

AGRICULTURAL DRAFT POLICY, ASSAM

*Aimed at Doubling Farm Production and
Farmers' Income*



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with inputs from
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AGRICULTURE Policy

Preamble

The economy of Assam is mainly agrarian with agriculture and allied activities contributing about 20 per cent to the state's net domestic product and providing livelihood support to about 75 per cent of the population of the region. However, the productivity of the major crops like rice, pulses, and oilseeds is still much lower in Assam compared to the national average.

Agriculture in Assam in macro sense is characterized by monocropping, largely small holders' low input-low output, subsistence farming systems practised primarily under rainfed condition. These weaknesses, however, could now be converted into opportunities by capitalizing on the hidden strengths in the form of maximizing production through input optimization, especially when green revolution belt has experienced fatigue. From the existing and anticipated R & D support, the state has to gear up itself to double its food grain production and substantially increase the production and productivity of all the crops and double the farmers' income in the next decade.

At present, the net and gross cropped areas in the state are 28.11 (35.1 per cent of geographical area) and 40.99 lakh hectares, respectively with a cropping intensity of 144 per cent. Rice is the dominating crop of the state occupying around 91% of the net cropped area. Pulses and oilseeds are yet to make desired headway. Among cash crops, sugarcane and jute occupy a substantial area. In horticulture, banana, pineapple and citrus are the major fruit crops while potato, various cole crops, cucurbits, okra and diverse leafy vegetables are the major vegetable crops. The state also has potential for spice crops, notable among them being ginger, turmeric, chilli and black pepper. The recent years have witnessed gradual rise in area devoted to flowers.

The state has also tremendous potential for the growth of livestock including poultry and fishery sub-sectors. However, poor production potential of the indigenous strains of livestock and poultry leads to dependance of the population on other states for meeting its animal protein requirements. Similar is the case with fish production. Realising the potential of this sector in addressing the very basic issue of inclusive growth in agriculture, several new programs are to be initiated to increase the production and productivity of the animals and fishes with greater emphasis on Integrated Farming System mode of food production. The overall achievement of agriculture and allied sector during the 10th Plan was just 1.16 per cent. Against this, the annual growth during the 11th Plan had been 4+ per cent which was quite encouraging against the target of just 2 per cent for the Plan period. So far, the pace of agricultural development in the current plan period is quite good though not very bright.

Assam can be broadly divided into three distinct physiographic units - the plains, the plateau and the hills with the plains of Brahmaputra and Barak valleys being the main area for agricultural development. The typical characteristic feature of Assam soils is its acidity (pH ranging from 4.2 to 5.8). High humidity and seasonal pattern of rainfall and temperature are important features of Assam climate with rainfall being the most important determinant factor for the climate. Rainfall distribution follows a typical monsoon pattern with peak precipitation during monsoon (June - September) and scanty rainfall in winter (December -

February). Based on variation in rainfall, physiography and soil characteristics, the state has been divided into six agroclimatic zones.

Agriculture policy for Assam was last framed in the year 2010. Since then there has been visible changes in the farming practices, ecosystem scenario, market and farmers' demands with lot many new schemes launched by the government for complete rejuvenation of the sector so that it is lifted up from a back-breaking, non-remunerative option for livelihood to a respectable profession roping in commerce and 21st century trade in complete business mode to leverage the benefit from globalization of agriculture. These changes in policies and targets have necessitated to revisit the policy and make a policy commensurating with the needed programmes to double the food production and farmers' income. While framing a new policy, following indicators were considered based on the current food production and availability scenario of the state.

Food production and availability scenario

Food grain: Assam could produce 52 lakh tonnes of rice in 25 lakh ha, 0.61 lakh tonnes of wheat and maize in 0.64 lakh ha and 0.88 lakh tonnes of pulses in an area of 1.50 lakh ha. While the state has almost achieved self sufficiency in rice production it is very badly failing to produce the required amount of wheat, maize and pulses and hence depends heavily on the import from the other parts of the country. On the whole, the state is still to go a long way to achieving self sufficiency in food grain production (Table). Considering its geographic positioning in the NER the state must aim to produce the food grains required to meet the demands of the entire region to lead the region for its self-reliance and also to derive benefit of its situational advantage.

Table 1: Demand supply scenario of food grains in Assam (2014-15 to 2030-31)

[Population (in lakh); food grain (in lakh tonnes)]									
Crop	2014-15 [Population (Adult Equivalent) : 312.00]			2020-21 [Population (Adult Equivalent) : 326.01]			2030-31 [Population (Adult Equivalent) : 397.40]		
	Demand	Supply	Gap (Deficit/ Surplus)	Demand	Supply	Gap (Deficit/ Surplus)	Demand	Supply	Gap (Deficit/ Surplus)
Rice	51.25	52.00	0.75	53.55	69.91	16.36	65.27	94.81	29.54
Wheat + maize	7.97	1.22	(-) 6.75	8.33	1.41	(-) 6.92	10.15	2.01	(-) 8.14
Pulses	5.69	1.11	(-) 4.58	5.95	1.46	(-) 4.49	7.25	2.16	(-) 5.09
Total food grains	64.91	54.33	(-) 10.58	67.83	72.78	4.95	82.67	98.98	16.31

Food requirements were calculated according to NIN standards (Rice: 450 g/capita/day, Wheat/Maize: 70 g/capita/day and Pulses: 50 g/capita/day). Total requirements: 570 g/capita/day.

Food producing resources

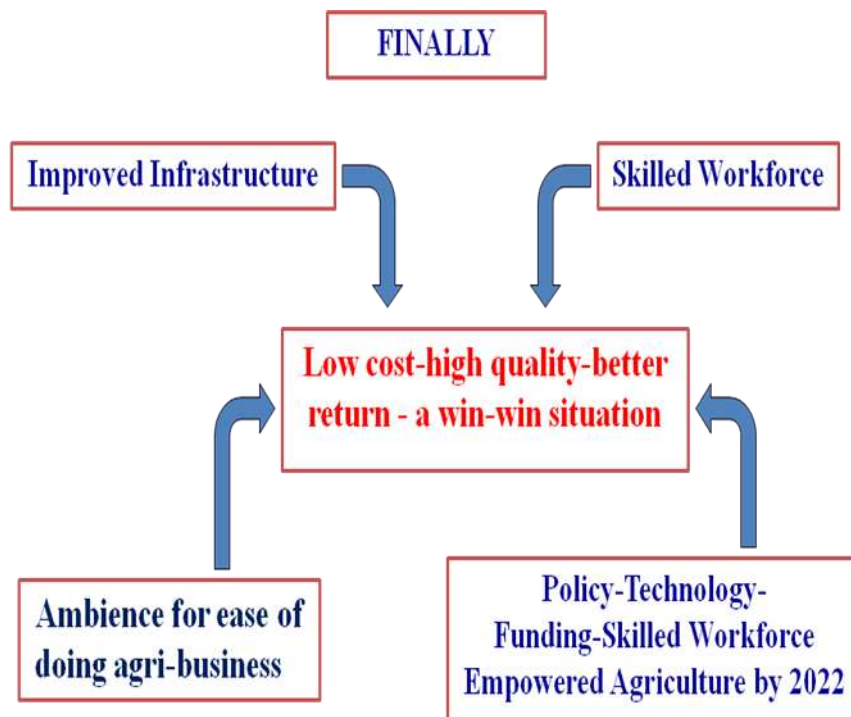
- i. **Land:** The state's gross and net cropped areas have, by and large, remained static at 40.9 and 28.11 lakh ha, respectively. Of the total cropped area, 25 lakh ha is under rice, 5.84 lakh ha in horticulture and the rest are under other crops including forages. It has been seen that there is no scope for expansion of net cropped area under cultivation.
- ii. **Water:** The state is surrounded, on three sides, by the hills and mountains with significant impact on the hydrology of the state. Water resources of the state as a whole are substantial. About 8251 sq km, which is 10.5 per cent of the total geographical area of the state, is occupied by surface water bodies. The total surface water resource of the state is estimated at about 600 billion cubic meters. The annual replenishable groundwater resource of the state has been estimated as 27.23 billion cubic metre and net annual groundwater availability as 24.89 billion cubic meters. The large available water resources, however, have remained untapped for development of the state's agriculture. The irrigation facility in the state is reported to cover 27.6 per cent of the gross cropped area and 39.6 per cent of the net cropped area. In practice, however, the facility is available to area much below the extent reported on paper.
- iii. **Soil:** The soils of Assam are acidic in nature with p^H ranging from 4.7 to 6.8. The soils of flood plains, Hill zone and the areas bordering/adjacent to this zone have higher p^H ranging from 6.0 to 7.1. This may be due to presence of free liming materials as limestone deposits in the hills of Assam. The available Nitrogen (N) content in the soil has been rated low to medium in the Upper Brahmaputra Valley, North Bank and Lower Brahmaputra Valley Zones whereas it is medium in the Hill zone of Assam. The available Phosphorus ranges from low to medium in Upper Brahmaputra Valley, North Bank and Lower Brahmaputra Valley Zones, medium to high in the Barak Valley Zone, low in the Hill zone and medium in the Central Brahmaputra Valley Zone. The available Potash content in the soil varies from low to medium in Upper Brahmaputra Valley, North Bank and Lower Brahmaputra Valley Zones, medium in Central Brahmaputra Valley Zone and Barak Valley Zone and low in Hill zone. It may be noted that the available nutrient content in the soil is relatively higher in the Barak Valley Zone. This may be due to relatively higher temperature and rainfall, which enhance organic matter decomposition in the soil and also finer soil texture that retain the mineralized nutrients.
- iv. **Seed:** The state is yet to go a long way to achieve self sufficiency in seed production and trade though the state has the capacity to produce almost entire quantity of seeds of rice, oilseeds (toria), several pulses and different kinds of vegetable crops with active involvement of the Assam Agricultural University, Assam Seed Corporation and also the Department of Agriculture. The Assam Agricultural University has already demonstrated its capability of producing huge quantity of seeds of different crops, particularly, rice, toria and several pulses in its own farms as well as in the farmers' field adopting participatory seed production programme. For achieving self sufficiency, the seed farms of the Govt. of Assam and ASC will have to be adequately strengthened and University's capacity also will have to be further geared up with needed facilities for storage, processing (both on-farm and mobile) etc. Of course, seeds of wheat, maize, some pulses and entire seeds of the hybrid varieties of rice and other crops will have to be procured from outside.

- v. **Mechanization:** Farm Mechanization is a critical input, which facilitates timely agricultural operation and is a key to achieving higher level of production. The present (2014) availability of farm power in the state is 1.25 HP per hectare (against national average of 2.25 HP per hectare) of which mechanical power is only 0.25 HP per hectare. Despite the efforts for augmentation of farm power through distribution of low lift pumps, tractors and power tillers among farmers and sinking of shallow tube wells in farms during the tenth and eleventh plan periods the growth of mechanization in Assam is very slow. Low availability of farm power is one of the major constraints to increasing cropping intensity.
- vi. **Plant protection:** Plant protection strategy and activities are of significance in the overall crop production programme for sustainable agriculture. Plant protection efforts to minimize crop losses from the ravages of pest and diseases give optimum results through Integrated Pest Management (IPM). Production of bio-pesticides including beneficial insects should be encouraged. The concept of IPM will be revitalized to include innovative components to suit local agro climatic situations. Application of Indigenous Technical Know-how (ITK) is one such approach and will be promoted aggressively. Farmers' Field Schools will be supported as an important instrument of participative IPM. Regular and frequent testing of pesticides to ensure quality is essential.

Indicators considered:

- a. Scaled up productivity of the natural resources and their conservation modules.
- b. Doubling of food production from 6 to 13.5 million tonnes and farmers' income from Rs 6000 to Rs 12000/ per month by 2022-23.
- c. Increasing cropping intensity to near 200 per cent from the present level of 146 per cent.
- d. Similarly, increase in milk production up to 1.5 litre per cow per day, live weight for meat production by 1.0 to 5.0 Kg (depending on poultry/other livestock) at slaughter age and fish production by 2.0t/ha. per year.
- e. Conversion of the state's agriculture to organic mode by 2022.
- f. Skill injected stakeholders along the production to consumption value chain.
- g. Market reforms by implementing revised APMC act, increasing procurement of the produce, opening up primary and secondary markets, establishing adequate numbers of food grain storage structures and accessing easily the agricultural credit.
- h. Phased out farmers' dependency on free seed supply by the Government agencies and doing the system away with simply provisioning quality seeds among the farmers on payment basis. Agricultural university in partnership mode with the farmers shall produce the required quantity of HYV seeds for the state, particularly for rice, oilseeds and pulses as well as the animal and fish seeds.
- i. Self sufficiency attainment for planting materials and seeds for horticulture and sericulture sectors.
- j. Convergence building among the actors implementing agricultural development and supportive schemes like the NIRD, SIRD, NABARD, NEDFi, PWD, Power, Irrigation and Soil Conservation, Finance, Rural Development and Forest etc.
- k. Mechanized farming in the state.
- l. Post-harvest handling and processing issue

- m. Upcoming issue of agri-trade and business
- n. Compatible human resources
- o. Organized Small Tea Growers sector



The Policy

1. Land policy

- ❑ State Land Use Board (SLUB) shall be strengthened and made mandatory to review the land allocation to different sectors like real estate, railway tracking, new airport structures, PWD roads etc. every quarter so that agricultural land is not transferred for such purposes.
- ❑ In order to discourage absentee land ownership in agricultural land, the crop benefit share between cultivators and such absentee land owners shall be brought down to 80:20 ratio 80 being the part for the cultivator. The agriculture department shall legalise the procedure.
- ❑ The government shall have the cultivation right on the lands kept fallow by the land owners for the period of fallow. The government shall also exercise this right either through private partners or through willing government/semi government/autonomous bodies in the line of contract farming by giving away 20 % of the profit so earned to the farmer family/land owner. In this case, the parties shall adhere to the sustainability norm so that farmer's land is not over exploited.
- ❑ Agricultural land data shall be digitized using GPS and RS technology and such data shall be put under public domain.
- ❑ Pending the implementation of the proposal to dig the Brahmaputra river, the char areas shall be delineated and identified for suitable crops like maize, medicinal plants, water melons, vegetables, oilseeds and pulses. For this purpose, either ICAR institutes located in the state viz., NBSS & LUP and the AAU shall be given the responsibility. Local NGOs, Panchayats shall also be involved.
- ❑ The state has 0.9 lakh ha of cultivable waste land which shall be utilized for agro-forestry with high value trees and livestock and fish production depending on the suitability. Reputed NGOs working in the state shall be identified and partially supported for this purpose in terms of leasing out such land. A concurrent plan to reclaim the cultivable waste land shall also be taken with the support from the Central Govt. under the schemes like watershed development, National Rainfed Authority etc.
- ❑ For the purpose of addressing erosion, the agriculture department in association with national bamboo mission, ministry of environment and forest, GoI, shall take steps for massive plantation of anti-erosion crops like broom grass, bamboo, banana, and select medicinal plants along the erosion prone areas. This measure shall be explored as a supplementary measure to the plans and programmes of the E & D, Soil Conservation etc. departments. Agriculture Officers in the target sites shall carry out this programme.
- ❑ All the unutilized land under agriculture, horticulture, animal husbandry and fishery departments shall be mapped by each department and then develop suitable plans for their utilization. This should add to quite a few hundred ha to the cropped areas. Each ministry of those departments shall prepare activity milestones for this.
- ❑ The Animal Husbandry and Veterinary Dept. shall mandatorily utilize the VGR lands for the purpose of feed and fodder production to bring in animal feed security. For this purpose, the department shall explore financial aids from DAH & F, GoI and other

sources. The state govt. shall explore the possibility of manpower backstopping to the department.

