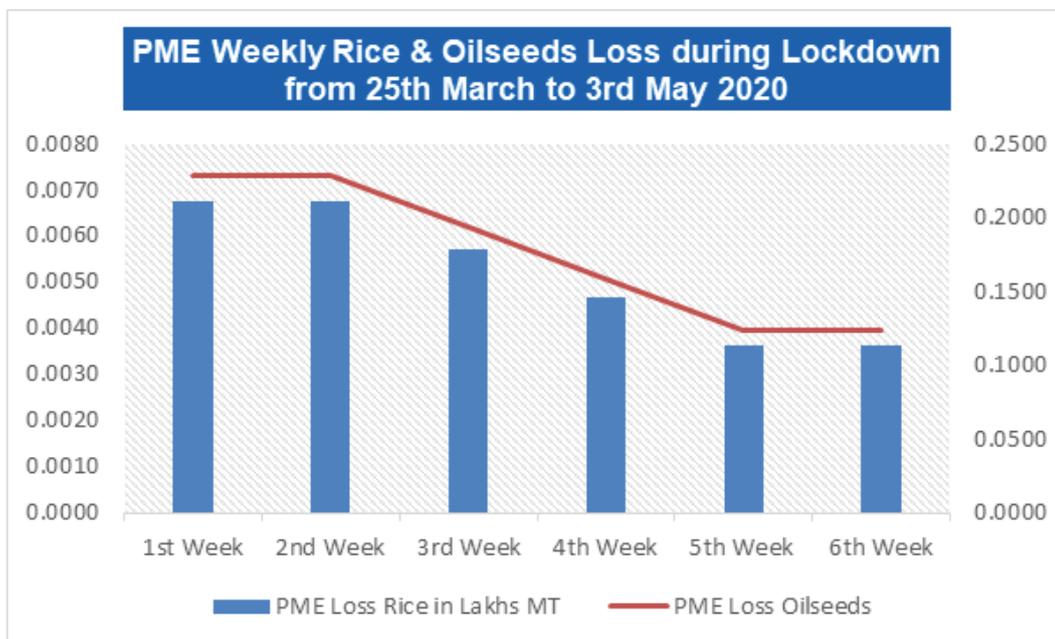
Lockdown Period	PME Loss Fruits in Lakh MT	PME Loss Vegetables in Lakh MT
1st Week	0.4370	7.3966
2nd Week	0.4370	7.3966
3rd Week	0.3698	6.2586
4th Week	0.3025	5.1207
5th Week	0.2353	3.9828
6th Week	0.2353	3.9828



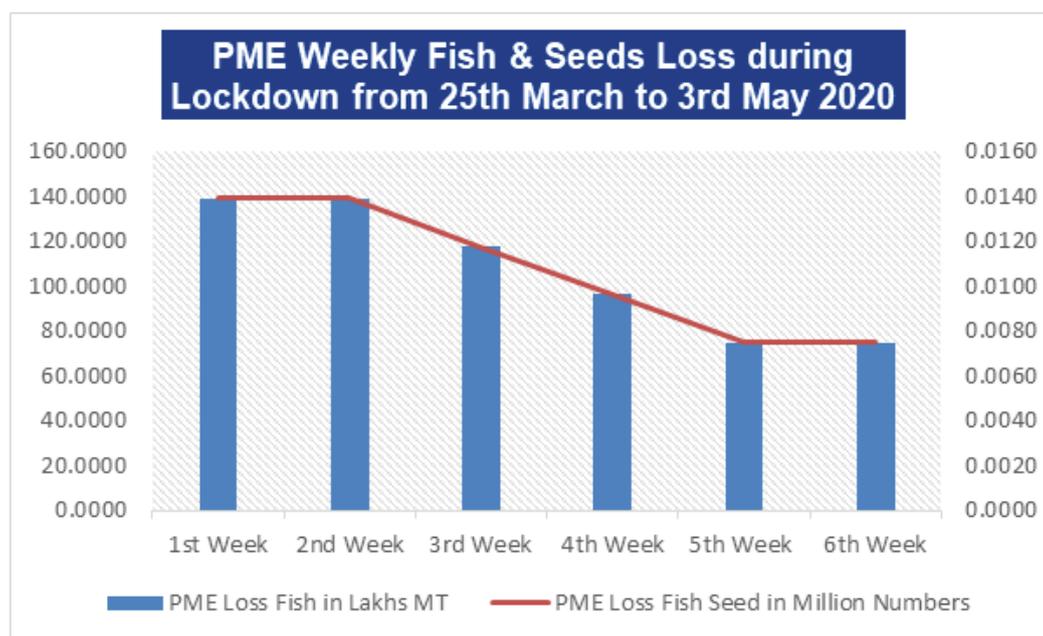
Lockdown Period	PME Loss Meat in Thousand Tonnes	PME Loss of Egg in Lakh Numbers
1st Week	0.4850	50.6167
2nd Week	0.4850	50.6167
3rd Week	0.4104	42.8295
4th Week	0.3357	35.0423
5th Week	0.2611	27.2551
6th Week	0.2611	27.2551



Lockdown Period	PME Loss Cattle Milk in Million Liters	PME Loss Buffalo Milk in Million Liters
1st Week	7.7702	1.1672
2nd Week	7.7702	1.1672
3rd Week	6.5748	0.9876
4th Week	5.3794	0.8081
5th Week	4.1840	0.6285
6th Week	4.1840	0.6285



