



The Arunachal Pradesh Gazette

EXTRAORDINARY
PUBLISHED BY AUTHORITY

No. 94, Vol. XXVI, Naharlagun, Wednesday, March 6, 2019 Phalgun 15, 1940 (Saka)

GOVERNMENT OF ARUNACHAL PRADESH
DEPARTMENT OF ANIMAL HUSBANDRY, VETERINARY & DAIRY DEVELOPMENT
ITANAGAR

NOTIFICATION

The 4th March, 2019

Arunachal Pradesh Pig Breeding Policy, 2018

No.AHV/D-Cell/3/2017-18.—Whereas, the State Cabinet has approved the Arunachal Pradesh Pig Breeding Policy, 2018, prepared by the Expert Technical Committee constituted by the Government of Arunachal Pradesh vide Notification No. AHV/D-Cell/3/2018-19 dated 23rd April, 2018, the Governor of Arunachal Pradesh is pleased to notify the Arunachal Pradesh Pig Breeding Policy, 2018 to promote breeding and development of pigs thereby enhancing pork production and piggery industry in the State in general and securing sustainable livelihood to the farmers in particular.

The Department of Animal Husbandry, Veterinary and Dairy Development, Government of Arunachal Pradesh would be responsible for effective implementation of the breeding policy. This policy will be subject to revision after every five years or earlier as deemed necessary by Department of Animal Husbandry, Veterinary and Dairy Development, Government of Arunachal Pradesh.

This issue with due approval of Competent Authority.

Bidol Tayeng, IAS
Secretary (AHV&DD),
Government of Arunachal Pradesh,
Itanagar.

ARUNACHAL PRADESH PIG BREEDING POLICY, 2018

**Technical Committee constituted by Government of Arunachal Pradesh
vide Notification No. AHV/D-cell/7/2018-19 Dated 23rd April, 2018 (Annexure-1).**

- | | | | |
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| 9. | Dr. S. Banik, Pr. Scientist, ICAR, (NRC on Pig), Rani. | - | Member |

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PREFACE

Arunachal Pradesh, a north eastern state of India with its congenial topographical and geo-climatic characteristics and rich domesticated animal biodiversity and varied bio - resources has immense economic potentials for animal husbandry activities and livestock farming along with dairy, poultry, meat and allied agro based industry. Pig rearing is a popular and traditional occupation among the Arunachalees for meat production since time immemorial. There is a big demand for meat and meat products as almost all the people are non-vegetarian and these products are the major source of proteins of higher biological value. However, the gross output of meat is low due to low genetic potential of the indigenous pig population so far their productivity is concerned. Disorganized breeding, inadequate feed supply, incidence of diseases, lack of efficient and scientific management of resources and lack of application of newer and advanced technologies for augmentation of productivity, inadequate adoption of processing technologies, and unorganized marketing are some of the important factors relating to lower production and supply of pork and value added meat products. The Arunachal Pradesh Livestock and Poultry Breeding Policy formulated in 2012 to cover the 12th Five year plan period with the mission and target to increase productivity of livestock and poultry and conservation of indigenous animal genetic resources which included pig as well needs to be revisited to make the pig breeding policy more dynamic in the present day context of advances made in the field of breeding, reproduction, management and product processing technologies to derive maximum benefit out of the proposed policies. Further, GOI has been reiterating time and again to formulate a State Pig Breeding Policy envisaging ways and means for augmenting the productivity, scientific breeding and growth of pig husbandry in the state.

The Government of Arunachal Pradesh, Department of Animal Husbandry & Veterinary and Dairy Development constituted a Technical Committee under the Chairmanship of the undersigned vide Notification No.AHV/D-cell/7/2018-19 dated 23rd April, 2018 to formulate the Arunachal Pradesh Pig Breeding Policy-2018 for its implementation throughout the state. The Committee accordingly framed the Policy and submitted the same to the Govt. of Arunachal Pradesh through the Director of the A.H. & Veterinary and Dairy Development Department for appraisal and implementation in its true spirit. It is pertinent to mention here that the policy has been framed in the perspective of the state's requirement and also fulfilling the national policy guide lines.

Accordingly, the required updated information and data were provided by the concerned officers of the Directorate and field Veterinary Officers. The Director and all senior level officers of the Directorate and other establishments of the state contributed immensely in framing the policy and preparation of the document. Contributions and assistance received from all are duly acknowledged. The present Pig Breeding Policy document is prepared in active collaboration with ICAR-NRC on Pig and by incorporation of their suggestions as and when necessary.

It is expected that implementation of the Pig breeding policy would lead the state of Arunachal Pradesh to become not only self sufficient in production of pork and other value added products and by products for domestic consumption as well as for export of these products to boost the economy of the farming community and entrepreneurs. The policy would also contribute towards increase in growth of GDP and development of the State.