2. Water and irrigation policy

The state of Assam has the problems of both plenty (during flood) and scanty (during drought like situation) water availability. The policy, therefore, is to bridge this plenty-scanty gap by way of:

- ❑ Undertaking appropriate water management and conservation measures in the line of small, medium and big watershed bringing in convergence with central and state sector schemes and thus promoting surface water lift irrigation up to around 20 per cent.
- ❑ Supporting rain & roof water harvesting devices including the treatment and channelization of marginal water to crop fields to facilitate life saving irrigation to less water demanding crops.
- ❑ Assessment of ground water quality particularly for arsenic, lead etc. to identify toxic elements and heavy metal free zones to promote ground water recharge in those areas and enhancing ground water irrigation potential up to around 30 percent. The heavy metals infested areas shall be treated with appropriate technologies.
- ❑ Irrigation channels of different sizes will be constructed in low/medium land situation with location specific engineering design to serve dual purposes of irrigating the crops during *rabi* season and draining the excess water during monsoon season.
- ❑ Promote the concept of 'crop per drop' by resorting to micro-irrigation measures using the water so harvested and conserved. Use of drip and sprinkler irrigation shall be demonstrated in wider scale for increasing water productivity.
- ❑ Instituting state level awards to the individuals and communities adopting novel and effective water harvesting and use models.
- ❑ Restructuring/resetting the irrigation canals of the state for prevention of seepage loss of water with priority attention to areas where the tail-end plots do not receive irrigation water at all.
- ❑ Recasting/reorganising the district level committee for release of irrigation water at Panchayat level with inclusion of the Agricultural Officers of the area and strengthening cooperation between Irrigation and Agricultural Department.
- ❑ Increasing the storage capacity of major and minor irrigation schemes and de-silting of dams and canals on priority basis to improve the water availability for crops in the irrigation command area.
- ❑ Developing and implementing agricultural programmes based on watershed concept on long term basis with watershed measures like afforestation, eco-restoration of catchments, rainwater recharging and harvesting, flood water management including drainage, water auditing, recycling and reuse etc. Technologies for these activities shall be accessed from the ICAR project on Water Management.

3. Soil policy

- ❑ A database on the soil characteristics of Assam up to Panchayath level will be created over a period of 2 years and shall be made accessible to the farmers through the web

and also through the service of agricultural officers/workers. Assam Agricultural University and ICAR Institute like NBSS & LUP shall complete the job with needed financial support from the state.

- ❑ Soil loss under the influence of heavy rain and flood is an issue. Such losses shall be prevented by way of contour laying and vegetative coverage promoting the cropping intensity, cropping density and forage farming.
- ❑ Similarly, erosion of riverine soil which is another major issue shall be checked both through erosion checking crops like broom grass and resorting to geo-engineering technologies developed for controlling soil erosion.
- ❑ Nutrient uptake from the soil by the crops grown in the state shall be assessed and replenishment of the used up nutrients shall be ensured for maintenance of sound soil health. Additionally, the health of the soil shall be continuously monitored through the assessment of at least 10 important parameters which will be reflected in the soil health cards to be prepared based on the assessment.
- ❑ Urea heavy soil nutrient supply shall be done away with. Instead, soil fertilizer application shall be governed by site specific nutrient management approach with emphasis on organic mode of soil nutrition. The soil mineral mapping for Assam was once done under an ICAR project. A fresh map shall be prepared to identify the deficient nutrients for appropriate mineralization of soil.
- ❑ Organic measures to support the above and underground soil-biota as well as to promote other soil biological activities shall be resorted to.

4. Seed and planting materials policy

- ❑ Agricultural sustainability together with productivity enhancement depends on quality seed in needed quantity so that the state becomes self sufficient in this vital sector. The major policy shall therefore be to produce the seeds locally in the state by completely reviving and strengthening the state seed corporation as well as bestowing the right to produce quality seed to the state agricultural university.
- ❑ The state govt. shall procure such seeds first, without opting for seeds from other states, unless the University certifies so. No seed suppliers without having their own mechanism to produce seeds shall be eligible to deal with seed supply.
- ❑ The state shall concentrate on production of seeds for crops like rice, toria, pulses, jute, sugarcane etc. As of now, seeds for crops like maize and wheat among the cereals shall be outsourced together with the hybrid seeds for all the crops till the state university starts producing such seeds. As regards horticultural crops, planting materials for fruit crops like citrus, banana, pineapple and litchi shall be produced locally. Vegetable hybrid seeds shall be outsourced. Accordingly, seed hubs shall be established.
- ❑ A detailed seed and planting materials production road map shall be prepared by the University for the convenience of the state.
- ❑ Adequate infrastructure for storing the seed and planting materials shall be put in place around the production sites.
- ❑ Incentive for conservation of indigenous landrace by the community and individuals shall be provided and farmers' right to quality seed shall be guaranteed as per the

provision of PPV & FR Act of Govt. of India. Similarly, AAU shall be responsible for preserving and conserving the seeds of the dominant crops in the germplasm bank.

- ❑ The planting materials including seeds produced and distributed by the Department of Agriculture, PSUs and other Government agencies shall bear bar-coded tags for assuring quality and traceability (Bar coded tags are used for data retrieval for ensuring the parentage and accountability).
- ❑ The Govt. will encourage/facilitate establishment of high-tech nurseries for production of quality planting material in large numbers/volumes maintaining the standards as given in the Indian Minimum Seed Certification Standards 2013 for different planting materials and also facilitate and promote use of micro-propagation and other modern innovative techniques and tools for mass multiplication of quality planting materials.
- ❑ Crop-wise seed quality control measures shall be followed and seed coating and pelleting shall be done to protect the seeds from various diseases and pests as well as to enhance germination.
- ❑ The government will explore the possibility of establishing partnership with other NE states for production of seeds of crops like sericulture, potato etc.
- ❑ For the risk-prone disadvantaged situations, the Govt. will institutionalize a system of maintaining buffer stock of the seeds of the desired crop varieties to meet the contingency situation arising out of the vagaries of nature, viz., flood, drought, soil erosion etc.
- ❑ Required Seed Replacement schedule shall be followed and seed production planned accordingly.
- ❑ The state shall develop seed and grain storage infrastructure under GOI programmes like doubling of farmers' income.

5. Farm mechanization policy

- ❑ Considering the farm labour shortage issue and the need to embrace mechanization in large scale, the Govt. shall consider establishing a state of the art college of agricultural engineering with farm implements manufacturing and training facilities for adequate backstopping of farm sector with situation specific kind of farm implements and skilled manpower.
- ❑ With the farm implements so produced, Agro-Service Centres shall be established at the Village Panchayat level to rent out the implements on custom hiring basis. Few FPOs at NGO, cooperative level shall also be promoted for larger reach of the implements.
- ❑ For larger implements like tractors as well as for resorting to precision agricultural methods, a subsidy rate of 80:20 shall be followed, 80 being the share from the Govt. Such subsidy shall be given either to a community/Panchayat or to farmers owning more than 50 acres of land.
- ❑ Each block shall be strengthened with custom hiring centres with equipments like tractors, power tillers, seed drill, transplanters, combined harvesters, threshers etc. which shall be managed by the dominating farmers' society of the area or the village panchayat.

- ❑ In each major production site, primary processing facility shall be established, particularly to enhance transportation load and time sustainability of the transported commodities.
- ❑ Few demonstration units on farm automation, particularly for high-tech horticultural produce shall be arranged in the green houses already established by the government under technology mission.
- ❑ Spices processing units, particularly for ginger, turmeric and *bhoot jalakia* shall be promoted for realizing optimum benefits from them. These units may be outsourced to a trained group of SHGs or NGOs on acceptable terms.

6. Fertilizer & pesticide policy (chemical inputs)

- ❑ The modern agriculture depends heavily on use of chemical inputs for nutrition of the crop and its protection from pests and diseases. The chemical fertilizer consumption in the state is about 53.50 kg per ha against the national average of 104.5 kg per ha. The pesticide consumption is also rather low i.e 81.58 gm a.i. per ha. While low use of chemical inputs may have placed the state in an advantageous situation to fast transform the agriculture of Assam to organic, the imbalanced and injudicious use of fertilizer and pesticides is a serious issue, to do away which the state shall take the following steps:
 - ❑ Take appropriate measure to stop entry of banned chemicals.
 - ❑ Shall resort to Integrated Nutrient Management (INM), Integrated Disease Management (IDM) and Integrated Pest Management (IPM) practices in the areas not covered under organic. For organic areas, 100 percent organic inputs will be used. The state shall also take steps to get such organic inputs prepared locally with scaled up facilities every year to meet the requirement of extended organic areas.
 - ❑ Nutrient and not nitrogen based subsidy shall be followed linking the support with soil health card recommendation and / or the assessment made through precision farming method at a later stage.
 - ❑ Massive awareness and training program shall be conducted on maintaining the eco-system health as well as on the use of judicious use of chemical and other inputs for their enhanced productivity.
 - ❑ Use of chemical fertilizers shall gradually be phased out.

7. Organic policy

Agriculture

The state shall aim at transforming its agriculture into organic over a time frame of 5 - 6 years adopting the following steps:

- ❑ Identify through appropriate survey the cropped areas that are organic *by default*. Roughly around 20-25 per cent of the state's net cropped area of 28 lakh hectare is organic by default. After identifying this area (roughly 5-6 lakh ha), NPOP guidelines to convert it to organic *by process* shall be applied so as to produce certifiable organic products within a year or year and a half.

- ❑ While doing the above, another 20-25 per cent area, where inorganic inputs at milder level have been used, shall be identified through survey again and the measures to convert them into organic over a period of 1-2 years shall be taken thus translating 40 - 50 percent areas into organic within 3 years.
- ❑ Having gained the experience and expertise for 3 years, the remaining chemical intensive areas shall be brought under organic mode within another 3 years.
- ❑ For the above to be implementable, that state shall take the following measures to position itself with needed organic inputs:
 1. Production of organic seeds: Starting with rice, the state shall take steps, in collaboration with the University and private players, to produce the organic seeds of selected crops locally.
 2. Production of other organic inputs: Mainly the bio-fertilizer and bio-pesticides. In the first year itself, to facilitate organic agriculture in 20 % area ie. 5.5 lakh ha, around 11 lakh MT of organic manures/bio-fertilizer shall be needed. Similarly, other inputs. Production of this quantity within the identified area/cluster shall be promoted through SHGs or farmers' organizations under technical guidance from the KVKs/DAO office. Meanwhile, a local certifying agency shall be promoted to ease out the process of certification.
 3. As the organic areas increase every year, similar localized attempts shall be made to ready the input supply.
 4. Every year, capacity building programme of the stakeholders on organic agriculture shall be undertaken through specific farm schools in the identified areas.
 5. Crop-wise organic package developed or to be developed by the University together with the guidelines contained in NPOP shall be followed.
 6. The harvest and the post-harvest shall also be managed organically with separate sorting, grading, branding, storing and onward marketing facilities.
 7. In the entire process, experience of states like Sikkim on organic agriculture shall be shared and linkage with other national and international bodies developed.
 8. Initial attempt shall be to produce the specialty agricultural products of the state organically.

8. Agricultural credit policy

- ❑ Credit at the right time and in adequate amount is a basic requirement of small farm families. Central Govt., of late, has given due emphasis on this aspect. The state shall facilitate NABARD to computerize the loan disbursement system by the functional Primary Agricultural Credit Society (PACS) and link them with national cooperative banking systems at district level, preferably within 6 months to ensure faster and speedy delivery of farm loan to small and marginal farmers.
- ❑ For medium and large farmers, the admissible loan amount of Rs 10 lakh each shall be made accessible doing away with the hassles in loan processing by the banks. Since VGR land cannot be mortgaged as co-lateral security and/or its valuation is kept low, loans need to be extended to such farmers on his likely turnover figures.
- ❑ While disbursing the loan, priority will be given on farm innovation and proposed actions.

- ❑ Each identified farm family in the state shall be given Kisan Credit Card within a period of five years. After screening and correcting the application for KCC submitted by the farmers, the bank concerned shall issue the credit cards within a day. The state Govt. shall also devise modalities to screen out non-farmers from availing the benefits.
- ❑ The interest rates on the agricultural loans taken shall be brought down to 4 per cent from the present level of 7 per cent. The issuance of certificates to the intending loanee farmer shall be made apolitical. Preferably, the ADOs in association with dominant farmer organization of the area may be entrusted with the responsibilities of certifying a farmer approaching farm loan.
- ❑ Issuance of farm loans shall be linked to crop insurance for ensuring recovery.
- ❑ The loans taken for poultry, dairying, animal husbandry and such other allied activities/ventures will also to be treated as agricultural loans. The State Government will take necessary steps to put pressure on the Central Government to consider these types of loans also at par with crop loans as these activities are of the primary production type and inseparable from agriculture. Since the repayment of all loans taken by livestock farmers are for farming only, they are to be treated as ‘Crop Loans’ for the purpose of interest. Their repayment schedule for recovery will be made 10 years with a moratorium of payment for first year and payment of interest for the next two years considering the fact that profit margins from such allied agricultural enterprises are low in initial 2-3 years and farmers find it difficult to re-pay the loan instalment during this period.
- ❑ The Government will regulate the functioning of the Micro Finance Institutions (MFIs), if needed with legislation, allowing such institutions to charge only 2 per cent interest rates above the rate they access it from the banks.
- ❑ An ‘Agricultural Credit Relief Fund’ will be created with contributions from the Central and State governments and banks for addressing the issue of waiving loans in the event of natural calamities.
- ❑ A system will be put in place for registration of the private money lenders and provision of legal support through legislative measures. Arrangement will be made for enacting legislation for debt determination and settlement of outstanding debts of the farmers.

9. Agri-trade related policies

- ❑ Following trade liberalization, intellectual property regime and change in consumer preferences, agriculture in 21st century has to shift its focus from production centric agriculture to market demand driven agriculture. The state of Assam has to do both ie., production centric to ensure sufficiency and market demand driven to capture the regional as well as market likely to be opened up after the operationalization of Act-East policy. Since this sector is emerging as a potential area for businessization of agriculture, it needs appropriate policy coverage like:
 1. Opening up of at least two primary markets in each district of the state.
 2. Opening up of two secondary markets in each block of the state.