Lockdown Period	PME Loss Rice in Lakhs MT	PME Loss Oilseeds
1st Week	0.2104	0.0073
2nd Week	0.2104	0.0073
3rd Week	0.1780	0.0062
4th Week	0.1456	0.0051
5th Week	0.1133	0.0039
6th Week	0.1133	0.0039



Lockdown Period	PME Loss Fish in Lakhs MT	PME Loss Fish Seed in Million Numbers
1st Week	0.0139	139.1019
2nd Week	0.0139	139.1019
3rd Week	0.0118	117.7016
4th Week	0.0096	96.3013
5th Week	0.0075	74.9010
6th Week	0.0075	74.9010

*Note: In each of the Sub-sectors of Horticulture, Animal Husbandry, Dairy, Agriculture & Fishery two focus products (except in case of Animal Husbandry where meat & eggs have different shelf lives) have been selected for the analysis and both have been assumed to be impacted proportionally as they depend on the same supply chain and exhibit almost the same degree of perishability.*

### 3.5 QUALITATIVE ANALYSIS THROUGH PANEL DISCUSSION WITH SMES

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In this section, the Panel Consensus method is used for Qualitative Analysis of the impact of COVID 19 on the various sub-sectors of the Agri & Allied Sector of Assam. Opinions and suggestions from several Subject Matter Experts (SMEs) and other eminent figures in the fields of Agriculture, Animal Husbandry, Horticulture, Fishery and Dairy in Assam were captured during panel discussions mostly telephonic and through email to arrive at the overall **Socio-Economic Impact** of the COVID 19 pandemic in Assam.

The sample size consisted of 30 top Academicians, and Bureaucrats from various Government Departments and Leading Universities of Assam in the field of Agriculture & Allied Sector. The sample size also included key persons from the Statistics Department, Farmer Producer Organizations, Private agencies and State Public Sector Enterprises of Assam.

The major disruptions in Agri & Allied Sector of Assam due to COVID 19 as pointed out by the panel of Subject Matter Experts (SMEs) are as under:

#### 1. Disruptions in Crops & Horticulture.

- To an extent the crops initiated for cultivation and/or harvested in the months of March-April-May in the state of Assam is affected or will get affected during/after the lockdown.
- Summer Rice (transplanted during Nov-Dec and harvested in May-June) and Autumn Rice (March-April and June-July) to an extent these two categories of Rice assume importance in Assam and contribute to total food grain production. Summer Rice accounts for 16.5% of total area under rice with production share of 22.4% and autumn rice account for 6% of area and 3.7% of production share of rice (Economic Survey 2018-19 data of Directorate of Economics and Statistics, Assam).
- In worst possible case the state will loss 26% percent of total production of rice which is not the likely case. It requires a quick estimate of actual data from ground if there are any damage/production loss of summer rice during the lockdown period, if so, the extent it is (officials of Directorate of Economics and Statistics, Assam or a quick field visit should give a rough estimate). Moreover, a quick estimate is required if the lockdown has affected the process to initiate cultivation of autumn rice; it may be that the farmers have exhausted the savings/working capital generated from sale of horticulture products, casual works in construction sector, petty trades or transport sector work to invest in cultivation.

- A section of Rabi cultivators is not able to sell their produce, therefore in the coming season they will not have any capital, thus govt needs the support with money to farmers so that they can cultivate paddy 15th April to end of August before first wave of flood comes.
- It may also be noted that for cultivation of winter rice (June-July to November –December) a large section of farm households now raise resources from money remitted by family members working in non-standard jobs such as construction, manufacturing and services within the state of Assam as well as outside the state. There are 25 lakh workers from the state at present working outside the state in lower end jobs; the state of Kerala alone accounts for about 5 lakh workers to the study on Domestic Migrant Laborers conducted by Gulati Institute during 2013. Considering all the developments (migrant workers across the country have lost job) it is anticipated that the agriculture sector of the state would see some crisis. Migration for last many years have seen out migration from Assam since Agriculture couldn't provide financial gains except subsistence. Now this section will not be going to other states in near future. Hence, a huge section of population in Assam will need to be accommodated in Agriculture sector.

## 2. Disruptions in Animal Husbandry & Dairy.

- In Livestock's, due to break in supply chain, livestock sector & Dairy production has been broken with little distribution. Other livestock as well are not able to get the markets due to the break in supply chain.
- The impact on dairy farmers in Assam is more than other part of the country because Assam does not have an efficient organized procurement system e.g. co-operative or private dairy. The milk processing units here do not have facility to convert raw milk to solid dairy products such as butter or milk powder for future use.
- Source of Seed & Feed: First, Livestock's farmers face severe pressure from supply side and market disruptions, since animals/ poultry need to eat every day and production cycles are short – Daily for Dairy, 6 Weeks for Chickens and 3 months for Pigs. Also, there will be shortage of animal/ poultry seed. Lack of Feed due to shutdown of around 20 feed plants. (Approximately there are 16 bigger size 50-200 Metric/ Month in Assam – Kamrup Metro, Nalbari, Naltali, Jorhat and Tinsukia and 1 Big plant is operating in Tezpur).
- Loss on account of trade in livestock products is expected. (Difficulty in market access e.g. closure of sweet shops who are largest consumer of raw milk produced in informal

sector, high transport & labor cost, distress sale, inability to liquidate stock at right time, & decrease in consumer demand). Loss in terms of decrease in farm production (e.g. due to difficulty in getting / providing high cost feed, absence of farm labor, failure to provide essential veterinary care / timely breeding services). Loss in terms of trade in farm inputs e.g. Hatching eggs, Day-Old Chick (for Poultry farming), Animal Feed (Finished feed + trade in key ingredient like Maize& Soya), feed supplements, health products & diagnostics, farm equipment etc. is expected. Death of animals / birds due to failure of getting timely health coverage, forced culling of Chicks in hatcheries, High future disease risk for existing stock (Due to failure of timely vaccination of animals) is expected.