Prof. (Dr.) Dharmeswar Das
Chairman, Technical Committee

EXECUTIVE SUMMARY

ARUNACHAL PRADESH PIG BREEDING POLICY, 2018

Pig rearing is a popular and traditional occupation among the people of Arunachal Pradesh since time immemorial. Arunachal Pradesh possesses a pig population of 3,49,890 numbers ranking next to cattle (Livestock Census, 2012). Of these total pigs, 2,79,045 numbers accounts for indigenous pigs and 35,556 numbers as crossbred pigs in the state. This indicates that the majority pig population reared by the farmers in the state is non-descriptive indigenous breeds. As per the sample Survey 2016-17 of Arunachal Pradesh, the milk, meat and egg production of the state are 54.09 thousand tones, 21.09 thousand tones and 559 lakh, respectively. Pork constitutes 60 percent of the total food of animal origin including egg and milk requirement and for which the state is still dependant on other states. However, productivity of livestock and volume of production is quite low resulting in a big gap between the production and demand of the animal products in the state. But bulk of indigenous pig germplasm has poor growth rate and low productivity. However, these indigenous pigs have some important genetically inherited traits like good mothering ability, early maturity, tolerance and resistance to parasites and diseases and low nutrient requirement. Therefore improvement of the indigenous Arunachalee pigs for productivity enhancement along with their conservation is of utmost important. Therefore productivity improvement of the animals through genetic up gradation is one of the major thrust areas of the state using a well knit breeding policy. Pigs reared in the villages are mostly indigenous and mixed breed types or crossbreds. The local people prefer the meat of indigenous pigs and crossbreds with black coat colour as it has high back fat thickness and has good preservative value.

The genetic potential of the available swine population requires up-gradation and improvement. The state department had made several attempts to improve the available pig germ plasm of the state by introducing recognized and improved exotic breeds of pigs such as Hampshire, Large Black and Yorkshire sourcing these from available stock within the country and even by importing from other countries. Therefore it is high time to review the pig development programmes vis-à-vis framing of a new breeding policy to have a positive impact for the development of the existing pig population and the germ plasm using the animals of superior breeds and genetic merit for productivity enhancement.

The objectives of the Arunachal Pradesh Pig breeding policy are as follows:

- (1) Genetic improvement of the indigenous pigs of Arunachal Pradesh for productivity enhancement by crossbreeding with exotic breed(s) to a desired level of combination of exotic and local inheritance,
- (2) Improvement and Conservation of Indigenous Arunachalee pigs by selective breeding,
- (3) Establish and maintain pure germ-plasm pool of exotic breeds suitable for the state to meet the requirement of crossbreeding,
- (4) Maintenance of well-planned crossbred animals at farmers' field,
- (5) Expansion of infrastructure and support mechanism to propagate the elite germ plasm of exotic breeds and crossbreds and adoption of Artificial Insemination (AI),
- (6) Ensure that the breeds introduced and crossbreds produced and propagated in the state are adapted to local environmental conditions and emerging climatic challenge, and
- (7) Strengthen support mechanism and development of the sector in respect of feeding, housing and health care besides value addition and marketing of the produce with value chain development.

Outline of the Arunachal Pradesh Pig breeding policy :

1. Genetic improvement of Indigenous Arunachalee pig population will be made by breeding them with superior exotic/improved pig breeds through Artificial Insemination/Natural mating. Selective breeding within the populations of indigenous/crossbred pigs and culling of poor meat producers owned by the farmers will be attempted to achieve sizable gains both in genetic and economic terms. The exotic breeds of choice for the state are mainly Hampshire, and Large White Yorkshire (LWY). However, the Large Black breed of pigs may also be maintained for crossbreeding of indigenous pigs in selected areas looking in to the demand of the consumers for black colored pigs.
2. Nucleus herds for the exotic breeds viz, Hampshire and LWY, Indigenous Arunachalee and crossbreds besides Large Black will be established in the Government Pig Breeding farms and also with the private participating entrepreneurs to carry out pig development programme in the state.
3. Required number of animals of the exotic breeds will be imported to strengthen the breeding programme and to introduce superior genes and increase genetic variability in the population.
4. The nucleus herd in the govt. farm will consists of 30 to 100 sow units depending upon the carrying capacity of the existing farm or newly established farms. Foundation stock will be procured from pedigreed herd of organized farms or reliable sources from different locations of the state and the country.
5. Mating plans avoiding inbreeding will be designed by the farm management to breed the best animals to ensure optimum number of farrowing and to produce sizable number of piglets in each farrowing as per breed norms. Selected sows will be bred and maintained up to 3rd or 4th farrowing depending upon performance. The replacement stock for both male and female will be selected on the basis of litter traits of dams, weaning weight, body weight gain and number of functional teats. After keeping the required number of selected piglets, gilts and boars, the rest of the animals will be provided to the multiplier farms and field units. Sire replacement will be a regular feature from new sources or on rotational basis to eliminate inbreeding effects.
6. The level of exotic inheritance in crossbreds of exotic breed and indigenous pigs of Arunachal Pradesh will be ranging from 50 percent to 87.5 percent depending upon the production system followed in a particular location/zone and availability of inputs required for the animals' optimum performance.
7. Upgrading of indigenous local pigs may be done by using exotic boars of suitable breeds viz., Hampshire and/or LWY in remote areas where pigs are reared in open ranging conditions in different zones without any scientific inputs in the form of feed or improved management and depends only on naturally available resources. The use of exotic breed in different zones will depend on the adaptability of that breed, choice of farmers and consumers' demand, feed resources and other input availability.