3. Scaling up of the rural *huts* at village level and linking up these markets with Sl. No. 2 & 1 above.
 4. Eventually, after 2-3 years, the state will resort to e-NAM (Electronic National Agricultural Market) encouraging private entrepreneurs to establish start-up companies in agri-market (All the 4 above shall be done with central assistance).
- ❑ In order to capture agricultural trade, the state shall encourage diversification to feed emerging markets being thrown open by the companies like Patanjali, Dabur etc. within the state which will need products like Manimoni, tulshi, honey, turmeric, black pepper etc. Production of these shall be the market driven agriculture besides the specialty agriculture of the state like *joha* rice, glutinous rice, parboiled rice, Assam lemon, Karbi ginger, *muga* silk etc. for outside the state/country trading. The policy of the Govt. is to lay special emphasis on such items for trade purposes while supporting the production enhancement of the food items required for the state.
 - ❑ In order to produce quality and competitive food items for trade, much greater emphasis shall be given on food value chain (from field to fork) research and development covering the areas like processing, cleaning, grading, packaging and branding along the value chain with food traceability components dovetailed in - promoting thereby secondary agriculture to address the unemployment problem.
 - ❑ Since 'Business as Usual' mode will not do to enter into the changing agricultural trade, the state will reorganize its agricultural marketing sector with infusion of marketing professionals.
 - ❑ e-Choupals shall be established in each Panchayat for disseminating agricultural trade related information to the grass root level producers.
 - ❑ In order to restrict middlemen taking a bumper profit, the Govt. shall enhance its procurement capacity while simultaneously promoting few certified private procurement agencies. Accordingly, the Govt. shall create storage infrastructures including the cold storage.
 - ❑ A functional Food Quality Assessment Cell manned by efficient officers with knowledge in international food trade and quality like HACCP shall be put in place.
 - ❑ The Government shall encourage agri-based tourism for widening the scope of the farmers, especially for the progressive farmers and the agri-preneurs.
 - ❑ A massive capacity building drive on agripreneurship shall be taken, inviting overseas experts, if needed to prepare the food growers and processors of the state to be capable of capturing the upcoming food trade.

10. Policy on biodiversity

- ❑ The state has an enviable floral and faunal bio-resource and the policy is to translate this bio-wealth into bio-economy by prospecting the vast gene pool hidden in them and utilizing them in production of stress tolerant varieties and even health protecting pharmaceuticals.
- ❑ Presently, the Forest Department under the aegis of National Biodiversity Authority is engaged in this sector. The role of the state agriculture and other line departments and the University are missing. Together, a data base on the bio-diversity shall be developed and the potential of the genetic strength of this bio-diversity assessed for

developing suitable cultivars on one hand and promoting the specialty resources for national and international trading converting thereby this wealth into economy.

- ❑ Developing gene therapy from these resources to counter the current and emerging stresses in agriculture and thus promote gene trading across the globe.
- ❑ Protecting, preserving and improving the homestead garden known for household biodiversity centres.
- ❑ The endangered and likely to be extinct bio-resources as identified by IUCN (International Union for Conservation of Natural Resources) shall be immediately conserved *ex sit* while taking up appropriate measures to conserve the less endangered one in situ with the help of national (Ministry of Environment and Forest, Agriculture and Farmers Welfare, ICAR) and international (Food and Agriculture Organization, Rome) agencies.
- ❑ Establish a research and training institute on agricultural biodiversity preferably in Kaziranga/Manas/Pabitora area and incentivise annually the biodiversity conservationists of the state.
- ❑ Incentivise annually the biodiversity conservationists while developing modalities to check gene piracy through clandestine transfer of the bio-resource.
- ❑ Strict vigil on invasive alien species and alien genotypes with effective measures for their eradication.

11. Post-harvest policy

For want of appropriate food processing and value addition facility, around 30-60 per cent of the food produced is lost annually in the state.

- ❑ The policy initiative shall be to bring this loss down to at least 15-30 per cent embracing established and novel technologies including bio-nano technologies.
- ❑ The state agricultural university shall be accordingly strengthened with highly skilled manpower and equipment to develop crop-wise post-harvest technological package suitable to the state condition.
- ❑ Research on the total food value chain right from harvest to packaging and marketing shall also be strengthened and bilateral collaboration promoted if needed.
- ❑ A complete package shall be made available within a reasonable time frame.
- ❑ The food parks being established by different agencies shall be centrally monitored for quality and traceability issues.
- ❑ Interested entrepreneurs in post-harvest area and food quality analyses shall be promoted for start up entrepreneurship venture under programmes like NLCPR.
- ❑ Linking the processed food to the market shall be facilitated through refrigerated transport means under programmes like RKVY, NFSM, NHM etc.

12. ICT policy

Information and Communication Technologies (ICTs) can directly support farmer's access to timely and relevant information, as well as empower the creation and sharing of knowledge of the farming community itself. The public, private, and Non-governmental Organization (NGO) extension services will be able to increase their effectiveness by

using these ICT tools. The concept of ICT is still in nascent stage in Assam. Following policies regarding ICTs are framed with these backgrounds.

- ❑ For knowledge empowering of the farmers on the use of ICT, each district office including the KVK shall be strengthened to organize farm schools in different locations for a period of one week for providing skill training on the use of internet and mobile applications.
- ❑ At village level, farm information resource centres shall be established exploring further the possibility of establishing custom hiring centres for computers wherever needed. Alternatively, e-Choupal/Information Kiosk shall be promoted at village level.
- ❑ Important agriculture related news/papers/periodicals shall be translated into Assamese language and made available to the above farm resource centres.
- ❑ Digital India initiative to share Govt. news/information electronically through the above resource centres shall be taken up.
- ❑ Appropriate training to electronically link up the food producers with village/secondary/primary and e-NAM markets shall be imparted.
- ❑ The identified best farmers from each Block of the state shall be given laptops/Smart Phone the way it is given to the rank holder students to promote ICT use in farming.

13. Policy on farmers' welfare

- ❑ In order to attract and retain the youths in farming, agriculture shall be restructured into a business mode like that of an industry where the crop fields, animals and fishes shall be the industrial factories and the input (seed, feed, fertilizer, farm machinery etc.) suppliers shall be the raw material suppliers to the above factories for production of the factory outputs in the form of grains, vegetables, fruits, milk, egg and fishes etc. and factory by-products like renewable energy (biogas), meat meal, bone meal, fish meal, cakes from oilseeds, leather etc.
- ❑ To support the above, the state shall build up convergence with the associated departments to assist the farmers under the flagship programme of the Govt. like issuance of soil health card, facilitate micro and drip irrigation, crop insurance scheme, start-up India, MNREGA and Skill India, e-NAM etc. The state shall also ensure delivering the quality deliverables on time for production and productivity doubling and thus the income of the farmers.
- ❑ The state shall also take all measures to position the farmers as organic farmers and promote higher dividends from their farming.
- ❑ A Farmers' Commission shall be opened to record the problems and vulnerability faced by the farmers to take up adequate redressal measures of such problems.
- ❑ A minimum support price for all the agricultural commodities produced in the state shall be considered based on the report of the Cost of Cultivation Centre, a Govt. of India setup attached with AAU.
- ❑ The state shall also increase its farm produce procurement capacity to the level of at least 50% so that the farmers do not suffer from market gluts.
- ❑ Known farmers' organizations shall be taken as partners while framing new approaches to farming and farm related trade.

- ❑ In order to address the issue of less and lesser numbers of farm labourers, the Govt. shall consider establishing an agricultural engineering college cum manufacturing centre of prototype farm machineries suitable for small holder farming situations.
- ❑ In order to encourage double/triple cropping, the Govt. shall explore establishing around 500 *gosalas* with capacity for 500 animals in each to control and contain open grazing as well as for facilitating the use of cow urine and dung from local cattle.
- ❑ The concept of Smart Farming in Small Villages shall be explored focussing on the niche area of crop/animal of that village with other than niche crops/animals supporting and backstopping the niche area crop/animal.
- ❑ In order to counter the spurious seeds which is a major cause of farmers' grief, the ASSCA shall be completely restructured with adequate manpower therein. Similarly, measures to contain the spurious fertilizers and chemicals shall be taken through a process of random certification after the supply has been made.
- ❑ The state shall also consider giving pension to the farmers above 60 years of age and also earmark a fund for assistance to the farming families while they suffer from diseases like cancer that demands costly treatments. Alternatively, medi-claim type of insurance for farmers shall be explored.
- ❑ The state shall devise mechanism to promote high value and high tech farming modules.

14. Policy for attracting and retaining youth in agriculture (Policy on ARYA)

The finding of NSSO, New Delhi that given an alternative option, 34 per cent of the farmers are ready to quit agriculture is a matter of great concern. This concern is compounded with the disinterest of the youth in agriculture mainly because of non-commensurating return from the enterprise as well as its back-breaking nature. Since tomorrow's agriculture has to be pursued in a business mode embracing mechanized activities, alluring the youth to agriculture through a policy is considered the need of the hour. The govt. therefore, shall

- ❑ promote secondary agriculture ie., input backstopping (through seed, fertilizer, farm implements, agro-advisory, agri-clinic etc.) and output handling (grading, sorting, packaging, branding, storage, and marketing etc.) involving the youth of the state.
- ❑ create high value and diversified agricultural options like floriculture, fishery, animal husbandry, medicinal plants, soilless medium for quality planting materials, hydroponics and aeroponics, vertical and rooftop agriculture, manufacturing units for farm tools and machineries, food entrepreneurs for door to door delivery etc.
- ❑ prepare them as master trainers in crop protection and extension service delivery agents.
- ❑ create a consortium of innovative and successful young farmers and engage them in university etc. sponsored farmers training programmes for injecting motivation.

15. Policy on central fund utilization

All central assistance is presently confined to the development departments. Since the state agricultural university today is widespread across the state through the different colleges, research stations and KVKs, a minimum of 25 per cent of the central assistance

for each programme shall be utilized through the university. This will include primarily programmes like organic agriculture, doubling farmers' income and ushering in egg, meat and fish revolution in the state.

16. Policy on PPP

In this era of financial crunch at Government level, the option of PPP needs to be explored at 90:10 per cent ratio, 90 per cent being the share of private players. Such partnership shall be promoted particularly in the areas where agricultural export promotion and domestic distribution is very high. Some identified areas could be floriculture, large scale production and processing of specialty agri-horticultural products including egg and fish area where deficiency level is high and expertise level is limited. Due care shall however be taken while selecting the private players whose performance indicators could be their institutional framework, field-farm-manpower availability and the duration of their expertise in the area.

17. Policy on convergence building

Delayed decision in delivering the agricultural deliverable inputs in time has been an issue which results into sub-optimal production. In order to address this and other related issues the state may consider forming an Agriculture Cabinet drawing the ministries like agriculture, animal husbandry, fisheries, irrigation, power, PWD, soil conservation and finance so that one can complement the need of the others for on-time delivery of all agriculturally important inputs.

18. Policy on skill development

Though the state is basically agrarian, the agricultural production system in Assam has remained, by and large, traditional and subsistence in nature due to which the productivity of almost all the crops has been much lower than the national average. More importantly, because of low return from engagement in this sector, the youths are generally reluctant to adopt agriculture or allied activities for their employment/livelihood. It is indeed a matter of serious concern that the sector on which almost 3/4th of the population depend for livelihood is manned by those who are engaged not by choice but on compulsion. Therefore, the immediate challenge for the state is to make agriculture and allied sector more productive and remunerative which can be possible only with infusion of skilled manpower to the sector who can effectively adopt the modern technology dynamically adjust to the changing demands of technologies. There is huge untapped opportunity for fruitful employment of the youths in agriculture and allied sector, particularly, in secondary agriculture if and when they are adequately prepared with needed skill and start-up support. The following policies regarding skill development are framed with these backgrounds.

- ❑ The state will launch massive skill development programmes with focus primarily on the school and college dropouts who are very large in number but relatively ill equipped for seizing employment opportunities.

- ❑ The Government will establish one skill development centre in agriculture sector in each district in the fashion of ITI. To begin with, certain vocational courses with potential of self employment will be introduced in few ITIs.
- ❑ The AAU will be adequately supported to take skill development programmes.
- ❑ Basics of agriculture will be introduced in school/college education.

19. Climate change adaptation policy

Effect of climate change on agriculture will be one of the major deciding factors influencing the future food security. Understanding the weather changes over a period of time and adjusting the cultivation practices towards achieving better harvest is a challenge to the growth of agricultural sector as a whole. Climate change induced increase in droughts, floods, heavy precipitation events, hot extremes and such other events is expected to negatively impact agricultural production, and farmers' livelihood. Increased production variability could be perhaps the most significant impact of global climate change on India including Assam. Recurrent flood is one of the major problems hindering the state's desired progress and prosperity. Warming of the climate will significantly aggravate the flood and erosion problem as it will surge the mighty river Brahmaputra flowing through the state with the water from the Himalayan glaciers. Similarly, the state is expected to experience frequent unpredictable drought like situations. Last one decade's experience might have already indicated to the possible difficult future. Population dynamics of the pathogen and insect pests is also expected to change resulting in significant yield loss. These will intensify the need of crop production strategies (e.g. drought and submergence tolerant rice varieties, flood escaping short duration varieties, adjusting the crop calendars, cropping sequences and cultivation practices and alternative land use planning etc.) to cope with the fast worsening situation. To cope with possible impact of climate change on agriculture the following policy initiatives will be taken.

- ❑ Initially, the Government shall promote the short-term adjustment strategies against climate change to optimise production with minor system changes through management of cropping systems (e.g. changes in crop varieties such as varieties with different thermal requirements, varieties with less variable yields, introduction of diverse cultivars, changes in agronomic practices like sowing/planting dates, changes in fertiliser and pesticide use etc.) and conservation of soil moisture (introduction of moisture conserving tillage methods like minimum tillage, conservation tillage, stubble mulching, etc., management of irrigation) etc. For this, needed collaboration will be sought from AAU and other institutions.
- ❑ The Govt. shall encourage and facilitate relevant agencies to work on long term adaptation strategies to overcome adversity caused by climate change through major structural system changes such as
 - Changes in land allocation to optimise or stabilise production by substituting crops with high year to year variation in productivity with crops with stable yields
 - Development of "designer-cultivars" to rapidly adapt to climate change induced stresses like heat, moisture deficit, submergence, pests and diseases etc.

- Crop substitution and cropping system adjustment to conserve soil moisture and improve water use efficiency
- Changes in nutrient management to be reflected in terms of growth and yield of crops and also changes in nutrients turn-over in soils
- Changes in farming systems to diminish vulnerability to sudden shock and make farming more competitive etc.
- ❑ The technology demonstration under the national initiative on climate resilient agriculture carried out in select pockets of the state by the university shall be expanded to more areas of the state so that the state can position itself with alternative cropping models as well as resource use efficiencies in the event of visible impact of climate change.
- ❑ The university shall scale up its research on finding gene based technology capsules for ushering in climate neutral agricultural model.

20. Policy on Intellectual Property Right (IPR)

In this era of guaranteeing and protecting the rights of the bio-resources and the processes emanating from research trials on them, it will be highly essential, particularly for states like Assam which contains enviable bio-resources, to protect the entity of its resources through patenting, trademark or copy rights as the case may be. The state shall therefore create a vibrant and accessible IPR Cell, preferably under the university providing additional manpower for this purpose so that all processes for patenting is neatly carried out by the Cell, irrespective of who the patent claimer is.