- Production and trade related losses of companies engaged in contract farming and organizations in processing and value-added sector e.g. Sweet producers / traders, traders and transporter of livestock products, meat processors & livestock product based exclusive food joints (due disruption in supply chain, closure of operation, decrease demand) is expected.
- Supply Chain Slow Down and Shortages: Due to disruptions in feed and raw material's delivery and pick up of farm products, communications will not reach to the doorstep of the farmers, no workforce.
- Animal Health Issues: As human health sector will get priority; veterinary health sector will get less importance in terms of funds and facilities.
- Farmers' Health: Throughout the country, farmers are an older population as compared to the general workforce and thus COVID 19 will disrupt farm activities in case they are inflicted frequently.
- The farm workforce: Due to illness or out of fear. Restriction, there will result more absenteeism. Farm activities will be hampered.
- Rumor about ban on consumption of meat: This sector has seen a huge drop due to fake propaganda on social media, saying that coronavirus is spread through consumption of milk, meat. which has been reported by various media outlets.
- Marketing was the main problem faced by producers due to lockdown as the marketing of Animal Husbandry production is mostly unorganized and operated through roadside vendors. Alternate market channels need to be explored to support the market through digital app for home delivery in organized way. Otherwise such disaster may again and again cause havoc for the Animal husbandry producers. To facilitate such platform of marketing, organized processing houses is a must to enhance shelf life of the products

and to easy doorstep delivery. Organized collection mechanism from the farms to processing houses needs to be evolved to hassle free movement of productions.

### 3. Disruptions in Fishery.

- As this period of the year marks the beginning of the culture season for the fish farmers of the state. So, due to this COVID outbreak situation, they will face hardship in obtaining superior quality inputs like seed, feed etc. starting their farming operations in time.
- Due to this outbreak, fish seed producers are going to be hit badly as their fish breeding operations have already been delayed by more than a month. The produce of the fish farmers/fish seed producers could not reach market in time which may prompt them for distress selling. There will be negative impact on farm-gate price of the fishes which sometimes may lead to such a situation where farmers will not even able to recover their capital expenditure. Due to this pandemic, fish farmers and fish seed producers will have to face shortage of liquidity for their farming activities.
- The fish supply chain totally disrupted by this COVID outbreak. From wholesale to retail every component of this supply chain will have to face economic hardship due to this disruption. Fish seed distribution network totally disrupted as this period of the year sees major seed production, marketing and distribution operations. Uncertainty of market will hit the supply and marketing chain.
- In long term unavailability of cash in consumers' hand will reduce the overall growth of the sector. The retailers or sellers will be severely affected in both short and long term due to uncertain market, limited/restricted marketing opportunity, limited purchasing power of consumers.

## 3.6 FUTURE SCOPE OF TRIANGULATION OF REAL DATA FROM GOVERNMENT SOURCES, PRIVATE SECTOR PLAYERS & ACTUAL FARMERS

### 3.6.1 SCOPE OF WORK FOR DETAILED ANALYSIS OF ACTUAL IMPACT

Due to the constraints of time and resources, there is a future scope of work for detailed analysis of the actual impact of COVID 19 on the Agri & Allied Sector by triangulating the data collected from the major stakeholders of the sector:

1. Assam State Government Departments.
2. Private Sector Players in Assam
3. Actual Farmers and Cultivators.

Without the inputs from the respective major stakeholders it would not be possible to arrive at the actual impact of the COVID-19 pandemic on the Agri & Allied Sector.

### 3.7 CONCLUSION OF IMPACT ANALYSIS OF COVID 19 ON AGRICULTURE & ALLIED SECTORS

In conclusion, the following result has been the outcome of the Impact Analysis of COVID 19 Lockdown on the Agricultural & Allied Sector of Assam where the worst hit sub-sectors have been arrived at from Causal Analysis and their estimated % age loss in value to the State GDP of Assam through Time Series Analysis.

*Methodology adapted to estimate the economic impact of COVID 19*

Impact Analysis Result of COVID 19 on Agricultural & Allied Sector of Assam			
01 *Causal Analysis Result		**Time Series Analysis Result 02	
Sub-sectors	Heat Map Zone	Impact Order	Projected % age loss in volume contribution
Horticulture	Critical (Needs Critical Intervention)	1	5.76 %
Animal Husbandry	Critical (Needs Critical Intervention)	2	4.32 %
Dairy	Critical (Needs Critical Intervention)	3	4.32 %
Agriculture	Moderate (Needs Moderate Intervention)	4	1.37 %
Fishery	Moderate (Needs Moderate Intervention)	5	1.73 %

#### 03 \*\*\*Qualitative Analysis Result

**COVID 19 has created**

1. Disruptions in Farming and Farm Prices.
2. Disruptions in Supply chains slowdowns and shortages.
3. Disruptions in Farmers' economic health.
4. Disruptions in the farm workforce elasticity.
5. Need for Farmers' physical safety and Personal Protective Equipment (PPE).
6. Other indirect socio-economic disruptions.

For details refer:

- \* Section 1.3 Causal Analysis Chapter
- \*\* Section 1.4 Time Series Analysis
- \*\*\* Section 1.5 Qualitative Analysis



RECOMMENDATIONS  
TO REVIVE

## 4. KEY RECOMMENDATIONS

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In the light of the above discussion and the Impact of COVID 19 on agriculture and allied sector as assessed in the state of Assam, a 3-fold recommendation is suggested.