8. In the areas where crossbred pigs are maintained by the small holders in households having some shelters for pigs constructed with local materials or penning system and provides very little feed from household and agricultural wastes the breeding policy recommended is cross breeding of these pigs with the boars of pure exotic breed or improved Crossbreds. Inter se mating of the selected crossbreds may be followed for fixation of desired genes for higher productivity and adaptability.
9. Rural and semi urban pig farms maintained by the farmers with small to medium herd size under semi intensive production system having good housing or shelters and providing some amount of compounded feed and maintain or capable to raise good crossbred animals, the breeding policy recommended is to practice cross breeding of indigenous female stock with boars of Hampshire/LWY or Large Black up to 75 percent or more of exotic inheritance.
10. In agro climatic zones of tropical to temperate climate where well accessible medium to large herd of crossbreds and exotic pig farms are maintained under intensive rearing system in urban and peri-urban areas with provision of modern housing system, good quality feeding and management, the recommended breeding policy is as follows:
 - (i) For commercial farming of improved exotic purebred and crossbred pigs of proven potential, elite populations of pigs of Hampshire and LWY/or Large Black may be produced and maintained as per market demand.
 - (ii) Commercial farming of improved crossbred pigs with proven potential may be encouraged under intensive production system.
 - (a) The level of inheritance may be fixed at 50 percent for both the exotic and indigenous pigs. *Interse* mating of the half bred may be done for fixation of the genes with 50 percent exotic level of inheritance.
 - (b) In elite herds of organized farms under intensive production system, the inheritance level of exotic breed can be raised to 75 percent or more for higher growth rate and body weight gain to attain maximum weight at market age.
 - (iii) Lines of selected exotic breeds and crossbreds may be maintained in the government Pig Breeding farms with the required mating plans for production of breeding stocks to be supplied to the multiplier pig farms for production of piglets and distribution in field for fattening.
11. Breeding plans and technical programmes to be followed in the state are as per the breeding pyramids through the Central Nucleus Breeding Scheme (CNBS) and outlined as follows:
 1. Pure bred boars and/or semen of 100 percent exotic inheritance from nucleus herds of Hampshire, LWY or Large Black will be provided to multiplier farms and to commercial /progressive farmers for breeding their animals and to produce 50 percent crossbreds.
 2. Boar/semen of 50 percent exotic inheritance produced in multiplier farms will be supplied to farmers to breed their local animals or to rear for commercial purpose and to increase the number of good quality piglet production which are in great demand.
 3. Boars of selected Indigenous Arunachalee pigs from nucleus herd will be provided to farmers in the rural areas and locations for breeding of their Indigenous animals.
12. For attaining the targets of cross-breeding programmes at the farmers' level the existing Government Pig Breeding farms will be converted into nucleus/multiplier farms at the state level and the private entrepreneurs will be encouraged to start multiplier farms for producing 50 percent crossbreds of exotic and indigenous pigs of Arunachal Pradesh.
13. At least four new exotic pig nucleus herds of each breed of Hampshire, and LWY will be established in different locations under organized public/private sector besides the existing Government pig breeding farms. At least one nucleus herds will also be established for Indigenous Arunachalee pig. These herds will be established with a parent stock of 100 Sow lines of Hampshire, and LWY pigs separately and about 150 female and 15 male piglets of each breed will be sourced from pedigreed herds from different locations of organized farms.
14. Artificial insemination (AI) will be initiated using superior boars for breeding by developing suitable facilities and required trained manpower besides natural mating. Rotational use of boars will be made with other farms in order to avoid inbreeding and introduce genetic variability. Frozen semen technology will be introduced after its standardization. Purebred exotic boars/Frozen semen may be imported to introduce superior genetic merit of desired traits from other countries/sources.