21. Policy on Agricultural Newsletter

In order to feed, on regular basis, the agriculturists including the farming community on the recent invention and information in agriculture across the country and beyond, a fortnightly newsletter on electronic mode shall be published by the Dept. of Agriculture accessing also the information from the veterinary and fishery departments.

22. Policy on Education, Research and Extension

Education

- ❑ Considering the manpower need to effectively man different sections of agriculture, the AAU, which is the sole university/institute, shall concentrate on producing farm ready, self ready, industry ready, bank/insurance ready and science ready students depending on their aptitude and approach. Agricultural trade/commerce, patent and computer literacy be also a part of the course curriculum.
- ❑ The Assam Agricultural University will be adequately supported to produce the 21st century needed manpower as indicated above.
- ❑ Considering increased emphasis on agriculture, the state may consider establishing few more agriculture/horticulture etc. colleges covering areas like Barak Valley.
- ❑ Excellent teaching-learning ambiance in the university shall be created to attract global students and global faculties as visiting/adjunct faculties.

Research

- ❑ In this era of fast technology changes, agricultural research has to be dynamic process to keep on providing time demanding technology backstopping for increasing and sustaining productivity and production growth curve and therefore, AAU shall widen its research portfolios by engaging the PhD scholars in problem solving and science feeding research. A yearly allocation of Rs 10 crore shall also be considered for faculty and students research to ensure technology flow from the university.
- ❑ The AAU and other institutes involved in agricultural research will be encouraged to establish linkage with the national and international institutes of repute for collaboration on research in the frontier areas of science and technology.

Extension

- ❑ Following the liberalization of agri-trade globally, agricultural extension will have to focus on market intelligence based extension service delivery advising the food producers on what to produce, how much to produce, when to produce, where to store and market etc. Accordingly the extension agents will be trained on market led extension for gearing the producers through ICT mode of information percolation to produce as per the market need.
- ❑ KVKs and ATMA shall be considered as the single window extension delivery institution by covering the weakness of one with the strength of the other.
- ❑ This institution shall develop a complete data base on farmers' inventory and interest for extending technological information with specificity.
- ❑ The state shall, on priority, fill up all the positions of field extension services including the VLEW's for supporting the KVKs and ATMA to reach the unreached for a technology led agriculture in the state.
- ❑ District-wise information and technology hub shall be created for assessing the similarities/differences in crops and cropping pattern for undertaking district specific technology percolation.
- ❑ Best extension service delivery modules across the globe shall be accessed and their adoptability in the state condition validated and refined for bringing in more vibrancy to the technology dissemination sector.

23. Policy on Agricultural Biotechnology

Despite the 'for and against' opinion about pursuing biotechnological means of food production path in the country, the state, because of its vast bio-resources, shall have to embrace biotechnological tool and technique development aspects to find, more particularly, biotic and abiotic stress countering technology capsules for food and environmental security. Accordingly, following shall be the policy backup:

- ❑ Further strengthen biotechnology research and education in the state in collaboration with the Department of Biotechnology, GoI. Skilled manpower generation and equipping and expanding the existing facilities, particularly in the university and the biotech hubs shall be the focus.
- ❑ The key areas of research for next 10 years shall be:

Agricultural Biotechnology:

- a) development of transgenic/genetically modified crop germplasm resistant to biotic and abiotic stresses especially for the crops having high potential to provide food and nutritional security using gene technology;
- b) molecular breeding for the improvement of crop plants with resistance against stresses using known genetic source and also discovering new genetic resources from germplasm of Assam and other places;
- c) production of genetically uniform quality seeds and planting material especially for banana, citrus and pineapple;
- d) development of Bio-fertilizers and Bio-pesticides to promote organic agriculture;
- e) tissue culture and bio-prospecting of medicinal and aromatic plants;
- f) diagnostics for phyto-pathogen and
- g) tea biotechnology for the creation/identification of newer and efficient clones.

Animal biotechnology:

- a) increasing the production, availability and shelf life of animal products including feed and fodder;
- b) development of nutritionally rich, high protein fish;
- c) increasing productivity of livestock through biotechnological interventions like in vitro fertilization, embryo transfer technology, gene technology etc;
- d) improving the health of productive animals through biotechnology based disease control mechanism and tools;
- e) developing value added animal products; (e) developing better breeds/strains of livestock and poultry using known or new methods of biotechnology;
- f) developing better strains of livestock species using known or new methods of biotechnology (transgenic cattle);
- g) developing diagnostics, vaccines and therapeutics for major livestock and poultry diseases such as foot and mouth disease, rabies, hemorrhagic septicemia, anthrax, classical swine fever, avian influenza, tuberculosis, brucellosis, salmonellosis, etc.;
- h) establishment of cell lines and semen banking facilities for maintenance and propagation of superior quality germplasm;
- i) development of better methods for pisciculture to cultivate commercially important fish species;
- j) genetic improvement of indigenous high-yielding fish species and establishment of live gene bank of indigenous fish species.

Microbial Biotechnology:

- a) bioprospecting for agriculturally beneficial microbes and elucidation of such mechanisms;
- b) identification & improvements of microbes involved in heritage drinks and foods of the NE India;
- c) identification, validation and barcoding of microbial strains/consortia to be used for bio-fertilizers and bio-pesticides applications and

- d) use of microbes to convert industrially polluted areas into arable lands through bioremediation etc.

Biotechnology education

- a) inclusion of relevant courses of biotechnology in both under-graduate and post-graduate programmes in all colleges of Assam Agricultural University to generate manpower for manning research in the areas of interest;
- b) promotion of biotechnology education among the meritorious students of the state by providing fellowships/studentships, training etc. for their confidence and capacity building to make 'Make in India' products using biotechnology;
- c) promotional steps to attract students and researchers from various South-East Asian countries.

24. Crops specific policies

Rice

Since the state's agriculture is rice centric occupying 64 percent of gross cropped area, the aim shall be to produce surplus rice for national and global food basket by scaling up its production and productivity to at least 12 million tonnes from the present level of 5.2 million tonnes by strategic planning and application of science and technology. The strategy already outlined by the university in this regard shall be pursued, both by the department and the university, under funding support from NFSM or RKVY for which the department shall appoint a nodal officer to oversee the implementation of the strategy. Special focus shall be given on the speciality rice of the state as well as conservation of local landraces. New technologies on water management, nutrient use, soil amelioration, mechanisation, organic rice, disease and pest management etc shall be applied including rice cultivation under drip irrigation, and the means to tackle the moisture content issue in harvested rice.

Maize

Maize has emerged as an important crop for the state and in view of the need to support a large livestock industry, much greater and concerted effort shall be given on expanding the maize area, fitting it in cropping sequence/ crop diversity. All the proven and developed technologies including the use of single cross hybrids shall be adopted to raise its productivity from the present level of 0.9 t/ha to 5t/ha within 4-5 years with a target to produce 12-15 lakh tonnes of maize annually. The department shall frame a detail project on this and also earmark needed fund for this. Expertise of AICRP on Maize, ICAR and the university shall be accessed.

Wheat

Though wheat is not a major crop of the state, a time has come to pursue this crop in view of changing food habit of the population as well as the need to have a second crop, second to rice, to tide over the impending threat from climate change. At present, wheat

is grown in just 0.31 lakh ha and most probably the area will not go up in the near future unless attempted through a policy coverage. One of the major constraints in wheat farming in the state is that the harvesting season coincides with pre-monsoon rain. Yet another is the kind of quality of Assam wheat. Scaled up research on developing short duration, pre-monsoon escaping variety, together with development of suitable agro-technique shall be carried out by the university in collaboration with wheat research institute of ICAR. The state shall also identify wheat farming friendly areas/the rain shadow areas for promoting its cultivation.

Minor millets

The state has some highly potential areas like BTC, Karbi Anglong and North Cachar hills for small millet production which has not been explored adequately. Considering their nutritional benefits, ability to adopt to difficult growing conditions and ease of storage, small millet production programmes shall be launched to popularize the crop first in their original production sites and then in other sites of the state with appropriate technology backing. With greater appreciation of the food value of the millets, there is now greater opportunities to market value added products from these crops.

Pulses

Pulses cover 1.5 lakh ha to produce 0.89 lakh tonnes with yield of 589 kg/ha. The area, production and productivity were 1.19 lakh ha, 0.67 lakh tonnes and 560 kg/ha, respectively during 2009-10 indicating rather slow growth of pulses in the state. One can imagine the amount of chickpea the state consume through its temples, namghar and home ceremonies. All out effort is therefore necessary to embrace pulses in the state's cropping pattern and increase its production from the present level of 0.89 lakh MT to about 6.00 lakh MT within the next 5-7 years to make the state self-sufficient in pulses for which the pulses area shall be increased from 1.5 lakh ha to 4 lakh ha and per ha productivity from 589 kg to 1000 kg selecting right varieties and adopting right technologies. For this, support from NFSM, 10 percent fund from Indian Institute of Pulses etc. shall be utilized.

Oilseed crops

The important oilseed crops grown in the state of Assam are rapeseed-mustard, sesamum, niger, linseed and groundnut. Among all these crops, toria (belonging to rapeseed-mustard) is most predominant which alone covers about 2.80 lakh ha of total oilseed area of 3.25 lakh ha. The average yield (611 kg/ha) and production (1.86 lakh tonn) are however not very encouraging. Like that in pulses, oilseed area shall also have to be increased from 3.25 lakh ha to about 5 lakh ha to produce 5 lakh MT (with per ha productivity of 1.0 t from 0.61 t/ha), 3.14 lakh MT up from the present level of 1.86 lakh MT over the years through the injection of technology, promotion of this crop to achieve double/ tripple cropping in the state as well as promoting its processing/ extraction facilities at community/ production site level. Needed support for this shall be accessed from Technology Mission on Oilseeds as well as from the FLD programme of the KVKs.

A detailed road map both for oilseed and pulses shall be prepared to achieve the milestone.

Sugarcane

Sugarcane areas in the state (0.30 lakh ha) is not very significant. It has rather reduced over the years especially due to the sugarcane areas being converted to small tea gardens in Upper Assam areas of the state. Non-availability or non-functioning of the sugar mills has added to this reduction in area and the farmers opting for alternative crop like Tea. In view of the Upper Assam erstwhile farmers opting for Tea, focus for sugarcane needs to be shifted to Lower Assam area with appropriate growing and processing technology as well as the sugarcane factory back up. A detail work plan for sugarcane shall be brought out by the department and worked upon.

Jute

This was an important crop for the state. However, the crop being highly labour intensive with a fluctuating market price, the farmers gradually became disinterested to grow this crop that too at a time when its market value is increasing owing to its products being bio-degradable. Necessary initiatives are therefore, called for to reinvigorate this mode of agriculture in the state by embracing newer technologies and processing (retting etc.), value addition methods. Linkages with Jute Development Board and ICAR institute on Jute at Kolkatta needs to be strengthened for rejuvenating the sector and farmers capacity building aspect needs to be taken up. A complete strategy document shall be prepared by the department to revive the sector for consideration of the government.

Horticultural crops

Vegetable crops

Because of suitable agro-climatic conditions, different types of vegetables are cultivated in the state over different seasons. The state produces about 52.15 lakh tonnes from an area of 2.79 lakh ha with productivity of 18.25 t/ha. Lack of suitable storage system, post-harvest and processing facilities and access to market and uncertainty in prices etc. discourage farmers from undertaking large scale cultivation of vegetables and fruits. Several other serious problems like lack of irrigation facility, menace of monkeys and other pests, stray cattle etc. also hinder vegetable cultivation in the state. The following few points need to be attended for expanding vegetable area and enhancing productivity and profitability:

The role of vegetables in the dietary habits of the people is increasing everyday and so also the fear of consuming hormone injected vegetables. The later, however has not yet assumed an alarming situation in the state, unlike other states, because of their local production methods. The state can take the advantage as an organic vegetable producer state in the near future for which the policy option shall be to produce all the vegetable seeds locally under protected cultivation method for supply to the growers and to ensure not utilizing the banned chemicals for pest and disease problems. Quality aspect of the

vegetables shall be assessed randomly in the established laboratories. In addition attempts shall be made to improve the traditional bari system (home stead gardening) of the state with high value - low volume vegetable crops besides introducing vegetable gardening in the school and college premises. Yet another area to focus on is the root and tuber crops of the state for which a special package shall be developed to support the farmers engaged in its farming. This will economically benefit the farmers since a great demand exist for these crops in animal feeding market, particularly the pigs.

Productivity increase in vegetable crop is an issue. So also the introduction of exotic vegetables. Research on development of new varieties and growing techniques (in organic mode) and validation/ refinement of exotic vegetables shall therefore be taken up. Similarly, techniques for hydroponic/ aeroponic and vertical gardening of vegetables in water bodies, green house/ net house/ floor space as well as roof top vegetable farming shall be made available to the stakeholders in a reasonable time frame. Pre and post harvest handling of vegetables shall receive priority attention. Block wise vegetable mandis shall be promoted with transportation facilities from the production sites.

Fruits

Though the overall fruits productivity (13.75 t/ha) in the state is in line with the national productivity, its production (20.74 lakh tonnes) is not yet sufficient to totally bridge the demand gap. Going by the potentiality and also the interest of the local youths in pursuing fruit farming (specially, Banana, Jackfruit, Pineapple, Citrus), there is a need to expand the areas under fruits and to make available disease free quality planting materials. In addition to this, the growing and mechanization techniques need to be further fortified for which advanced technologies from countries like Israel need to be accessed, validated, refined and used. According the following options:

For expanding the areas, massive plantation of fruit crops shall be carried out in the cultivable waste land as well as the permanent fallows. The outer boundaries of the integrated farming system plots shall be erected with fruit crops with intercropping of site specific crops. The erosion prone areas shall also be utilized for production of banana. The concept fruit orchards as is available for litchi in Tezpur areas shall be promoted for different fruit crops for area expansion.

For disease free planting materials, private players, in addition to the university, shall be supported under a PPP mode. Number of tissue culture laboratories and grafting units shall be increased to produce the required quantity of planting materials. V-type nurseries with a production capacity of around 16 lakh planting materials per annum shall be established in each agro-climatic zone and a linkage chain for their outlet to the users developed.

Increasing the shelf life of fruits like banana is an unsolved problem. This aspect shall be dealt with appropriate technological knowhow including a package for right time harvesting and packaging. A fruit corporation needs also be formed for procurement, transportation and handling of the fruits. An incentive to provide a minimum of 30 percent subsidy to the semi-commercial and commercial units desirous of expanding their area and embracing newer technologies shall be considered.

Spices

Assam is the home for many important and lucrative spices like chilli, ginger, turmeric, black pepper etc. this strength of the state needs to be explored to capture the upcoming spices trade and thus facilitate improving income of farmers engaged in this sector. The state therefore shall take all necessary measures, right from introducing spices under agro-forestry programme to creating appropriate drying and processing facilities. The areas like Sonapur shall be developed as spices collection hub from the entire Northeaster Region in an industrial mode for bulk processing, packaging, branding and marketing. Special emphasis shall be made on organic production of spices for capturing both national and international market. Needed support for additional growth spices sector shall be explored from Spices Board of India as well as from APEDA. The university shall develop all needed packages separately for each important spice crop.