*Figure 33: Recommendations Framework*



The recommendations are described in the following sections:

### 4.1 BALANCING THE LOSS

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It has been assessed that overall loss in Agriculture was 0.97 lakh ton of rice and 0.03 lakh ton of oilseed; in Horticulture for fruits- 2.01 and Vegetables-34.14 lakh Metric tonnes; in Animal products- for meat-6.27 thousand tons, egg – 233.62 lakh numbers and milk-35.87 million liters and for fish, it was 0.06 lakh ton of fish and 642 million number of fish seeds. In terms of monetary value, state department of Agriculture has already worked out the loss for fruits and vegetables as Rs 34.00 crores and for paddy- Rs 10.00 crores. Similarly, in animal husbandry sector, the loss has been calculated to be Rs. 93.00 crore. The total loss including that of Fishery etc. could be around Rs. 200 crores during the first phase of lock down period. However, as per economist, the projected loss from agriculture and allied sector is expected to be a whopping 4061 crores for the state.

In the absence of income opportunity during this period coupled with the loss incurred in their rabi crops, it will be highly desired that the losses incurred by the farmers are balanced to help them prepare for the coming kharif crops for which following recommendations are made:

- I. 10 percent fund of each central department/ ministry which is to be spent for the growth of North East per year must have been released by January end or February i.e. before the COVID 19 crisis. It is logical to infer that this fund has not been utilized in the last month or so. Even if the earmarked fund for this year has not been released, this will not lapse as it will go to the non-lapsable pool of fund. State may approach the Centre for a special permission to utilize part of this fund (Rs 5000

crore) to balance the loss incurred.

- II. The loan taken by the farmers for their Rabi crops last year may be considered for waiving off since the amount is not likely to be substantial. This would ease out the economic stress on the farmers already reeling with capital inadequacy and help them in gearing up for the upcoming kharif Crops. The Government must ensure that guidelines are issued to every branch of every lending institution including public sector banks, scheduled commercial banks, Regional Rural Banks (RRBs) and cooperative lending institutions.
- III. Till date<sup>10</sup> around US 1.84 million dollars has been paid in fee, interest & charges under Assam Agribusiness and Rural Transformation Project (APART). At present exchange rate, this is roughly around Rs. 135 crore – Rs. 140 crores. State Government may request for a of moratorium/one-time waiver for such fees/amount which would assist the Government in access to funds.

## 4.2 PREPARING FOR NEXT STEP

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- I. Since the farmers movement within the farm has been now allowed, proper monitoring and surveillance of the Autumn rice may be ensured to protect the crop. This may include maintaining adequate supply of correct fertilizer, pest control methods and adopting proven farming techniques. This can help farmers realize a bumper crop and provide much needed economic relief.
- II. All steps needed to procure quality seed and other inputs for coming kharif crops need to be taken on time and for this, special approval if needed, be taken from finance ministry. Fund available under central sector schemes like RKVY may be used for this purpose with special approval from the concerned ministry. Quality seeds having high germination percentage, generally free from disease and disease organisms, and rapid emergence, and vigorous growth would catapult the farmers towards better yield and quality. Their timely availability must be made easily accessible to farmers by the Assam state government for which the seed farms must be re-activated and more vacant lands dedicated for seed production. This will not only support the timely availability of quality seeds to our farmers but also generate employment opportunities for the inward migrant laborers of the state. The Krishi Vigyan Kendra (KVK)s can be given charge for providing guidance in terms of sound agricultural and technical support thereby increasing the efficiency of seed production and making it cost effective.

<sup>10</sup> <https://projects.worldbank.org/en/projects-operations/project-detail/P155617>

- III. Apparently, the seed companies are being handicapped with manpower shortage for seed treatment, packaging etc. For this and if need be, staff experienced in these jobs may even be considered for deputing to the selected company to get the state quota of seeds of different crops on time. This would open a new avenue for secondary employment in the Agriculture and Allied Sector besides streamlining the seed supply chain to farmers' doorstep.
- IV. The insurance policies for crop, animal etc. should be made compulsory since only a small percentage of farmers are covered under insurance policy as of now. This would have a two-fold benefit to farmers. Firstly, it would bring stability in income of the farmers as it will protect the farmers against losses caused by crop failure. It acts like a tool that allows farmers to manage their yield and price risks. Secondly, it would solve the debt cycle problem which has plagued the farming community since a long time. With insurance in place, farmers can repay their loans even during the time of crop failure with the support of the right insurance partner. In the short run, crop insurance must be made available to farmers on a case to case basis without the usual regulatory norms in the wake of COVID19 pandemic. In the long run, insurance settlements must be made transparent and hassle free for farmers.
- V. All the non-functional Cold Storages may be made functional within a reasonable time not exceeding the length of kharif season. The importance of Cold Storage facilities has become more important in today's condition when lockdown has become the new norm help to prolong the shelf life of fresh goods. This will be effective in reducing the amount of waste and in lengthening the timeframe for marketing the produce. Cold storage facilities must be made farmer friendly through affordable pricing and attractive group storage schemes for multiple farmers.
- VI. Procurement of farmers produce at Minimum Support price will be an issue which is to be attended to by the state if necessary, even by modifying the state APMC Act. The objectives of such market regulation are - to ensure that farmers are offered fair prices in a transparent manner, to help farmers in direct marketing and organizing retailing, to expand and modernize marketing facilities, to improve marketing information communication and to link small producers with efficient marketing channels. Hence, the provisions of the APMC Act of Assam must be revisited to identify the ones which could be modified for accommodating welfare of the farmers in the context of COVID19 pandemic.