15. Multiplier farms will be established in Government and private sector to produce crossbreds with 50 percent inheritance level of Hampshire and Indigenous, LWY and Indigenous besides multiplication of pure line Hampshire, LWY and Indigenous Arunachalee pigs.
16. Selection of breeding/replacement stock: The nucleus pig breeding farms are advised to design their own selection indices following guidelines as prescribed for selection of the breeding animals.
17. Disposal of non-selected/unproductive animals: All non-selected male may be castrated before selling, Selected surplus male may be sold preferably to existing boar rearers to replace their poor quality stock. Animals for breeding should be certified by the Department, by following guidelines (to be developed by the Farm Advisory Committee). Unproductive sows and those which complete 3rd or 4th farrowing should be sold and disposed. Attempts will be made to implement a traceability system to keep track of the value chain in respect of germ plasm and food safety protocols.
18. Policy for improvement and conservation of Indigenous Arunachalee pigs: In order to conserve and improve Arunachalee pigs, a Government pig breeding farm will be established and developed as Nucleus farm for the germ plasm where selective breeding will be practiced to produce good quality piglets. In the native breeding tracts and localities where good quality Arunachalee pigs are available these animals will also be bred pure for conservation and improvement *in situ* through selective breeding.
19. Indigenous Arunachalee pig Breed registration: The state department will take necessary steps for breed registration of indigenous Arunachalee pig breed/germ plasm in collaboration with ICAR-NRC on Pig and ICAR-NBAGR, Karnal.
20. A state of art State level modern Pig Breeding farm will be established with all required facilities in an ideal location with a capacity of housing initially about 5000 pigs at one point of time besides other new proposed pig breeding farms in different zone/district for production and supply of breeding boars, gilts/sows as per demand of the state.
21. For maintenance of crossbred animals at farmers' field, *inter-se* mating will be practiced for fixation of the genes in the animals at farmers' field. Selection of breeding boars will be made by evaluating their performance in respect of litter size and body weight at birth and weaning, age at first farrowing, body weight and measurements and weight gain of the initial crops of the progeny.
22. Expansion of infrastructure will be made along with other support mechanisms to propagate the elite germ plasm through Artificial Insemination (AI) as recommended along with man power development to implement in the field.
23. Measures recommended to be followed to ensure that the breeds introduced, crossbreds produced and propagated in the state are adapted to local environmental conditions and emerging climatic challenge have been.
24. Strengthening of support mechanism and development of the sectors in respect of feeding, housing and health care and biosecurity besides value addition and marketing of the produce with value chain development, extension network, livestock insurance, and collaboration have been recommended.
25. Additional recommendations including designing work plans to implement and operationalize the policy have been outlined.

The Arunachal Pradesh Pig breeding policy framed once implemented will raise productivity of the animals and production as a whole and contribute towards sustainable pig husbandry practices, enhance rural livelihood, industrialize the piggery sectors thereby enhancing Gross Domestic Product (GDP) of the state. Implementation of the State Pig Breeding Policy will not only target socio-economically weaker section including women folk in terms of their sustainable livelihood security but also will address the issues of pig production system under changing climatic scenario. As the pig sector enterprises are dynamic and global scenario is also changing rapidly, periodical review of this policy in an interval of five years is recommended.

ARUNACHAL PRADESH PIG BREEDING POLICY, 2018

1. INTRODUCTION :

Pig rearing is a popular and traditional occupation among the Arunachalees since time immemorial. Today, pig is reared by almost every household wherein they keep 2-3 pigs as backyard farming keeping them in local sties. Arunachal Pradesh has huge potential to take piggery as a tool for the livelihood opportunities and profitable enterprise with its locally available resources. In 1977 improved pure breeds like pure Large White Yorkshire (LWY) and Hampshire were introduced for the first time for crossbreeding, resulting a higher yield and improved performances. But these breeds/crossbreds have been developed without following any systematic and scientific breeding programme which results in inbreeding problems and poor performances over the time even under optimum feeding conditions. Due to haphazard breeding practice in rural areas bulk of indigenous germplasm has poor growth rate and low productivity. But the indigenous pigs have some genetically inherited good traits like dark coat colour, good mothering ability, early maturity, tolerance and resistance to parasites and diseases and low nutrient requirement. Thus, conservation of these indigenous animals is of utmost important.

So to address the above issues and to develop high-producing crossbred pigs that are appropriate, adaptable and productive even in smaller context in Arunachal Pradesh, a scientific intervention in assessing the profile of existing breeds, correlating them with production performance and identifying the desired breed(s) for Arunachal are very much necessary for the state. This can rightly contribute in framing a breeding policy for the state.

Thus, while aiming for the genetic improvement of the existing swine population of the state in the interest of the pig rearing and farmers' economic sustainability, the Department of Animal Husbandry, Veterinary & Dairy Development of Government of Arunachal Pradesh, do hereby design and develop this Pig Breeding Policy known as the "*Arunachal Pradesh Pig Breeding Policy -2018*".