Flowers

Assam with its humid tropical climate has a promising future in the field of floriculture. Flowers like orchids, anthurium, gerbera, tuberose, lily, marigold etc can very easily be grown in both open and shade-net house in the state. In order to become a competitive player in this upcoming floriculture trade, the Govt. shall take the following initiatives.

Develop a data base on potential areas of the state for diversification into floriculture including farmers'/societies' interested to undertake this farming on competitive mode.

Capacity building programme of the groups so identified shall be taken up on growing techniques, both under open and protected cultivation mode, as well as their post-harvest handling, packaging and marketing.

Special emphasis shall be given on the production of demand driven flowers grown locally, namely, orchid, marigold etc.

Considering the perishable nature of the flowers for trading within the state, a suitable procurement and distribution network shall be formed to encourage the growers.

Flower farming on hydroponic mode, specially in the water bodies in the departmental/university fisheries farms as well as in the *beel* areas to create additional areas for such farming.

Feeding the flower industry with appropriate planting materials shall be an issue for which local seed growers shall be promoted in addition to easing out the process of accessing planting materials from outside the country.

Medicinal and aromatic plants

Over 7500 flowering plants are available in NE India and almost all are having medicinal properties. The Steering Committee of National Mission on Medicinal Plants (NMMP), Govt. of Assam has identified 34 prioritized medicinal plants, other than aromatic plants, for the state. In view of the increased awareness and importance of managing and sustaining the human, crop and animal health with naturally occurring medicinal plants and to minimize the use of chemo-centric therapy, MAP is now being pursued vigorously across the world and therefore, it is the most opportune time for the state to leverage the benefit from its vast MAP resources. In order to achieve this, setting up of organized MAP farms shall be a policy together with adequate conservation and improvement

measures of this resource presently being managed and farmed by traditional farmers by way of injecting awareness and the possible income generating opportunity from them. Since this sector is already organic by default, they will be made organic by process following the NPOP/IFOAM guidelines.

As the farming gets momentum, facilities shall be put in place to process and derive the drug molecules in collaboration with the institutes on pharmaceuticals as well the ICAR institutes on MAP at Bhopal for enhanced profit and/or getting the royalty out of the made medicines by the pharmaceutical companies. NEDFi, NEIST and the university shall refine the agro-techniques and assist in seed multiplication either themselves or in collaborative mode with NGOs/Farmers Societies.

Plantation crops

Owing to long tradition of use and also for favourable soil and climatic conditions, several plantation crops, particularly, areca nut and betel vine, coconut etc. are being grown in large area in the state. However, the state has not been able to tap its potential warranting suitable policy initiatives as follows:

Like that with fruit crops, area expansion drive will be made with promotion of nurseries for quality planting materials, garden concept, site specific intercropping with different crops (like ginger, turmeric etc.).

Market infrastructure and linkage will be established with needed processing facilities in the production hubs for different plantation crops. For instance, needed facilities will be created at Hawli for storage and processing of areca nut.

LIVESTOCK POLICY

Livestock plays an important role in Indian economy. About 20.5 million people in country depend upon livestock for their livelihood. Livestock sector contributes 16% to the income of small farm households as against an average of 14% for all rural households. This sector provides livelihood to two-third of the rural community. It also provides employment to about 8.8 % of the population in India. India has vast livestock resources and the sector contributes 4.11% of GDP and 25.6% of total GDP contributed by Agriculture and allied sectors. The share of this sector to the total Agriculture GDP increased from 18.8% in 1981-83 to 25.6% in 2007-09.

Driven by the structural changes in agriculture and food consumption patterns, the utility of livestock has been undergoing a steady transformation in the country. Sustained income and economic growth, a fast-growing urban population, burgeoning middle-income class, changing lifestyles, increasing proportion of women in workforce, improvements in transportation and storage practices and rise of supermarkets especially in cities and towns are fuelling rapid increases in consumption of animal food products. Between 1983 and 2004, the share of animal products in the total food expenditure increased from 21.8% to 25.0% in urban areas and from 16.1% to 21.4% in rural areas.

Livestock sector grew at an annual rate of 5.3% during 1980s, 3.9% during 1990s and 3.6% during 2000s. Despite deceleration, growth in livestock sector remained about 1.5 times larger than in the crop sector which implies its critical role in cushioning agricultural growth. Both livestock and fisheries components have been growing faster than the crops component for a decade. However, the livestock sector has so far not received the policy and financial attention it deserved. The sector received only about 12% of the total public expenditure on agriculture and allied sectors, which is disproportionately lesser than its contribution to agricultural GDP.

The extent to which the pro-poor potential of livestock can be harnessed would depend on how technology, institutions, policies and financial support address the constraints of the sector. The future growth has to come from improvements in technology and service delivery systems leading to accelerated productivity, processing and marketing.

Livestock Sector in Assam:

The Livestock Sector in Assam has a great potential for emerging as a major contributor to the rural economy. For long, the sector has been deprived of the required attention. It is high time that we pay due attention to this sector for the benefit of the state. A paradigm shift in our attitude towards the Animal Husbandry and Veterinary Sector is an immediate necessity. Proactive government intervention in streamlining the activities of the Department of Animal Husbandry & Veterinary, establishing better coordination and linkages with all stakeholders (those involved in education, research, services and extension), providing required government support and bringing in necessary changes in the basic set up of the entire machinery are desired.

Shortfall in production and high domestic demand, export opportunities, livelihood security, large-scale employment opportunities, entrepreneurship development and industrialization,

economic renaissance of Assam – these are some major issues that the state can deal very effectively through the Animal Husbandry and Veterinary sector.

The contribution of Animal Husbandry sector to the State Domestic Product is observed to have remained at around 1 percent till 2011-12 but during 2012-13 the contribution is seen to have increased to just under 2 percent which can be regarded as a significant achievement of the sector.

Year	2010-11	2011-12	2012-13
Contribution to Agriculture & Allied Sector (%)	5.00	4.83	8.30
Contribution to GSDP (%)	1.12	1.06	1.77

For a small state like Assam, a large part of which is covered by forests and water bodies like beels and rivers, its animal wealth is formidable when it comes to numbers. The livestock and poultry populations in Assam in 2003, 2007 and 2012 are shown below:

SPECIES	2003 (in '000)	2007 (in '000)	2012 (in '000)
Cattle	8440	10041	10308
Buffalo	678	500	435
Pig	1543	2000	1636
Sheep	170	354	518
Goat	2987	4320	6169
Poultry	21664	29060	27216

Annual production of meat, milk and egg in the state is as under-

Year	Milk (million litre)	Meat (thousand tonne)	Egg (million no.)
2011-12	838.70	34.19	470.90
2012-13	844.80	36.63	471.20
2013/14	857.26	38.34	471.70
2014-15	873.00	42.54	473.00

The figures indicate an almost static condition in production. However, going by the potential, manifold increase in production of milk, meat and egg is possible in reasonably short span of time, provided due attention is paid for removing the major constraints.

Need of strengthening coordination:

The major public sector players of animal husbandry and veterinary sector till today are basically working in isolation with weak linkages (if at all that exist) among them. As a major stakeholder in the development of the livestock sector, the Faculty of Veterinary Science, Assam Agricultural University, a robust instrument is already in place to take care of teaching (Human Resource development), research and technology generation and transfer. On the other hand, the Department of Animal Husbandry and Veterinary, Assam is the main service provider. The Department's duties are broadly two – providing health coverage to animals (Veterinary) and enhancing production and productivity of animals (Animal Husbandry). Although there is acute dearth of manpower, and massive renovation and strengthening in all aspects are necessary, the department is otherwise very strong in terms of

available infrastructure and facilities. Given little attention, the department is expected to do marvels in serving people.

The collection, processing and marketing of dairy products are the mandates of the Dairy Development Department of the state. The ALPCO (Assam Livestock and Poultry Corporation) is also attempting to promote marketing of meat, milk products and eggs. The ALDA (Assam Livestock development Agency), executing the ambitious Artificial Insemination programme of cattle, is also working independently, although it is a component of AH & Veterinary Department only.

The Assam Veterinary Council, which is the state level regulatory and advisory body on veterinary practice, is also practically working in isolation.

In order to bring about an economic renaissance in Assam by strengthening the entire animal husbandry sector one of the major policy thrust has to be ensuring strong coordination between the above mentioned public sector institutions/organizations.

Major Challenges/constraints to Address:

- ❑ Acute shortage of man power in public sector institutions involved in service delivery.
- ❑ Poor genetic merit of most of the indigenous livestock germplasm in terms of production and reproductive efficiency.
- ❑ Inadequate coverage of genetic improvement programmes through techniques like of artificial insemination.
- ❑ Shortage of feeds and fodder.
- ❑ Inadequate health coverage.
- ❑ Collection, processing, packaging and marketing of livestock produce is largely unorganized. Inadequate market linkages and infrastructure.
- ❑ Need of special attention to quality assurance of livestock produce, particularly in unorganized sector.
- ❑ Lack of access of small holders to institutional finance/ credit is a major constraint in attracting investment required for improving productivity by adopting latest technology.
- ❑ Lack of emphasis on regular production of para-veterinary staff like VFA and on continued veterinary education to serving veterinarians.
- ❑ Lack of appropriate livestock waste management system.

Mission Mode Approach for bridging the deficiency gap:

Animal agriculture, if strategically pursued, can definitely improve the livelihood opportunity and thus reduce or eliminate poverty in the state where agriculture perhaps cannot be thought of without the integration of livestock/ poultry sub-sector in it. So far however, all livestock sector discussion/ seminars conducted in and outside the state are full with papers lamenting the deficiencies in milk, meat and egg sector which hovers around 50 percent for milk and meat and a whopping 87/ 88 percent for egg. As the years are rolling by, there appears to be an wider deficiency trend- may be due to the increase in human population on one hand and lesser number of people in animal farming on the other. Even if one wants to enter into this otherwise lucrative business, he/ she is confronted with many 'have nots' ranging from non-availability of improved/ quality germplasm to feed to health protection measures and so on. On this back drop, the present policy is farmed.

The Policy

1. Infrastructure and human resource development policy

In order to provide round the clock animal husbandry and veterinary services in all the 26000(approx.) villages of the state, massive revamping of the infrastructures under Animal Husbandry Department as well recruitment of veterinary officers and support staff commensurate with requirements will be necessary. One of the major policy approach will be repair and up-gradation of existing infrastructure, creation of new infrastructure, expeditious filling up of all vacant positions of officers and staff and creation of posts commensurate with requirements in the Animal Husbandry & Veterinary Department.

The two existing veterinary colleges under Assam Agricultural university shall be supported with all required facilities for the production of quality human resource for the sector. Additionally, refresher courses for the field veterinarians shall be made mandatory after every 5 years so that they are trained on changing approaches to the profession. Similarly, in order to meet the shortfall of para-vets, government shall support establishing an institute under Assam Agricultural University for production of Veterinary Field Assistant and stockman with one year training duration with 100 intake capacity.

2. Quality animal seed production policy

One of the vital and very basic requirement to augment production and productivity of livestock is quality seeds produced from elite parent stock. It has been gathered that non-replacement of the existing stock with quality animal seed is eluding the effort to realize optimum productivity and therefore, the shortfall in all animal products. The following, therefore is planned to be pursued :

- A. **Quality Cattle Seed:** The government shall either improve or newly establish one quality semen production farm in each agro-climatic zone of the state with a production capacity of 2.50 lakh semen doses in each. Same principle for buffaloes with a lowered number of two centres nearby the buffalo dominated areas. Principally, semen from Murrah buffalo will be produced.
- B. **Quality Pig Seed :** This has already been taken up partially by ICAR through the Veterinary college and the NRC on pig. However, going by the requirement of quality pig seed, the number being produced by them is far less and therefore, the state government shall take steps to scale it up to 6 more seed production centres utilizing the existing pig farms under the department with little modification wherever needed. The target shall be to produce a minimum of 5000 quality piglets per annum.
- C. **Quality Goat Seed:** Goat, the poor man's cow, has the potential to alleviate rural poverty being a part of the rural households. Efficacy and acceptance of AI technology in goat by the farmers indicate that quality goat semen production aspect needs expansion and spread. The state government shall therefore, attempt to produce

the semen of goat particularly from Beetal and Sirohi breeds in their goat farm units spread across the state. While the department will improve the stations for this job to be done, the University shall train the veterinary department personals on this.

- D. **Quality Poultry Seed:** The policy shall be to promote indigenously produced poultry breeds seed production for small holder farmers and accordingly, the department shall take necessary steps to establish poultry hatchery units in each block of the state initially for 5 years after which small hatchery units shall be extended to village level. The breed of choice shall be Kamrupa. For the commercial and semi-commercial farms, the University may enter into negotiation with large poultry farm houses like Venkateswara Hatchery to access grand parent stock from them for the purpose of producing the seed of the desired variety locally. One such seed production farm for the state shall suffice as of now. PPP mode of operation shall also be tried. Similar will be the approach for duck seed production for small and medium holders.

3. Policy for animal feed and nutritional security

Like human being and the crop fields, animals also need their feed and nutritional security for expected level of production. Presently, this is a neglected sector and needs due attention and policy coverage accordingly the following policy:

- A. **Utilization of VGR lands for fodder production:** All VGR lands, mostly lying unutilized for the purpose meant, shall be brought under seasonal and perennial fodder cultivation seeds for which shall be arranged by the University. For seasonal fodder, the identified fodder for an area shall be fitted into the cropping sequence by the agriculture department while the perennial fodder growing shall be the responsibility of the veterinary department.
- B. **Linkage development with agriculture and KVKs:** The other feed needs like maize, wheat bran, rice bran, MOC, fish meal etc. the veterinary department shall enter into an MoU with agriculture department and the KVKs for a buy back arrangement of the produce of the above crops pursued by them. For the production of the above crops, a mission mode program shall be launched by the agriculture department and the University since the products of the above crops are essentially needed to bring down livestock production cost. Since the state is poised to embrace organic mode of agriculture, all the feed to be compounded with the above ingredients need to be bio-fortified so as to avoid use of antibiotic etc. the residue of which is otherwise an issue.
- C. **Silage:** Since lean season feeding of livestock has always remained an issue, a comprehensive strategic action plan to address the problem is the need of the hour. The Agricultural university, through its Veterinary College, need to validate recent silage making techniques and technologies to identify the best suited one for the state. Tunnel silaging, silaging in silo pits, use of silo bins, geo-technology, mulching technology etc. be tried so that the feed biomass likely to be available from the above two interventions could be effectively preserved and conserved for lean season

feeding finding and/ or evolving/ innovating perfection to counter issues like negative impact of high rainfall, high humidity etc. on the silage feed staff.