- VII. Since it is an otherwise opportune moment to focus on state specific agriculture and their marketing, ways and means are recommended to be developed to promote the specialty agriculture of the state following organic production mode. Also, since the food market is not likely to be as open as it used to be, regional food market within NE states shall have to be explored. In the wake of the COVID19 crisis, the region has also emerged as a potential source for supply of organic agriculture produce to Middle East & South East Asian markets. With respect to agricultural products, the entire North-East region must be considered as a one big market from a competitive advantage point of view. The scope of a common market made sustainable through lucrative taxation and tariff policies is highly viable in the light of the geographical diversity of the region.
- VIII. Preparations shall also be needed for coming rabi season about technology, planting materials, handling and processing of the produce including their storage and marketing.

## 4.3 WAY FORWARD

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- I. Form an Agricultural Task Force immediately to develop Agri-economy reviving plans, policies and programs – sector and sub-sector wise for the government to implement. The Task Force will examine ways of improving productivity and enhancing economic returns in farming including structural reforms and consequent changes needed in legislation. The Task Force created can have a bottom up approach inclusive not only of policy makers but more importantly progressive farmers, farmer organizations, agriculture practitioners, etc.
- II. The state may also consider formation of a Farmers' commission like many other states to bring out the farmers' issues of concern for mitigation by the government. This will boost the sustainability in farming system in the state and make it more profitable and cost competitive in farm commodities.
- III. Establishment of primary processing centers particularly for horticultural crops, meat and milk after semi-commercializing their production on cluster mode for continuously feeding the processing units. Adequate storage, transport, handling and processing will significantly reduce the level of wastages and value loss. The average post-harvest wastage of around 37% can be reduced significantly by installing relevant food processing centers and promoting individual as well as group entrepreneurship at various levels built around activities like sorting, grading, aggregating, transportation, etc. of the Food Processing value chain.
- IV. District-wise Fruits, Vegetables and Spices mandis are recommended for streamlining the market, both far and near.
- V. In order to leverage the benefit from the upcoming Act East policy of the government, agricultural commodity markets in the neighboring countries need to be explored through adequate Market Intelligence analysis.
- VI. Use of digital and Artificial Intelligence technology, among others, in Agriculture and allied sector is a foreseeable conclusion which is why adequate funding for research and capacity building in these areas is recommended for ICT enabled farming in the state.



**ACTION PLAN  
TO RESTORE  
NORMALCY**

## 5. ROADMAP TO NORMALCY

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Our analysis clearly shows that the lockdown due to COVID19 has impacted almost all the sectors including various subsectors of Agriculture and its allied activities, albeit differently. The quantum and duration of impact, however, will vary for different stakeholders in every sector viz. Agriculture, Horticulture, fishery, Dairy, Poultry, Animal Husbandry. Looking into this situation, as suggested by most of the stakeholders we interacted with, we are also of the opinion government will have to take a multi-prong approach to address this issue. Sector specific intervention will be required at different time for next one year.

We have recommended many such recommendations which can be bracketed based on their timing, as under:

- Short term – Within a Month after lockdown
- Medium term – within two to three months after lockdown
- Long term – within six to twelve months after lockdown

The recommendations have been proposed with aim to

- Minimize the losses of various stakeholders, be it farmer or people engaged in agriculture related activities. The major source of losses being opportunity loss due to no work, less demand, compulsion to sell their produce at throw away prices
- Restart various operations, which came to stand still due to lock-down such as, transportation, procurement of Agri-produces, distribution of Agri-inputs, processing of Agri-produces, particularly the perishable one.
- Revive Markets- Immediately after lock-down, there are chances of Agri-produce getting dumped in-to the market, particularly those got harvested during lock-down, this may result in price drop due to high amount of distress selling. This will further aggravate the problem.

Apart from this government should also be prepared for emergency response towards, 2nd wave of Pandemic, as that can be even more fatal than the first wave. Secondly during monsoon chances of flooding is very high in our state, if we are not well prepared, it will break the backbone of rural economy, which currently is already in bad shape.

The detailed action items are listed in following tables:

Horticulture			
Strategy	Interventions	Type of Intervention	Timeline
Reduce Losses	<ul style="list-style-type: none"> <li>• <b>Better Credit Flow:</b> The existing Kisan Credit Card Scheme must be made more accessible and 5% of the loan amount must be immediately disbursed to those farmers who have already availed KCC Loans.</li> <li>• <b>Adequate steps must be taken to ensure 100 % KCC coverage</b> which is currently at around 70% in Assam.</li> <li>• <b>Subsidies to be sent to Farmers quickly:</b> Handing over all subsidies to farmers, including input subsidies, crop insurance, and interest subventions, directly to the farmers (simultaneously giving cash subsidy in place of PDS supply to consumers at the other end).</li> </ul>	Monetary Assistance	Short term
	<ul style="list-style-type: none"> <li>• <b>Supply and Demand Management:</b> The requirement of raw materials and the quality is to be clearly determined well in advance, so that the farming community can be ready to produce abundantly to act as feeder of Agri-based industries.</li> </ul>	Digital Intervention	Long Term
Restart Processes	<ul style="list-style-type: none"> <li>• <b>Support SMEs using raw inputs:</b> Small and medium enterprises, running with raw materials from the horticulture farmers, need special attention so that the rural economy doesn't collapse.</li> </ul>	Start-up support	Short Term
	<ul style="list-style-type: none"> <li>• <b>Process Horti Produce:</b> Horticulture crops when processed will add value,</li> </ul>	Investment Promotion	Medium Term