2. JURIDICTION AND DEFINATIONS :

It shall be called as the "ARUNACHAL PRADESH PIG BREEDING POLICY- 2018" which shall become effective from the date of publication in Government Gazette and follow up notification. The Arunachal Pradesh Pig Breeding Policy shall be effective all over the state of Arunachal Pradesh from the date of its notification.

- **Breed** : A breed is a specific group of domestic animals having homogeneous appearance (phenotype) and behavior, and/or other characteristics that distinguish it from other organisms of the same species. Breeds are formed through genetic isolation and either natural adaptation to the environment or selective breeding, or a combination of both.
- **Animal Breeding**: Animal Breeding means mating of animals and production of offspring. Animal breeding addresses the evaluation of the genetic value (Breeding value) of animals, their selection with superior growth rate and meat/pork production, or with other desirable traits and planned mating of the selected animals for improved productivity and adaptability. Breeding in this case – contextually, is producing improved breeds/varieties of domesticated pigs by improving their genotypes through selective mating.
- **Arunachal Indigenous Pigs**: Any or all the animals classified under the term, swine, that has been inherently in existence indigenous within the state and reared as domestic pigs by the Arunachalees.

- **Extensive Production system:** Farming system which is, considered as low input- low output system. This is a traditional system where mostly the indigenous animals are reared without providing any significant inputs in the form of feed or improved management requirements thereby depending only on naturally available resources.
- **Intensive Production system:** Farming system which is also considered as the high input high out production system where modern and improved technologies are adopted. With the result the out-put i.e. production and productivity is also high.
- **Semi-intensive Production system:** Farming system which is considered as a medium input medium output system depending upon the adoption of improved technologies for feeding, management, breeding etc.

3. ARUNACHAL PRADESH STATE PROFILE :

3.1. Geographic, Agro-climatic conditions and Demographic patterns:

Arunachal Pradesh stands like a sentinel in the North-East region of the Indian union sharing International Border of 630 Km with China in the north, Myanmar in the east and Bhutan in the west. It shares inter-state border with Nagaland in the east and linking Assam in the south. It is the 19th State in the country with the largest land mass amongst the NE States measuring 83,743 sq km laden with thick forest coverage.

The state is predominantly occupied by difficult hilly terrains characterized by rugged high mountains, deep gorges, turbulent streams and rivers flowing down to the plains of Assam joining with the mighty river Brahmaputra. The climatic condition varies within a short distance owing to varying topographical features and altitude. The state is divided into 4 major agro-climatic zones viz. The tropical zones with evergreen forest coverage with hot & humid area with highest rainfall, the hot and humid sub-tropical zone of foot-hills, the micro thermal/moderate temperate zone of mid-hills, Cool alpine zone of snow capped high mountains of greater Himalayas. This varied agro-climatic zones offer greater opportunities for the diversified agro based farming and vast animal resources as the livelihood options.

3.2. Agro-ecologies in Arunachal Pradesh:

Arunachal Pradesh being essentially hilly with deep valley and high mountain peaks traversed by number of rivers and rivulets, has varying agro-climatic zones which can broadly be classified as follows :

- (i) **Tropical Zone:** With high rain-fall and humidity, warm temperature ranges from 22-36 degree C in summer and 10-25 degree in winter and elevation range of up to 900 m above MSL. This may also be divided in to two sub-zones, namely Mid tropical hill zone and Mid tropical plain zone.
- (ii) **Sub-Tropical Zone:** With moderate rain-fall and humidity, cool temperature is ranges from 15-30 degree C in summer and 14-21 in winter and elevation range 900-1800 m above MSL.
- (iii) **Temperate Zone:** With less rain-fall, cool temperature is ranges from 0-22 degree Centigrade and elevation ranging from 1801 m to 3500 m MSL.
- (iv) **Alpine Zone:** Essentially cool temperature from 0-20 degree Centigrade with snow- fall and elevation above 3500 m above MSL.

The state is endowed with the huge dense forest coverage of 83 percent of the total geographical area which is considered to be the 12th Mega diversified hot-spot in the world with its 20 percent country's flora and a homeland of wide-range species of faunas. There are two National Parks located at Namdapha (Changlang district) and Mouling (East Siang district) and three Wildlife Sanctuaries at Pakke (East Kameng district), Miao (Changlang district) and Pasighat (East Siang district).

3.3. Land use pattern for agriculture and livestock rearing:

The total population of the state is 1.38 million (Census 2011) with population density of 17 persons sq km. The main occupation of the people is agriculture and livestock rearing. Therefore, agriculture and allied sectors primarily drives the economy of the state and nearly 75 percent of the state's total workforce is engaged in agriculture and allied services.

[Computed from various NSS Reports and various issues of NASO].

There are three types of land ownership pattern, namely the clan land, the village land and individual ownership. Shifting cultivation (*Jhum*) is a predominant practice in clan and village ownership land system, whereas sedentary agriculture along with livestock rearing is prevalent in the individual ownership pattern.