- D. **Searching Novel Feed Staff;** Since the state is rich in floral bio-diversity, a systematic research effort shall be made to unearth potential but hidden animal feed resources for their inclusion in animal feeding program to cut down cost and ensure ready availability. Research results available with the University through its PhD researchers on the subject shall be screened and the most potential fodder trees, herbs, shrubs etc identified for large scale multiplication on the boundaries of VGR lands for which necessary financial resource shall be provided to the University. Similarly, the activities under the All India Co-Ordinated Projects like AICRP -Maize, AICRP- Forage Crops, AICRP-Tuber crops etc. will have to be spread to wider areas for enhanced production of these crops to support the feed sector. The 23 KVKs in the state shall cover larger areas under their FLD programs on Maize, Ground nut, Soybean, Mustard etc. for the same purpose of enhanced feed resource availability.
- E. **Sourcing Advance Technologies on Animal feeding:** Right from cellulose degrading bacteria/ fungi to ensuring nutrient bio-availability technologies in the feed staff are available today. These technologies shall be fine tuned for Assam condition for fortifying the rations accordingly.
- F. **Ensuring Nutritional Security:** Each state of the country including Assam has mapped its mineral resources and prepared Area Specific Mineral Mixture that contain the deficient minerals in the soil. Research has already proven that such mixture can, besides ensuring efficient feed conversion, address infertility and related problems. Large scale production of Assam specific Mineral mixture, either by the department or private agencies and its inclusion in animal feeding program shall be mandatory to reap a better harvest of animal protein. The policy shall also be to assess and reassess the soil minerals every three years or obtain this report from the soil health assessing agencies in the state for effecting changes in mineral dosing, if needed.
- G. **Compound feed Manufacturing Units:** As of now, the state has only one big player in supply of compound feed of limited quantity. With the increased emphasis on a shift towards semi-commercial to commercial venture in animal farming, requirement of compound feed is likely to increase and therefore, the state shall take effective steps to promote compound feed manufacturing small scale industry in a PPP mode. With the proposed steps under 1 and 2 above, raw materials to support such units are also going to be available. Steps at government farms shall also be taken to store such feed so as to avoid losses etc due to infection and other causes for which needed support shall be explored by the government.
- H. **Water as Feed Input:** Livestock use a substantial amount of water not only for drinking purpose but also for cleaning and washing but till date Animal Husbandry department is not seen taking any step to preserve and conserve water. The department shall therefore make all out effort to create water harvesting infrastructure

within the premises of livestock / poultry farms for which the government shall extend needed assistance through schemes like MNREGA.

- I. **Broad Umbrella Approach** : The state government, in consultation with the University, shall frame State 'Animal Feed Security Mission' in the line of National Rural Health Mission or National Food Security mission encompassing all the areas indicated above to ensure animal feed and nutrition security to livestock and poultry.

4. Policy for animal health management and disease control

Management of the health of the animal, like soil and human health, as well as gearing up of the machinery (Man power in the sector and equipments) with skills and competitiveness to control the disease is both very crucial and vital for any animal production program. This aspect is better handled with sub-sectoral approach – one for those diseases that are transmitted from animal to human (zoonotic) and the other affecting animals and birds only. The policy framework for these are :

- A. **Policy for effective disease surveillance and Monitoring:** Since the state of Assam has both domestic and international boundaries, it is highly essential that a close vigil is kept for any kind of disease migration to the state. For trans-boundary animal diseases, molecular surveillance of animal diseases shall be carried out from time to time in collaboration with the national ICAR institute established specially for this purpose. As preventing the entry of animal diseases into the country through Assam or North East corridor is in the interest of the country, the University shall explore framing of surveillance project in consortium mode involving multi-partners from across the country and also mobilize needed resources and the state shall support to the extent of bridging the resource need gap.
- B. Similarly, a data base on district wise animal disease pattern shall be developed with primary information (based on both active and passive data) collected from the laboratories, Vety Dispensaries/ sub centres etc. for contingency planning for both prevention and on time service delivery. This data shall be updated regularly which will act as the online repository of all available updated epidemiological information of scheduled diseases indicating location, intensity and time of occurrence of different diseases.
- C. **Strengthened Facilities** : Presently, the state or for that matter, the entire region does not have adequate facility to handle highly pathogenic animal diseases like Avian Influenza or PRRS which are a major threat to both animal and man. Though the Veterinary Biological at Khanapara has been strengthened to some extent, it is yet to come up to the level of providing prompt diagnosis. This facility needs to be transferred to the University for effective utilization and desired services to the mankind by further scaling the facility up with BSL-IV level laboratory. The government shall provide additional man power positions needed for such works.
- D. **Strengthening Animal Health Services sector further:** With the kind of animal population the state has, the number of veterinary doctors is too less. The situation is further aggravated from near non-functioning of para-vet production institutions in the

state. The department shall therefore carry out a man power need assessment taking the number of vets/1000 heads of cattle/ buffalo, per 1000 heads of pig, per 500 heads of goats and per lakh of poultry and accordingly identify the man power requirement to deliver effective health services. Similar should be the assessment for the para -vets and minor animal health service providers. The veterinary hospitals/ dispensaries shall also be fully equipped for offering faster diagnosis and treatment. A schedule for vaccination of the animals shall also be worked out and followed to guarantee proper protection from infectious diseases. The Colleges shall be updated to validate and also develop molecular animal disease diagnosis kits for onward transmission to the dispensaries/ hospitals after properly training the field veterinarians on their use. One mobile ambulatory clinic equipped with all facilities shall be provided to each district of the state initially which might be taken to block level later on.

- E. **Empowering Unemployed youths on animal health service delivery** : Groups of Prani Mitras shall be constituted village wise drawing the unemployed para-vets prepared by the proposed institution for knowledge and skilled backed animal health services at the door step by these groups.
- F. **Promoting Vety. Service Concept in the line of Agri-Clinics** : Agri-Clinics established by professional agriculturists have worked very well in some states in providing crop protection and treatment measures. A similar approach for the animals in the form of Vety. Service units to be managed by unemployed veterinarians shall be attempted through SFAC particularly for companion/ pet animals. Such services could also be utilized for inspecting the animal product selling booths/ shops to check transmission of animal food borne diseases if the department personals find it difficult to attend. Such service providers shall have to be certified groups by the department.
- G. **Working for One World- One Health Concept** : With the world becoming a global village due to increased mobility of people and NET connectivity as well for agricultural trade liberalization, steps shall be taken to work towards the UNO's above concept. For this, collaborative/ consortium mode of disease projects will be worked upon involving the vets, medical professionals, food processors, people from alternative medicines as well as social scientists. Escalated research shall also be carried out on CAM (Contemporary Alternative Medicines), development of bio-formulations using the bio-resources of the state/ region and bio-prospecting of disease countering genes in domestic and wild relatives of plants and animals to find out chemotherapy free health management options.
- H. **Carcass Care and proper disposal of dead animals** : The Municipality board shall be given a specific task to ensure timely removal and burial of dead animals to check the risk of disease pathogen spread in the area. Wherever needed, the department staff shall assist them to carry out this job. Similarly, advanced knowledge and technology shall be applied for adequate disposal and use of animal wastes – be it carcass, dung or urine.

5. Policy for conservation and utilization of animal genetic resources

Food and Agriculture Organization (FAO), Rome, Italy has already accepted that each country of the world has sovereign rights over their animal genetic resources and India is also a signatory to this. It is therefore important that the state work towards this direction and conserve and preserve its unique animal and poultry genetic resources for utilization of their hidden traits in future breeding and developmental program. Compounded with this requirement is the currently unfolded characters in the indigenous animal genetic resources like the possible use of urine, milk etc from indigenous cattle and buffaloes for therapeutic and other purposes. The state shall therefore identify at least 100 hectare area in each of the 6 agro-climatic zones for conservation of its animal genetic resources. The department shall explore funding support from Govt, of India, Department of animal Husbandry, Dairying and Fisheries besides the support under schemes like RKVY. Exploration of stress countering genes/ traits from them shall be taken as researchable issues. Pastoralists shall also be taken into this genetic resource conservation fold.

6. Breeding policy for livestock and poultry

It has been gathered that breeding policies for many animals are not available and that even where they are available like cattle and buffalo, they have not actually been worked upon. For any improvement to bring in the livestock and poultry, a sound breeding policy and adherence to it is almost mandatory. The state shall therefore, have a total relook at the framed breeding policy and also prepare the policies for those animals for which it is presently not available. This task shall be completed within 6 months.

7. Policy on dairy sector

Dairy sector growth in the state has not been commensurating with the population growth with resultant milk deficiency to the extent of more than 50 per cent. The use of Jersey and Holstein breeds of cattle without a suitable replacement policy needs to be reviewed more particularly due to the current research finding concerning A1 and A2 milk alleles. The breed of choice for improving the genetic merit of indigenous cattle shall be indicated by the breeding policy framing group which will then be accepted for the state after thorough discussion and debate.

After the breeds are decided, the production part will be linked to the policies indicated under seed, fodder and health coverage for realizing optimum benefit and bridging the gap in milk availability. Since government sector or university alone cannot do this job, the policy shall be to rope in cooperative sector, the NDDB, the programs of Govt. of India on Bull Mother farm creation etc. Yet another aspect will be to encourage private service providers particularly in providing adequate input backstopping in the form of semen, value addition to milk and milk products, the animal fertilizers like area specific mineral mixtures and disease diagnostic kits etc.

As of now there are few functional cooperatives who are also constrained with hindrances. The government, under the chairmanship of Additional Chief Secretary (Vety) shall arrange to take a complete stock of the functioning of these cooperatives and

facilitate redressal of their problems so that they can emerge as a viable alternative to push the milk sector growth curve forward. In addition, the state has a large number of individual and innovative dairy farmers who can outperform their present level of performances if government lends the supporting hand. Such farmers need to be enlisted as progressive dairy farmers through the respective DVOs/ public representative/ panchayats and necessary support service provided right from scaling up his/ her farm to procurement of the produce to partnering him / her in government sponsored programs.

It has been seen that the crop farmers of the state receive many benefits right from improved seeds to fertilizers which is eluding the dairy farmers. Therefore, inputs like area specific mineral mixture, milking machines, fodder seeds etc shall be arranged by the department in a subsidized manner to the dairy farmers. The activities under dairying shall also be attempted to be made tax free. Similarly, MSP for milk shall be implemented based on actual cost of milk production and this responsibility of working out the cost shall be given to the Agro-Economic Research Centre of GoI which is functioning under the University. The university and the department shall validate, develop and provide milk quality testing kits/ adulterant detection kits at affordable cost. Dairy animals shall also mandatorily receive the benefit of insurance coverage.

In view of the climate change impact, special housing design shall be developed by the university, carry out studies on Heat Shock Proteins, calculate the THI requirement of the animals and also prepare contingency planning to deal with the issue.

Credit facility provision for purchase of good quality animals, construction of sheds, machineries like tractor/ power tiller for fodder plots, milk cooling chamber etc shall be considered by the financing agencies dealing with agriculture sector. Issuance of KCC to the animal farmers shall be considered for easy access to farm loan. No distinction shall be made between dairy and crop sector while extending the credit facility.

8. Policy for strengthening organized milk marketing channel

In order to minimize the role of middle man in an unorganized milk marketing environment, one of the important policy thrust would be to create more and more Dairy Cooperative Societies. This would be the bottom level platform for providing veterinary and animal husbandry services to the bulk of the poor rural cattle owners and also for collection and marketing of milk with the active involvement of Animal husbandry & veterinary department and the Dairy development department. The aim would be to promote small holder dairy activity at the poor rural household level by providing access to scientific means of production and support system. The Department of Dairy Development, the Department of Animal Husbandry and Veterinary, the Panchayati Raj institutions, financial institutions, NGOs and SHGs would be brought under a nodal agency for bringing out a kind of dairy cooperative movement.

In order to promote dairying in Assam, the micro-, small and medium-sized enterprises relating to dairy business will be supported. Dairy farmers shall be given subsidy by Government for attracting the new generation to dairy sector in the form of cattle feed

subsidy to the tune of 20 %, quality animal purchase subsidy and housing infrastructure subsidy to the tune of 50 per cent.

9. Policy for a Blue Revolution

Since milk is an essential item for ensuring nutritional security, particularly among the children, lactating mother and the old age population, a blue print for a Blue Revolution in the state is necessary. It is disheartening that the state does not even produce 1 million tonne of milk of the 142 million tonnes produced by the country. In order to give a boost to the sector, the state shall completely modernize its existing cattle farms in terms of infrastructure, animals, equipments needed for automation and clean milk production besides complete strengthening of the co-operative sector including procurement and subsequent processing of milk in to value added products. The enhanced capacities shall be supported, from production to marketing, under the policies outlined above already.

10. Meat production and marketing policy

The state has the opportunities to transform its meat sector both for domestic consumption as well for meeting export demand of neighboring countries for which the following policy coverage has been designed ;

For export purpose:

Assam has a sizable population of Swamp buffaloes which are used for agricultural purposes. Unlike the other parts of the country, no river-type buffaloes are found in Assam. Swamp buffaloes are poor in milk production but excellent source of meat. There is tremendous scope for utilization of Swamp buffaloes for meat production for export market. Unfortunately till now, no scientific approach has been made to exploit these native animals for meat purpose. The swamp buffalo farmers shall therefore, be supported to establish fattening farms, at least 6 numbers in the state, to prepare the buffaloes for meat purpose either in live form or in processed form depending on the demand particularly in countries like Bangladesh. A scientific schedule shall be prepared by the department for the buffalo growers to follow and capture this market. Similar fattening units could also be prepared for spent cows and bulls as there exist a clandestine cattle trade with Bangladesh. This will legalize the export and help in earning foreign exchange. Fund required for this shall be explored either from NEC or Ministry of DoNER.

For domestic purpose:

The meat sources for the state are from pig, goat and the poultry including duck, quail, turkey etc. which provide only around 42500 Kg of meat with a per capita availability 1.90 Kg against All India average of 5.5 Kg and ICMR recommendation of 10.65 Kg. Now, in order to take this availability to All India level at least, a production increase of 3.60 Kg (5.50 - 1.90) per person will have to be targeted. Considering a non - vegetarian population of 2.50 crore in the state, the meat production will have to be scaled up to 9.0 crore Kg. or 900 lakh Kg. out of which around 100 lakh Kg. could be met from the sale of spent hens after egg laying. A policy for the production of

remaining 800 lakh Kg. is therefore needed. A reasonable policy to produce 800 lakh Kg. of meat will be to target 20 percent production from pig, 40 percent from poultry and 40 percent from goat i.e 160, 320 and 320 lakh Kg. respectively.

160 lakh kg. from pig: if we target a carcass weight of 55 Kg per pig, the state will need around 2.91 lakh number of pigs to produce 160 lakh Kg of pork. A Mission Mode project shall be framed to produce this number, both under public and private sector, where around 10 lakh farmers are engaged rearing one or two pigs and if supported with right type of pigs for rearing backed by technology and other deliverables, the state can achieve this miracle looking target. The sector is very much paying. Considering a net profit of Rs. 25/ per Kg of pork, the profit from 160 lakh Kg of pork is going to be as hooping as Rs. 40.00 crore annually.