## Horticulture

Strategy	Interventions	Type of Intervention	Timeline
	increase shelf-life and ultimately returns. Hence more value-add sales of fruits and vegetables should be focused.		
	<ul style="list-style-type: none"> <li>• <b>Bring Agri Entrepreneurs on single platform:</b> Need of a platform to encourage Agri Entrepreneurs which need policy reform like implementation of state Food Processing policy.</li> </ul>	Start-up support	Long Term
	<ul style="list-style-type: none"> <li>• <b>Bring awareness on Opportunities in Food processing industry:</b> There is a need to create an environment so that the stakeholders can learn about latest initiatives and opportunities available in the field of food industries.</li> </ul>	Investment Promotion	Long Term
	<ul style="list-style-type: none"> <li>• <b>Improve Storage Infrastructure:</b> Ramp-up cold storage facilities in the State.</li> </ul>	Investment Promotion	Long Term
<b>Revive Markets</b>	<ul style="list-style-type: none"> <li>• <b>Create demand from food and nutrition schemes:</b> Get (food provisioning schemes like) mid-day serviced from local produce.</li> </ul>	Process Support	Short term
	<ul style="list-style-type: none"> <li>• <b>Regulate Market Prices</b> for fruits and Vegetables</li> </ul>	Policy support	Short term

## Agriculture

Strategy	Interventions	Type of Intervention	Timeline
<b>Reduce Losses</b>	<ul style="list-style-type: none"> <li>• <b>Better Credit Flow:</b> Facilitate loans through Kisan Credit Card (KCC) mode to ensure better credit flow in time for the next cropping season.</li> </ul>	Monetary Support	Short term

## Agriculture

Strategy	Interventions	Type of Intervention	Timeline
	<ul style="list-style-type: none"> <li>• <b>Subsidies to reach Farmers quickly:</b> Handing over all subsidies to farmers, including input subsidies, crop insurance, and interest subventions, directly to the farmers (simultaneously giving cash subsidy in place of PDS supply to consumers at the other end).</li> </ul>	Monetary Support	Short term
	<ul style="list-style-type: none"> <li>• <b>Payout wages from NREGS funds:</b> It is suggested to explore leveraging NREGS funds to pay part of the farm labor (with farmers paying the balance wage amount) to lessen the monetary burden on the farmer, while ensuring wage employment to the landless laborers and workers.</li> </ul>	Monetary Support	Short term
	<ul style="list-style-type: none"> <li>• <b>Pay advance against warehouse receipts:</b> To minimize distress selling, advance against warehouse receipts should be made available to the farmers.</li> </ul>	Monetary Support	Short term
<b>Restart Processes</b>	<ul style="list-style-type: none"> <li>• <b>Enable bulk freight movement:</b> Public Transport have a big role to play. First they should actively start transporting farm inputs - including seeds, etc. from seed hubs to all states and grain and fresh produce from the hinterland to the cities.</li> </ul>	Process support	Short term
	<ul style="list-style-type: none"> <li>• <b>Utilize co-operatives to mobilize farm equipment:</b> To obviate the immediate concerns of scarcity of farm labor, policies must facilitate easy availability of machinery through state entities, Farmer Producer Organizations (FPOs) or custom hiring centers (CHCs) with suitable incentives.</li> </ul>	Process support	Short term

## Agriculture

Strategy	Interventions	Type of Intervention	Timeline
	<ul style="list-style-type: none"> <li>• <b>Facilitate Tool Banks:</b> Government should facilitate setting up “tool banks” at Block level. Government will have to provide subsidy for procurement of these tools.</li> </ul>	Process support	Short term
	<ul style="list-style-type: none"> <li>• <b>Train &amp; Advise Farmer Community</b> ICAR to train farmers about the changing farming methods and make them aware about the precautions they need to take even after lockdown, like social distancing, use of masks, regular washing of hands through behavior change communication.</li> </ul>	Skill Development	Short term
	<ul style="list-style-type: none"> <li>• <b>Utilize FPOs for aggregating Harvest:</b> FPOs can be used to aggregate the harvest of farmers which could then be lifted by the Centre/State procurement agencies. FPOs would need mini trucks to do this as they would be collecting produce from farmers’ fields.</li> </ul>	Process support	Short term
	<ul style="list-style-type: none"> <li>• <b>Enhance Storage Facility:</b> A chain of approved and certified warehouses will not only minimize the post-harvest losses but can also facilitate online trading of the commodities.</li> </ul>	Investment Promotion	Long term
	<ul style="list-style-type: none"> <li>• <b>Create Farmer Helpline:</b> A call center with trained manpower to provide relevant information to farmers, regarding current best practices of their trade. The same helpline may also be used to provide prices at different Markets.</li> </ul>	Technology Intervention	Short term