Table 1 : Land use pattern in Arunachal Pradesh.

Land Use	Area (000 ha)	%
Total Geographical Area	8,374	
Reporting area for land utilization	5,659	100.00
Forest	5,154	91.07
Net available area for cultivation	64	1.13
Permanent Pasture and other grazing lands	19	0.33
Land use misc. tree crops and grooves	37	0.65
Cultivable wasteland	65	1.15
Fallow land and other than current fallow	70	1.23
Current fallows	40	0.71
Net sown area	211	3.73
Irrigated area	13	<0.01

Source : Report 2011 on Land Use Statistics, Ministry of Agriculture, GoI,

Land use (Table 1) potentials of Arunachal Pradesh is low since it is a mountainous state and has more than two-third of its area above 1000 m and about one-third area above 2000 m altitude. It has a very low proportion of plain area. Below 5° slope, land including riverbed covers only 12,434 sq km and about half of the geographic area is either very steep or overhanging. Typical geographic set-up of the state is responsible for the rain deficiency in the western part and per-humid in the east-central part. Soils are mostly shallow, recently formed and have low fertility. The land holding pattern of Arunachal Pradesh is presented in Table 2. The total number of agricultural farm families in Arunachal Pradesh is 1, 09,298 and the average holding size is 3.51 hectares.

Table 2. Operational land holding by size group in Arunachal Pradesh.

Operation Holdings as in 2010-11	Marginal	Small	Semi-Medium	Medium	Large	All Holdings
Average size (ha)	0.55	1.34	2.76	5.54	14.90	3.51
Number	21,456	19,333	34,038	27,941	6,530	1,09,298
Area (ha)	11,863	25,914	93,944	1,54,858	97,292	3,83,871

Source : Basic Statistics of North Eastern Region 2015

4. METEOROLOGICAL DATA OF ARUNACHAL PRADESH:

4.1. Precipitation trends :

Rainfall in Arunachal Pradesh varies considerably both in space and time from year to year.

Table 3 : Rainfall statistics in different seasons in Arunachal Pradesh.

Season	Statistics	Value	Contribution in Annual Rainfall (%)
Annual	Average (mm)	2818.02	
	Inter Annual Valuation (CV ⁸)	0.25	
	Range	0-3764.75	
	Range – Inter-annual variation	0.38 - 0	
Winter	Average (mm)	120.75	4.3
	Inter Annual Valuation (CV ⁸)	0.59	
	Range	0- 200.52	
	Range – Inter-annual variation	0-0.9	
Pre-Monsoon	Average (mm)	660.15	23.4
	Inter Annual Valuation (CV ⁸)	0.35	
	Range	0-1051.95	
	Range – Inter-annual variation	0-0.5	
Monsoon	Average (mm)	1815.06	64.4
	Inter Annual Valuation (CV ⁸)	0.32	
	Range	0-2654.28	
	Range – Inter-annual variation	0-0.58	
Post Monsoon	Average (mm)	222.06	7.9
	Inter Annual Valuation (CV ⁸)	0.51	
	Range	0-284.86	
	Range – Inter-annual variation	0-0.83	

Average number of rainy days in the state during the south west monsoon is about 78 days and varies from 60 days to 88 days. Days when there is high rainfall events range from 1 to 9 days and similarly the extreme rainfall days are less and are about 1 to 2 days.

4.2. Temperature trends :

Arunachal Pradesh shows a large spatial as well as temporal variability.

Table 4 : Temperature Statistics in different seasons in Arunachal Pradesh

Season	Statistics	Maximum Temp(°C)	Minimum Temp(°C)
Annual	Average	33.1	22
	Inter Annual Valuation (CV ⁸)	0.01	0.017
	Range – Average	31.5 – 34.3	20.8 – 23.5
	Trend	0.34	0.25
Winter	Average	31	18
	Inter Annual Valuation (CV ⁸)	0.022	0.047
	Range Average	29.2- 32.4	16-19.6
	Trend	0.37	0.36
Pre- Monsoon	Average	37.7	24.5
	Inter Annual Valuation (CV ⁸)	0.017	0.023
	Range Average	34.8-40	25.5-22.7
	Trend	0.08	0.05
Monsoon	Average	32.9	24.2
	Inter Annual Valuation (CV ⁸)	0.02	0.016
	Range Average	31.6-35	22.4-25.7
	Trend	0.24	0.29
Post Monsoon	Average	30.2	19.4
	Inter Annual Valuation (CV ⁸)	0.022	0.041
	Range Average	28.8-31	17.2-21.4
	Trend	0.72	0.33

Seasonal Statistics :

Average Maximum temperature is higher in monsoon season and ranges between 31 and 32°C. Season wise, maximum rise in mean maximum temperature is observed during the post monsoon season (0.40° C). Rise in maximum temperature is noticeably higher during post monsoon months.