320 lakh kg from Broiler poultry : Considering an average weight of 1.50 Kg per broiler chicken at marketable age, the state will need around 2.0 crore broilers to produce 320 lakh Kg of poultry meat. For this a strategic approach to scale up and newly establish around 315 farms with a farm unit size of 1000 birds X 6 batches per year, shall be taken.

320 lakh kg from Goat : At an average carcass weight of 7 Kg per goat, the state will need 46 lakh goats to produce 320 lakh Kg of goat meat. Since goat is considered a poor man's cow, the policy shall be to encompass the existing goat farmers of the state, besides the state machinery and private players to produce this number in 3 to 5 years with their horizontal expansion to replenish 50 percent population on yearly basis that is likely to be slaughtered.

For the meat sector, the issue of input backstopping has already been indicated. Though the road ahead appears difficult to walk on, primarily due to financial resources and massiveness of the goal, it will be doable through :

- Accessing the needed capital from the non-lapsable pool of fund for NE Region under the disposal of the central government for which the Members of Parliament from the state shall take the needed steps with state's backing.
- Major national and even international players dealing with meat and egg sector business shall also be facilitated to establish 'Make in India' livestock food products centres.
- Tie ups with ICAR institutes like NDRI for dairy, IVRI for health related issues, Poultry institutes like CARI / PDP and pig institute like NRC-Pig will have to be made both for technology sharing and 10 percent funding support of their budget which is earmarked for NE region.
- Since backyard animal farming or Integrated mode of farming is very common in the state, 25 to 30 percent of targeted production shall be realized from them enlisting them as tertiary production units to the main production house.

- With slaughtering etc facilities that are going to be put as a component of the mega program, several livestock product processing units shall be established, right from meat/ bone meal production factory to feather/ skin/hair etc processing.

11. Poultry development policy

The egg sector:

Present availability of egg per person per annum in the state is only around 20 against All India average of 57 and WHO recommendation of 180 eggs. Now, if we take an immediate target of reaching the All India average availability number of 57, the state will have to attempt to add up to its egg basket another 37 (57 - 20) eggs per person. Considering an egg eating population of around 2.9 crore, this increase will mean an additional production of 107 crore eggs annually. Presently, around 30 lakhs eggs are brought to the state from outside every day. Their production locally is therefore an important task. In order to achieve this target, the state will have to establish 1600 number of layer farms with 220 number of egg laying capacity (per bird per annum) bird strength of 3000 in each farm. Out of this number of 1600 farms, 50 percent could be established with central assistance and 50 percent in a PPP mode thereby opening up self employment scope. A time table of 3 years could be earmarked to reach the number and financial resources planned accordingly. A buy back arrangement of the eggs so produced shall be put in place by establishing Poultry Corporation so that the production units feed the corporation which will operate in a hub and spoke model across the state and the corporation in turn feeds the retailers and consumers. Employment avenues in this sector of product procurement and delivery also could be imagined.

Promoting diversification: The dominant poultry species in Assam is fowl (197.33 lakhs) followed by duck (73.11 lakhs). Unlike many other state of the country, rearing of duck is traditionally popular and both duck meat and egg are favored over that of fowl meat and egg. Pigeon is another poultry species reared by farmers in rural areas for production of high value delicacy meat from the swabs. Turkey, Guinea fowl, Geese as well as Quails are also reared in limited numbers by farmers in rural areas. All these species shall be promoted as specialty product of the state.

Others:

The policies with regard to animal biotechnology, animal insurance, tax rebate on livestock product, organic animal farming and marketing have been dealt with under agriculture sector.

Fishery sector

Broad mission and policy objectives

- ❑ Make the state self-sufficient in advanced fingerling production and, thereby, table fish production by 2021.
- ❑ Ensure effective conservation and judicious exploration of indigenous fish and fishery resources.
- ❑ Generate entrepreneurial and employment opportunities and facilitate creation of necessary infrastructure facilities through public and private investment in the sector.
- ❑ Encourage the farmers for adoption of Good Management Practices in fisheries and aquaculture.

1. Policy for fisheries resource management

- ❑ Fishery resources of the state shall be mapped within two years using Remote Sensing and Geographic Information System (GIS) for drawing resource specific intervention plans aimed at improving the production capacity of these resources..
- ❑ The Assam Fish Seed Act 2005 shall be the basis for quality fish seed production at the private sector. All fish hatcheries including defunct hatcheries shall be brought under the purview of the above Act..
- ❑ Government shall promote Fish Seed Villages for reservation of ample fish seed to be stocked in ponds during post flood period.
- ❑ All qualifying hatcheries/fish ponds of fish seed producers /growers/happa breeders/progressive fish farmers shall be registered under Fishery Deptt. Renewal of annual registration shall also be ensured subject to adherence to Assam Fish Seed Act 2005 by the farmers.
- ❑ Fish seed certification body shall be formed to check its quality. A fish seed monitoring mechanism, particularly for checking the inflow of inferior seed shall be put in place. All seeds are to be procured from the registered seed producers.
- ❑ Department shall encourage Brood Fish Bank Concept and shall convert few important Government farms to the Brood Bank under Government schemes.
- ❑ Department shall emphasize on improvement of fish seed transportation system.
- ❑ Research shall be scaled up for breeding of commercially important indigenous fish species.

2. Policy for aquaculture including pond culture

- ❑ At least 30 per cent of MNREGA fund shall be earmarked for additional 1 lakh number of new fish ponds as well as for renovating the existing ones on scientific footing to increase per hectare productivity to 5 tonnes initially and then to 8 tonnes.
- ❑ Package of practices for culture fisheries shall be updated every two years and fish growers trained on its adoption and application.
- ❑ Government owned derelict water bodies and low lying areas unsuitable for agriculture would be reclaimed and leased out to groups of SHGs/cooperative society for enhanced fish production by constructing community tanks.

- ❑ Integrated fish farming with agriculture, horticulture and animal husbandry would be promoted for improving and stabilizing farm productivity and income of rural poor.
- ❑ Government shall encourage promotion of cluster-based fisheries development approach in rural pond aquaculture.
- ❑ In each of the 6 zones of the state, a demonstration unit shall be established for technology showcasing on advanced breeding and rearing techniques. Such units may be with the Department of Fisheries or the University including its KVKs.
- ❑ Govt. of India's (ICAR) recommendation shall be followed before introduction of any exotic fish in state water bodies.
- ❑ The College of Fisheries and the Fishery Research Centre under the AAU shall be facilitated to develop organic aquaculture package.
- ❑ For prompt and quickest aquaculture extension system, private extension shall be popularized with the involvement of *Matsya Mitra* at GP level, *Matsya Sarathi* at Block level and *Matsya Sanchalak* at district level plus reputed local NGOs for training & capacity building programs.
- ❑ Department shall introduce Single Window Project Management Approach through State Project Management Unit (SPMU) at the Directorate. The SPMU shall consist of highly experienced and professionally qualified technical officers supported by Engineers, Accounts and IT professionals. The Unit shall be headed by a Chief Nodal Officer and will be assisted by concerned Nodal Officers.
- ❑ Benefit of Fasal Bima Yojana shall be extended to fishery sector and the current taxation rate on fishery inputs and products shall be reviewed and possibly done away with.
- ❑ Fisheries hospital in each district shall be established or the district fishery offices strengthened for testing soil and water quality as well as fish health and other services including extension services.

3. Policy for fish health management

- ❑ A Regional Centre for Fish Disease Diagnosis and Monitoring shall be set up in the college of Fisheries, Raha.
- ❑ District level fish disease diagnosis unit linked with the Fish Disease Diagnosis and Monitoring centre shall also be Established.
- ❑ Creating facilities for developing quarantine and bio-safety protocols in cultured systems to avoid threats of trans-boundary diseases

4. Policy for *beel* fisheries

- ❑ The *Beels* of the state are scientifically unexplored water resource of the state. In order to reap the best harvest from these beels, a comprehensive project shall be framed by the University for their improvement and utilization for productivity enhancement.
- ❑ Possibility of community based fisheries management, like pen and cage aquaculture, of the beels and other community water bodies will be explored and detailed mechanism worked out.

- ❑ Concept of Model Beel as Demonstration Unit in each district, beel ranching and integrated development of beel would be popularized.
- ❑ For conservation of indigenous fish germplasm and fish bio-diversity, the concept of **Fish Sanctuaries** shall be introduced in few select water bodies.
- ❑ **Centers of Ecotourism and Aqua Sport** shall be developed in compatibility with the socio-culture and livelihood of the primary stakeholders in and around *beel* premises.
- ❑ Effective conservation and judicious fishing norms, for control of over fishing, illegal fishing shall be put in place in the identified *beels* which will be monitored by an officer not below the rank of Fishery Extension.
- ❑ Leasing out the beels to the adjoining community shall be considered for better management of the resource.

5. Policy for riverine fisheries

- ❑ Conservation measures as per Assam Fishery Rules, 1953 shall be enforced to minimize further degradation of riverine ecosystem, balanced retention of the aquatic resources and enhance natural productivity.
- ❑ Conservation incentive in the form of award, recognition to the local Community based organization, SHGs, Co-operative societies, NGOs, etc. shall be considered for effectiveness of conservation facilitating declaration of the sites as protected areas, closed season for fishing, preventing /banning the use of destructive types of fishing methods and gears, mesh size regulation etc.
- ❑ For enhancing fish production from the riverine resources, fish seed stocking (called as river ranching) with quality fish seeds of suitable varieties shall be ensured.
- ❑ In potential locations, purely site specific, community based pen and cage culture shall be encouraged for productivity enhancement.
- ❑ The methodologies adopted by states like Andhra Pradesh, Tamil Nadu, Uttar Pradesh, Maharashtra, Odisha, Jharkhand, etc for fish production enhancement in reservoirs shall also be followed in the state.
- ❑ Initially regular stock enhancement program in the reservoirs shall be taken up creating basic fish seed infrastructure like captive hatcheries, rearing pond etc.
- ❑ Captive rearing and nurseries shall be established at the vicinity of the reservoirs which shall be leased out to Fishermen Cooperative Societies for rearing of fish seed up to advanced fingerlings of 80-100 mm size under govt. schemes.
- ❑ Cage and pen culture shall be promoted in the suitable areas to boost fish production as well as employment generation.
- ❑ Conservation measures shall be enforced for catching fish as per Assam Fishery Rules, 1953.
- ❑ The policy shall propose to transfer the fishing and management rights of the reservoirs to the Fishery Department for the purpose of fishery development.
- ❑ The department shall draw a full proof plan to manage the reservoirs.
- ❑ The state shall take needed steps to reclaim around 20000 ha of derelict water bodies to enhance fish production without disturbing the original ecology of the water bodies.
- ❑ In suitable and feasible locations, construction of community tanks and leasing to the fishermen cooperative societies/SHGs, etc. shall be undertaken. Management of such

fishery shall also be handed over to the local fishermen cooperative societies/SHGs, etc.

- ❑ Community-based fisheries management shall be promoted for development of the derelict water bodies.

6. Policy for ornamental fish

- ❑ The policy shall envisage adopting a rational exploitation strategy from natural freshwater resources where indigenous varieties are available.
- ❑ Department shall give attention on captive breeding of potential local varieties of ornamental fishes under R&D program of the university and research institutes of the state to ensure development of breeding and larval rearing of those potential local ornamental fish species. This shall directly help to conserve natural resources and fish bio-diversity, as the dependency on nature for ornamental fish collection shall gradually decline.
- ❑ Potential entrepreneurs/farmers shall be trained-up on ornamental fish breeding for taking up ornamental fish farming as profit making rural enterprise.
- ❑ Government shall give more emphasis on fish breeding and propagation, culture, etc. in selective breeding units to be established under private sector.
- ❑ Women SHGs shall be assisted technically and financially to take up ornamental fishery in a big way with the financial assistance from RKVY/NFDB/MPEDA where ever available and applicable.
- ❑ Government shall take aquarium keeping in all the government/affiliated University/ College/school (s) for bringing mass awareness on ornamental fisheries and thereby exploring the potential of the sector to create livelihood and employment generation among the unemployed youth and women.
- ❑ Government shall initiate the concept of establishment of health certification centers for quarantining at key locations of the State.
- ❑ Public Aquaria, Ornamental fish park shall be established as a measure towards eco-tourism through PPP mode in prominent places.
- ❑ Promotion of mini hatcheries for seed production of ornamental fish.
- ❑ Policy shall emphasis establishment of aquarium gallery cum ornamental fish gene banks at the campus of Directorate of Fisheries to conserve indigenous ornamental fish germplasm.
- ❑ Proper export policy for indigenous ornamental fish trade.

7. Policy for cold water fisheries

- ❑ Government shall arrange detailed study on prospect and potential of cold water fisheries in the State and shall come up with detailed road map for sustainable exploitation of the resource.
- ❑ Directorate of Cold Water Fishery Research (DCFR), ICAR, Bhimtal shall be engaged for such studies and based on the out- come of the study selective development initiative shall be taken (in collaboration with the College of Fisheries, AAU, Raha).

8. Policy for fishermen (fishers) cooperative society (societies)

- ❑ Creation of awareness about the right and responsibilities of members and democratization of election process. Training and exposure visit to successful Cooperative societies shall be arranged to ensure good governance in fisheries cooperative.
- ❑ District Fisheries Development Officer and Fishery Extension Officers shall be empowered to perform the role of Assistant Register, Cooperative Society and Inspector of Cooperative Societies by making suitable amendment to the existing Bylaws and Rules of Cooperative Societies. The entire responsibility for management of fisheries cooperative societies shall be handed over to the Fisheries Deptt. Fishery Officer not below the rank of FEO shall be the Member Secretary in a cooperative society.
- ❑ Incentive and award to the best performing societies based on overall production and annual profits and other socio-economic parameters.
- ❑ The State shall take appropriate steps to strengthen all the existing Fishery Cooperative Societies by developing need based infrastructures with financial assistance from NCDC/FISCOPFED/ NFDB/RKVY etc. as applicable.
- ❑ The policy shall advocate bringing FISHFED under the aegis of Fishery Department so as to organize fish procurement, marketing, processing, in a systematic manner on the lines of other States like West Bengal, Orissa, Andhra Pradesh, etc. This shall create additional employment generation and livelihoods to thousands of fishers as well as streamline the entire fish marketing system in the State.

9. Policy for post-harvest, marketing & value addition

- ❑ AFPA shall aim at developing and maintaining a fast and reliable marketing network to reduce post harvest loss, better price for fish seed and table fish producers besides creating gainful employment opportunities.
- ❑ FCS/SHGs/FPOs would be motivated to establish a marketing network along with transporters and retailers.
- ❑ Construction of whole sale and retail hygienic fish markets, retail outlets, mobile outlets, aqua-shop shall be promoted and consumer's awareness shall be taken up to ensure engagement of rural unemployed through fish marketing.
- ❑ Hazard Analysis and Critical Control Point (HACCP) and other quality issues shall be monitored by the Government machinery.
- ❑ Improved dry fish processing and packaging technologies shall be adopted to enhance marketability.
- ❑ AFPA shall emphasize on improvement of marketing facilities for the fishermen by providing deep freezers, insulated vans, live fish carriers, ice plants, etc. as per the government norms.
- ❑ Women SHGs would be trained in reputed institutes and financially supported for value addition of fish and their marketing.
- ❑ AFPA shall encourage involvement of private sector through PPP mode in creating requisite infrastructure for value addition and smart marketing of fish and fishery products.