## Agriculture

Strategy	Interventions	Type of Intervention	Timeline
	<ul style="list-style-type: none"> <li>• <b>Tie-up co-operatives with WDRA to ramp up storage facilities:</b> Farmers can consider putting their stock in the go-downs of agriculture co-operative societies nearby. If those are ones accredited with WDRA, then borrowing against the stock will be easy.</li> </ul>	Process support	Medium term
<b>Revive Markets</b>	<ul style="list-style-type: none"> <li>• <b>Leverage Price support schemes to create demand:</b> State Governments must gear up their machineries for smooth procurement operations of farmers' marketable surpluses at MSP (minimum support price) or through other price support schemes.</li> </ul>	Process support	Medium term
	<ul style="list-style-type: none"> <li>• <b>Encourage end-mile connecting delivery startups:</b> e-commerce and delivery companies and start-ups need to be encouraged with suitable policies and incentives. To sustain the demand for agricultural commodities, investments in key logistics must be enhanced</li> </ul>	Start-up Support	Medium term
	<ul style="list-style-type: none"> <li>• <b>Maintain social distancing at Market places:</b> The market yard can be divided into separate segments for different commodities with farmers trading in each commodity being assigned specific date and time in advance to come to the yard for trading their produce.</li> </ul>	Process support	Short term
	<ul style="list-style-type: none"> <li>• <b>Create demand from food and nutrition schemes:</b> Get (food provisioning schemes like) mid-day serviced from local produce.</li> </ul>	Process support	Short term

## Agriculture

Strategy	Interventions	Type of Intervention	Timeline
	<ul style="list-style-type: none"> <li>• <b>Enforce Market Hygiene:</b> Mandatory face masks and hand gloves, sanitization at entry, and alternate platforms at the market yards while trading to maintain social distancing.</li> </ul>	Process support	Short term

## Dairy

Strategy	Interventions	Type of Intervention	Timeline
<b>Reduce Losses</b>	<ul style="list-style-type: none"> <li>• Organize health camps for livestock, so as to boost immunity of cattle fallen sick during lockdown.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li>• Make rice and pulses wastage in Food Corporation of India warehouses to be provided to livestock farmers through the public distribution system.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li>• The AH department to facilitate employment to migrant laborers who have returned back to their home State during lockdown, in Livestock rearing, Milk Processing Units and Supply Chain operations.</li> </ul>	Employment support	Short Term
	<ul style="list-style-type: none"> <li>• <b>Create Farmer Helpline:</b> A call center with trained manpower to provide relevant information to farmers, regarding current best practices of their trade. The same helpline may also be used to provide prices at different Markets.</li> </ul>	Technology Intervention	Short Term
	<ul style="list-style-type: none"> <li>• Train &amp; Advise Farmer Community ICAR to train farmers about the changing</li> </ul>	Skill Development	Short Term

## Dairy

Strategy	Interventions	Type of Intervention	Timeline
	farming methods and make them aware about the precautions they need to take even after lockdown, like social distancing, use of masks, regular washing of hands through behavior change communication.		
<b>Restart Processes</b>	<ul style="list-style-type: none"> <li>• <b>Put Fodder mills in operation:</b> Operation of feed mills is to be regularized as soon as raw material is available, so that feed for cattle is adequately provided.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li>• <b>Utilize co-operatives for aggregation:</b> Facilitate procurement of milk by WAMUL co-operative.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li>• Digitization of milk procurement, storage, sale and payment to the farmer to bridge the gap between the dairy market and farming, transport and storage of milk.</li> </ul>	Technology Intervention	Long Term
	<ul style="list-style-type: none"> <li>• Government to set up a joint venture with Dairy co-cooperatives for producing milk and milk products daily to create demand for small farmers.</li> </ul>	Start-up support	Medium Term
	<ul style="list-style-type: none"> <li>• Tie-up co-operatives with e-commerce startups for door-to-door distribution of its products on request from consumers.</li> </ul>	Start-up support	Short Term
	<ul style="list-style-type: none"> <li>• Increase infrastructure for storage, pasteurizing and packaging of milk.</li> </ul>	Investment Promotion	Long Term

## Dairy

Strategy	Interventions	Type of Intervention	Timeline
<b>Revive Markets</b>	<ul style="list-style-type: none"> <li>• <b>Enforce Market Hygiene:</b> Take sanitization measures at meat shops and facilitate social distancing at marketplaces.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li>• <b>Create demand from food and nutrition schemes:</b> Get (food provisioning schemes like) mid-day serviced from local produce.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li>• Regulate price of fodder, so that distressed commercial Dairy farmers be able to purchase feed for the cattle.</li> </ul>	Policy intervention	Short Term
	<ul style="list-style-type: none"> <li>• Build an effective milk marketing chain that would give farmers a fair return on their investment.</li> </ul>	Marketing Support	Long Term

## Fisheries

Strategy	Interventions	Type of Intervention	Timeline
<b>Reduce Losses</b>	<ul style="list-style-type: none"> <li>• <b>Create Farmer Helpline:</b> A call center with trained manpower to provide relevant information to farmers, regarding current best practices of their trade. The same helpline may also be used to provide prices at different Markets.</li> </ul>	Technology Intervention	Short Term
	<ul style="list-style-type: none"> <li>• <b>Train &amp; Advise Farmer Community ICAR</b> to train farmers about the changing farming methods and make them aware about the precautions they need to take even after lockdown, like social distancing, use of masks, regular washing of hands through behavior change communication.</li> </ul>	Skill Development	Short Term

## Fisheries

Strategy	Interventions	Type of Intervention	Timeline
	<ul style="list-style-type: none"> <li>Partially compensate the losses of Fish farmers as, they got hit mostly due to market restrictions by the government.</li> </ul>	Monetary Support	Short Term
Restart Processes	<ul style="list-style-type: none"> <li><b>Put Fodder mills in operation:</b> Operation of feed mills is to be regularized as soon as raw material is available, so that feed for fish is adequately provided.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li><b>Support SMEs using raw inputs:</b> Small and medium enterprises, running with raw materials from the fish farmers, need special attention so that the rural economy doesn't collapse.</li> </ul>	Start up support	Medium Term
Revive Markets	<ul style="list-style-type: none"> <li><b>Enforce Market Hygiene:</b> Take sanitization measures at meat shops and facilitate social distancing at marketplaces.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li><b>Create demand from food and nutrition schemes:</b> Get (food provisioning schemes like) mid-day serviced from local produce.</li> </ul>	Process support	Short Term