Rise in maximum temperature is appreciably higher than that of minimum temperature over Arunachal Pradesh. The rise is nearly 0.70° C in the south western part during post monsoon followed by winter season (0.40° C) and monsoon season (0.20° C). There is no significant Inter-annual variation.

(Sources – All above data are from *IMD Gridded temperature data (1969-2005)* as compiled in Arunachal Pradesh state action plan on climate change)

5. WATER RESOURCES IN ARUNACHAL PRADESH :**5.1. Drinking water:**

In Arunachal Pradesh, water for the purpose of drinking is primarily used from surface water (from perennial streams, *nala*'s and other natural water sources). The water supply is ensured by the Department of PHED. Few urban areas like Itanagar, Pasighat etc. underground water chlorinated and treated are used for supply. Use of river water for drinking is negligible. In foothill areas bordering Assam, the practice of using water from well and use of deep well is also practiced. Over all the state of Arunachal Pradesh is bestowed with natural rivulets, springs and [streams that caters basic requirement of water to the people of the state. Average per capita supply of water in the cities is 119 lpcd, lower than the desired supply of 150 lpcd.

5.2. Irrigation:

An area of more than 87,500 hectares has been irrigated in Arunachal Pradesh. Minor Irrigation Census of the State reveals that about 0.12 million hectare (about 66.67% of available potential) area is irrigated. The net irrigation area under utilization is around 51,700 hectares with cropping intensity in the level of 130.56%. The Command Area Development Water Management (CADWM) programme envisages the utilization of irrigation potential. Available records indicate that a wide utilization gap exist till today, it is estimated that about 55% of created potential is utilized and 45% remains unutilized due to poor resource support.

6. HUMAN POPULATION STATISTICS OF ARUNACHAL PRADESH :

Arunachal Pradesh - erstwhile popularly known as 'North-East Frontier Agency (NEFA)' was named on 20th January, 1972 and given the status of an Union Territory, attained it's statehood on 20th February 1987 with its original 5- districts named after 5-rivers viz. Tirap, Lohit, Siang, Subansiri and Kameng. These districts have been now divided into 20 districts based on geographical topography and ethnic populations at present.

The state is predominantly a tribal state and a homeland of 26-major tribes and 110 sub-tribes having different dialects, culture and traditions which are enlisted as under:

- The Mongpas, Sherdukpens, Akas, Mijis in Tawang and West Kameng districts.
- The Nyishis, Apatanis, Puroiks, Tagins and Hill Miris in East Kameng, Lower and Upper Subansiri, Kurung Kumey, Kra- Dadi and Papum-Pare districts.
- The Galos, Adis (with nos. of sub-tribes), Khambas, Memba, Bori and Bokars in Upper & Lower Siang, West & East Siang districts.
- The Mishimis (with numbers of Sub-tribes), Khamtis in Lohit, Lower Dibang valley, Dibang valley and Namsai districts.
- The Noctes, Tangsas, Singphos in Changlang and Tirap districts.
- The Wangchos in Longding district.

Present human population of the state is 13, 83,727 (Census 2011) with the decadal growth rate of 26.03 percent from 2001 to 2011. But the density of population is very low ranging from 5 – 15 persons per sq km except Papum Pare which has the highest density of 42 persons per sq km. The state has attained 65 percent literacy rate at present.

Table 5 : Human population and literacy rate in different districts of Arunachal Pradesh (Census Reports, 2011)*

Sl. No.	District	Total Population	Males	Females	Others	Literacy rate in %
1	Tawang	49977	29151	20826	0	59.00
2	West Kameng	83747	46155	37792	0	67.07
3	East Kameng	78690	38775	39915	1	60.02
4	Papum-Pare	176573	89182	87391	0	79.95
5	Lower Subansiri	83030	41843	41187	0	74.35
6	Kurung -Kumey	92076	45318	46758	0	48.75
7	Kra- Dadi	Included with Kurung-Kumey				
8	Upper Subansiri	83448	41758	41690	0	63.80
9	West Siang	112274	58168	54106	0	66.46
10	East Siang	99214	50116	49098	0	72.54
11	Upper Siang	35320	18699	16621	0	59.99
12	Dibang Valley	8004	4414	3590		64.10
13	Lower Dibang Valley	54080	28053	26027	0	69.13
14	Lohit	145726	76221	69505	0	68.18
15	Namsai	Included with Lohit				
16	Anjaw	21167	11507	9660	0	56.46
17	Changlang	148226	76948	71278	0	59.80
18	Tirap	111975	57604	54371	0	52.19
19	Longding			Included with Tirap		
20	Total	1383727	713912	669815	1	65.38

*The data for new districts of Siang/Lower Siang and Kamle are not available separately.