- ❑ AFPA shall empower the Department of Fisheries in inspecting import/export of fish and fish seed and agency dealing with fish and licensing for all fish and fishery products in all aspects of quality assurance including inspection of fish health in the wholesale, retail markets/outlets. Government through its designated officials (not below the rank of Fishery Extension Officer) would ensure proper inspection of consumable fish in the wholesale, retail markets/outlets and quality export and import permit for fishery products and endorse export permits for fishery products along with other State and National authority. Sophisticated fish disease diagnostic and quality assurance Lab shall be in place in each district and State Head Quarters.
- ❑ Department shall ensure financial assistance for modernization/construction of wholesale and retail fish markets, establishment of cold-chain, value added fish production centers, individual fish retail outlets, model fish dressing centers and dry fish production units, strengthening of post harvest infrastructure, development of fish processing, preservation and storage facilities including ice plants and chilled storages, and fish transport infrastructure including refrigerated trucks/ containers and distribution of subsidized insulated fish boxes.
- ❑ The Segmentation, Targeting and Positioning (STP) approach of marketing research should be adopted for more profitability and sustainability of fisheries and aquaculture business. After segmenting the market using different demographic and geographic variables, the target market should be identified through consumer survey. The position of fish to be created in the minds of the target segment has to be identified. To create the identified position, the marketing mix has to be conceptualized.
- ❑ Promotional campaign using different mass media to create awareness and popularity of different value added fish and fish products with their nutritional value should be taken in order to increase consumption of fish and value added fish products.
- ❑ The promotional actions should be made through (i) television and radio commercials; (ii) press brochures and street posters; (iii) leaflets providing direct or indirect information on the product. Promotion in the main demand areas i.e. product testing, product presentation, cooking presentations should be emphasized.
- ❑ Branding strategy for value added fish and fish products should be formulate.
- ❑ Fish food festivals with good publicity should be organized where consumers get exposure to variety of fish and value added fish products.

10. Policy for fishery and aquaculture extension

- ❑ The AFPA envisages to popularize the private extension for a vibrant fishery extension service throughout the State by engaging Matsya Mitra at the GP level, Matsya Sarathi at the Block level and Matsya Sanchalak at the district level.
- ❑ Department shall adopt the concept of establishment of Fish Call Centre (to be called as Matsya Sahayak) at the Directorate of Fisheries which can be dialed from all over Assam to facilitate the farmers and other stakeholders to get reliable fisheries and aquaculture information easily. The centre will be manned by Fisheries Department officials.
- ❑ Fisheries and Aquaculture success stories from different parts of the World would be documented through the Call Centre-the *Matsya Sahayak* to the farmers.

11. Policy for information, education & communication and awareness

- ❑ Effective system shall be introduced for collection, compilation, analysis, storage, dissemination, updating the data base and maximizing the use of Information and Communication Tools (ICT) for fisheries planning, management, monitoring, and governance and evaluation process.
- ❑ Need based awareness programs shall be conducted in each and every development block by involving institutes like CIFRI, CIFE, COF, KVKs to educate the farmers and other stakeholders on sustainable fisheries.
- ❑ Information, education and Communication shall be strengthened for improving the knowledge base at the grass root level, and also for taking the issue relating to conservation, management, development of fishery resources and providing food and livelihood security to fishers in the State.
- ❑ Strategic linkages among State Agriculture University, Krishi Vigyan Kendra (KVK), CIFE, CIFRI, CIFT would be strengthened and farmer need based extension strategy would be evolved accordingly.
- ❑ Capacity development shall be focused at four levels (a) individual fishers including fish farmers, fisherwomen and other stakeholders, (b) State Fisheries Departmental officials, (c) NGOs and Fisheries Cooperatives and (d) unemployed youth and entrepreneurs.
- ❑ Maximum emphasis shall be given for capacity building of farmers through progressive farmers as far as possible.
- ❑ Department shall undertake development and publication of need based scientific literature in the form of leaflets, bulletins in Assamese, English, Bengali (and in other local languages) for better and greater dissemination of information to ensure sustainable fisheries.

12. Policy for women empowerment (in fisheries sector)

- ❑ Training on fish seed raising for employment opportunity.
- ❑ Management of aquariums/backyard hatcheries for self employment.
- ❑ Making and repairing of craft and gear with the help of cheap and easily available local material for sustainable catching and harvesting,
- ❑ Preparation of pen and cages for promotion of pen and cage culture.
- ❑ Training on conservation of endangered fish species.
- ❑ Preparation of value added fishery products (e.g., indigenous fish drying, smoking, salted, fermented products, fish pickles, etc.).
- ❑ Department shall take steps to educate the fisherwomen for micro credit enterprise for their empowerment.
- ❑ Department shall encourage formation of **fisherwomen club** at grass root level to make fisherwomen self reliant, self dependent and self decision makers. Such fisherwomen clubs shall be facilitated by providing daily news papers, fisheries bulletin, besides provision of radio and TV at the club premise.
- ❑ AFPA shall focus on training and capacity building of the women fishers and fish farmers on relevant subjects.

- ❑ Department shall explore the possibilities of undertaking community based women led fisheries project for rural household aquaculture and in ornamental fisheries.

13. Policy for human resource development

- ❑ Department shall reform the recruitment policy to recruit requisite number of professional fishery graduates for each development block to accelerate extension and development. Sufficient promotional avenues and appropriate incentives coupled with accountability shall be the integral part of the policy.
- ❑ Department shall (A policy should be developed to) conduct training for development management program for senior officers, project management program for middle level officers, and technical training for junior staff shall be the major focused area. A minimum one month probationary training shall be arranged for the newly recruited Fishery Extension Officers/Fishery Demonstrators to make them well accustomed with the Departmental activities.
- ❑ The policy emphasizes on upgradation of Regional Fisheries Training Institute (RFTI), Amranga, Guwahati into Regional Institute of Fisheries and Aquaculture Development (RIFAD) with national outlook and the entire training and related skill development program shall be conducted by RIFAD.
- ❑ AFPA shall focus on establishment of Fisheries and Aquaculture University, Fishery Colleges and Fisheries Polytechnic through public or private sector to cater to the needs of fisheries professional manpower. (In this case proper assessment of manpower requirement in all the sectors of fisheries and aquaculture is essential)
- ❑ The existing training program for Fishery Demonstrators shall be upgraded for two (2) years training program with the inclusion of course content like open water resource management including wetland fisheries management, forest fisheries management, integrated cluster based development, government fish farm management for productivity enhancement, hatchery operation and maintenance, community based fisheries management, etc. apart from normal course content.
- ❑ AFPA shall emphasize on renovation of all the training centers including hostels of Fishery Department and all the local level fishery training shall be conducted/ arranged accordingly.
- ❑ Information Communication Technology (ICT) shall be implemented in the Department to act as a cost effective and interactive mechanism for delivering relevant information and knowledge to the stakeholders.

14. Policy for environment code of conduct in fisheries

- ❑ The State Fisheries policy shall ensure that Environmental Impact Assessment (EIA) is carried out taking into consideration all large scale/ commercial fisheries sector projects, control/ ban destructive fishing including poisoning, electric shocking and dynamiting and processing activities, monitor and review environmental protection measures applied in fisheries sector, promote protection of the fragile ecosystems, ecosystems process and conserve ichthyo-biodiversity by protecting endangered, vulnerable, threatened fish species, habitat as well as areas of specific biological significance.

- ❑ The policy would ensure sustainable and rational exploitation of fishery resources by putting in place mechanisms at appropriate level and promote alternative livelihood to fishers during lean fishing seasons.
- ❑ The policy also strives to promote public awareness among all stakeholders for the need to protect aquatic ecosystems and fish in particular and promote multi-disciplinary research into adverse environmental impacts on open waters that support fisheries.
- ❑ A concrete strategic action plan would be evolved for implementing conservation and protection of the rich biodiversity of the State.
- ❑ Department shall identify and designate few areas as protected areas (Fish Sanctuary) to allow natural *in-situ* spawning and breeding of potential fish species and shall conduct vigorous training and awareness camps in those localities. Extension service system shall be strengthened to make people/farmers aware about the destructive effect of culturing undesired, exotic and banned species of fishes.

15. Policy for infrastructure strengthening

- ❑ New pond construction including seed production and rearing infrastructure in potential location through cluster based fisheries development approach shall be promoted.
- ❑ Establishment of hatcheries at private and govt sector would be ensured.
- ❑ Pen and cage culture for fish seed raising in Beels would be promoted.
- ❑ All the Government farms which are under lease shall be brought back to the fishery department. Young Fishery Graduate shall be engaged as Farm Manager and their service performance would be linked with field performance.
- ❑ Establishment of small and medium size feed mill shall be encouraged.
- ❑ *Eco-tourism and Aqua Sport* shall also be considered which shall create new avenues in wetland fisheries.
- ❑ Net making, boat making and other related activities, etc shall be introduced as alternative livelihood activities during closed season in *Beel*.
- ❑ Need based requirement of fish seed hatcheries shall be established especially for progressive fish farmers, successful cooperative societies, etc.
- ❑ AFPA shall focus on establishment of need based infrastructure for hygienic fish markets in the form of hygienic wholesale and retail markets, mobile fish retail units, road side rural markets or other related infrastructure.
- ❑ AFPA shall also focus on establishment and modernization of fish landing centres linked with fish carrying insulated van or live fish carrier van so as to get maximum remunerative price from the fishes.
- ❑ Infrastructure facilities like fish processing plants (viz. canning plants), fish drying platforms, solar drying, dry fish storage shed, boat and net building yard, approach road shall be implemented by converging with other activities.
- ❑ Department shall emphasize on establishment of district level fish disease and diagnostic labs, Aqua-shops to create employment avenues among the qualified job seekers.

16. Policy for public private partnership (ppp)

- ❑ Government shall promote public private partnership model for setting up enterprises in fisheries sector so as to harness the fishery resources in the State in most effective manner.
- ❑ AFPA shall focus on involvement of PPP concept in developing and establishing modular cage culture, wetland aqua-tourism in Assam Beel.
- ❑ AFPA envisages integrated and holistic development of one district Beel as a Model Beel under PPP mode which shall act as a Beel demonstration unit in future.
- ❑ Fisheries cluster based development initiatives such as cold chain, processing and value addition shall be established with the active participation from private stalwarts.
- ❑ AFPA shall focus on involvement of national and multi-national public sector giants like Indian Oil Corporation, Oil India Ltd., ONGC, NRL, or such type of organizations to be involved as a partner of development in fisheries sector under corporate responsibilities initiative in order to bring a holistic development in fisheries.

17. Policy for entrepreneurship development, self employment and fishers' livelihood and welfare

- ❑ Government shall play a catalytic role in self employment through developing private entrepreneurship in fisheries, in the areas of fish farming, integration of fish culture with livestock rearing and paddy cultivation, fish seed production, ornamental fish trade, fish processing, production of value added fishery products, fish marketing (whole sale and retail), fish trading /vending, transport operation, net mending and repairing, setting up of small scale industrial units for fish feed and seed plants, production of fishing equipments, trading of aquaculture equipments, etc.
- ❑ Government shall extend all the facilities to the fishermen which are available under the existing welfare scheme of Government of India/Government of Assam.
- ❑ Government shall ensure how best fishermen/women could be involved in other activities as a source of alternative livelihood during ban period. Pen and cage culture for seed rearing and growing, net making, etc. are some of the examples for alternative livelihood to them.
- ❑ AFPA shall focus on creating employment generation and rural livelihood through fisheries by extending assistance to the fishers for new pond construction, pond renovation, development of ornamental and Beel fisheries for production and productivity enhancement.
- ❑ Appropriate steps shall be taken to ensure that quality education and health care, housing shall be made available to the families of the fishermen. Fishermen habitation shall be provided with safe drinking water, roads, etc.
- ❑ Institute like Fisheries polytechnic shall also be established. (In this regard proper assessment of manpower requirement in different sectors of fisheries and aquaculture of the state is essential)
- ❑ All the potential fish farmers shall be trained in the Professional Fisheries Institute both inside and out-side the State.

- ❑ Progressive fish farmers would be sent for exposure visit to States like Andhra Pradesh, West Bengal, Jharkhand, Chhattisgarh for advanced and quality learning and training (as it is an exposure visit so training may be omitted).

18. Policy for convergence and linkages

- ❑ For promotion of fishery sector, participation and convergence shall be ensured with the other line Departments like Water Resources, Forest and Environment, Revenue, Agriculture, Animal Husbandry, Cooperative, etc. and other funding sources like Central Government, , MGNREGA, NFDB, ICAR, NEC and EAP.
- ❑ All the programmes of State, Central Government, NFDB, ICAR, NEC or other funding agencies including EAP shall be implemented through a single window. The State Project Management Unit (SPMU) under section 4 of the Policy shall be well equipped for effective implementation of the projects. SPMU shall be the nerve centre for planning, development and implementation of schemes, projects etc. in the State.
- ❑ A task force committee headed by Principal Secretary, Fishery Department or Commissioner and Secretary in absence of Principal Secretary, Director of Fisheries as member Convenor and other major stakeholders as members shall be constituted to deliberate on the issues concerning fisheries and aquaculture. SPNO shall be the one of the member of the committee.
- ❑ Steps shall be taken to involve national and international agencies like NFDB, ICAR, SAU, CAU, NABARD, NCDC, MPEDA, World Bank, World Fish Centres, etc. For development of fisheries sector in Assam.

19. Policy for research & development including technology upgrading

- ❑ Research and development is the backbone of development. College of Fisheries under Assam Agricultural University has been mandated for research and development activities in fisheries and aquaculture. Technology upgradation programs are also a part of the R& D and has been entrusted to the Assam Agricultural University.
- ❑ Sufficient qualified Departmental Officers are already in place and hence the policy shall emphasis for undertaking R&D projects, TUPs under ICAR, NFDB, DBT, GoI, NEC, EAP, etc. by the Department through SPMU considering changing scenario of fisheries and aquaculture throughout the globe. SPNO shall be the Principal Investigator of such type of R&D projects. Department shall bring out detailed modality and guidelines in this regard.
- ❑ All R&D projects, TUP projects to be run by the Department, an amount of 10% of the total project cost shall be taken as **Institutional Charge** which shall be deposited and utilized by the Department under Administrative Expenditure head.

20. Monitoring evaluation and policy review

- ❑ The progress of implementing the Assam Fisheries and Aquaculture Policy, 2016 requires an effective monitoring and evaluation mechanism with appropriate and efficient feedback mechanism.

- ❑ SPMU shall be entrusted with providing systematic inputs for refining the policy depending on the future needs, its implementation and management, to handle inter-sectoral issues and to protect the interest of fishers and fishing community.
- ❑ Policy shall be reviewed both by internal and external agencies in every five years to continue to align with successive five year plans, national priorities, global issues, impact of climate changes, fisheries governance, etc.