## Eggs & Poultry

Strategy	Interventions	Type of Intervention	Timeline
Reduce Losses	<ul style="list-style-type: none"> <li>Partially compensate the losses of Poultry farmers as, they got hit mostly due to ban on chicken and egg imports.</li> </ul>	Monetary Support	Short Term
	<ul style="list-style-type: none"> <li>Promote Duck farming in the State, as duck meat is preferred over chicken in the State.</li> </ul>	Process Support	Long Term

## Eggs & Poultry

Strategy	Interventions	Type of Intervention	Timeline
	<ul style="list-style-type: none"> <li>• <b>Create Farmer Helpline:</b> A call center with trained manpower to provide relevant information to farmers, regarding current best practices of their trade. The same helpline may also be used to provide prices at different Markets.</li> </ul>	Technology Intervention	Short Term
	<ul style="list-style-type: none"> <li>• <b>Train &amp; Advise Farmer Community</b> ICAR to train farmers about the changing farming methods and make them aware about the precautions they need to take even after lockdown, like social distancing, use of masks, regular washing of hands through behavior change communication.</li> </ul>	Skill Development	Short Term
<b>Restart Processes</b>	<ul style="list-style-type: none"> <li>• <b>Put Fodder mills in operation:</b> Operation of feed mills is to be regularized as soon as raw material is available, so that food for poultries is adequately provided.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li>• Tie-up co-operatives with e-commerce startups for door-to-door distribution of its products on request from consumers.</li> </ul>	Start up support	Medium Term
	<ul style="list-style-type: none"> <li>• Build infrastructure capabilities for Cold Storage and Food Processing facilities.</li> </ul>	Investment Promotion	Long Term
<b>Revive Markets</b>	<ul style="list-style-type: none"> <li>• <b>Enforce Market Hygiene:</b> Take sanitization measures at meat shops and facilitate social distancing at marketplaces.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li>• Remove import restrictions on Egg and Chicken and allow fast food</li> </ul>	Policy Intervention	Medium Term

## Eggs & Poultry

Strategy	Interventions	Type of Intervention	Timeline
	franchise outlets in the State.		
	<ul style="list-style-type: none"> <li>• <b>Create demand from food and nutrition schemes:</b> Get (food provisioning schemes like) mid-day serviced from local produce.</li> </ul>	Process support	Short Term

## Meat & Meat Products

Strategy	Interventions	Type of Intervention	Timeline
<b>Reduce Losses</b>	<ul style="list-style-type: none"> <li>• The AH department to facilitate employment to migrant laborers who have returned to their home State during lockdown, in Livestock rearing, Meat Processing Units and Supply Chain operations.</li> </ul>	Employment support	Short Term
	<ul style="list-style-type: none"> <li>• Organize vaccination camps for livestock especially pigs to arrest spread of swine fever.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li>• Make rice and pulses wastage in Food Corporation of India warehouses to be provided to livestock farmers through the public distribution system.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li>• <b>Create Farmer Helpline:</b> A call center with trained manpower to provide relevant information to farmers, regarding current best practices of their trade. The same helpline may also be used to provide prices at different Markets.</li> </ul>	Technology Intervention	Short Term
	<ul style="list-style-type: none"> <li>• <b>Train &amp; Advise Farmer Community</b> ICAR to train farmers about the changing</li> </ul>	Skill Development	Short Term

## Meat & Meat Products

Strategy	Interventions	Type of Intervention	Timeline
	farming methods and make them aware about the precautions they need to take even after lockdown, like social distancing, use of masks, regular washing of hands through behavior change communication.		
<b>Restart Processes</b>	<ul style="list-style-type: none"> <li>• <b>Put Fodder mills in operation:</b> Operation of feed mills is to be regularized as soon as raw material is available, so that food for poultries is adequately provided.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li>• <b>Support SMEs dependent on raw inputs:</b> Small and medium enterprises, running with raw materials from the meat industry, need special attention so as to encourage export of processed meat.</li> </ul>	Start-up support	Long Term
	<ul style="list-style-type: none"> <li>• Tie-up co-operatives with e-commerce startups for door-to-door distribution of meat products on request from consumers.</li> </ul>	Start-up support	Short Term
	<ul style="list-style-type: none"> <li>• Increase infrastructure for storage, processing and packaging of meat to meet export quality standards</li> </ul>	Investment Promotion	Long Term
<b>Revive Markets</b>	<ul style="list-style-type: none"> <li>• <b>Enforce Market Hygiene:</b> Take sanitization measures at meat shops and facilitate social distancing at marketplaces.</li> </ul>	Process support	Short Term
	<ul style="list-style-type: none"> <li>• <b>Create demand from food and nutrition schemes:</b> Get (food provisioning schemes like) mid-day serviced from local produce.</li> </ul>	Process support	Short Term

## Meat & Meat Products

Strategy	Interventions	Type of Intervention	Timeline
	<p>• <b>Improve Marketing of Meat products:</b> ALPCo to commission meat processing plants and slaughterhouses to assure production and marketing of hygienic meat through a chain of modern meat shops in the State.</p>	Process support	Mediun Term
	<p>• <b>Focus on Exports:</b> Assam and North Eastern States due to lesser impact of COVID, are ideal for exporting local produce. Hence Piggery, Duck farming industry should be supported with export subsidy.</p>	Investment Promotion	Mediun Term

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