7. POLITICAL PROFILE OF THE STATE (AS OF JUNE, 2018)

Total Districts	:	22 nos.
ADC Head-quarters	:	37
Sub-division	:	12
EAC Head-quarters	:	25
Circles	:	123

Table 6 : District wise area, number of Sub-divisions, Blocks, Circles and Villages:

Sl. No.	District	Area (Sq Km)	Sub-division	CD block	circles	Villages
1	Tawang	2172	-	6	7	268
2	West kameng	7422	1	5	5	281
3	East kameng	4134	-	8	8	347
4	Papum-Pare	2875	2	5	8+1	250
5	Lower Subansiri	10135	1	3	5	243
6	Kurung -Kumey		1	10	5	423
7	Kra- Daadi				6	
8	Upper Subansiri	7032	2	9	11	450
9	West Siang	8325	1	12	7	498
10	East Siang	10193	1	6	6	140
11	Upper Siang		-	6	7	216

12	Dibang Valley	13029	-	3	5	86
13	Lower Dibang Valley		1	3	5	121
14	Lohit		-	5	2	469
15	Namsai	11402	-		2	
16	Anjaw		-	4	6	
17	Changlang	4662	1	7	8	264
18	Tirap	2362	1	7	4	155
19	Longding		-		6	
20	Siang	Included with East Siang District				4
21	Lower Siang	Included with East, Upper & West Siang District				-
22	Kamle	Included with Upper & Lower Subansiri district -				
20	Total	84743	12	99	120	4211

Source : Statistical handbook of Arunachal Pradesh (2015).

8. INFRASTRUCTURE :

8.1. Roads :

The State has the lowest road development index with road density of 25.16 km per 100 sq km area national average is 73 km per 100 sq km. The National highways account for about 1,992 km, and major district roads are about 12,169 km.

8.2. Power :

The State is largely dependent on the power from the micro/mini/small hydels stations now besides supplements from the diesel generator set and Central sector power. Arunachal Pradesh has a total installed power capacity of 201.9 MW, under the state and central sector. While 83.3 MW of installed capacity was under state sector, 118.6 MW was under central sector. Hydro power is the major source of electricity generation in the state, contributing around 97.6 MW, followed by 67.4 MW of renewable energy resources and 36.9 MW of thermal power.

The present average energy consumption per capita in the State is only 300 units which are far below the National Average of about 704 units. The current demand for power is 170 MW as against the generation/supply capacity of 115 MW. The transmission losses are also high as around 50 percent. The state lacks grid of its own and there are high voltage/extra high voltage transmission lines.

The Hydro power potential estimated in the State from the mega hydro electric projects is around 58676.40 MW and an additional 2000 MW hydropower potential is assessed from micro/mini/small hydro electric projects.

9. LIVESTOCK POPULATIONS OF ARUNACHAL PRADESH :

9.1. Different species of livestock :

A large variety of livestock is reared across different districts of Arunachal Pradesh. Yak and Mithun are two unique bovine species of animals of the state. All other species of domesticated livestock, cattle, goats, sheep, pigs and buffaloes are available besides different poultry species.

Table 7 : Livestock population in different districts of Arunachal Pradesh (Livestock Census, 2012)

Sl. No.	District	Cattle	Buffalo	Mithun	Yak	Dzomo	Goat	Sheep	Pigs	Horses/Ponies
1	Tawang	12093	0	43	7490	3865	2389	7425	1015	904
2	W/Kameng	23483	8	3305	4057	0	19319	4118	6655	2476
3	E/Kameng	29116	0	30249	0	0	25279	0	29098	0
4	PapumPare	53945	0	44286	0	0	44437	12	38064	6
5	L/Subansiri	20603	0	36001	0	0	18618	280	22639	28
6	U/Subansiri	16109	0	21932	254	0	19531	406	22958	0
7	KurungKumey	22866	0	39074	0	0	27518	0	35543	0
8	West Siang	31652	0	23607	98	0	20816	0	40628	240
9	Upper Siang	7847	0	20463	0	0	7845	17	19104	
10	East Siang	59605	679	9776	0	0	16557	3	35308	35

11	U/Dibang Valley	292	28	5565	0	0	1526	54	2000	0
12	Lohit	66204	1930	1818	0	0	30495	0	22149	265
13	L/Dibang Valley	23814	2749	2104	0	0	10763	0	12337	0
14	Anjaw	5747	0	9758	0	0	5745	0	15211	0
15	Changlang	60795	444	0	0	0	34036	406	28241	47
16	Tirap	12099	47	0	0	0	16319	0	18940	0
Total		456270	5885	253215	11899	3865	301193	12877	349890	3995

Among the different species of livestock, Yak, *Dzo-Dzomo* and Sheep are reared mainly in high altitude alpine and temperate pastures and grazing lands of Tawang and West Kameng districts of Arunachal Pradesh. Whereas, buffalo population is restricted to warm climate of Lower Dibang Valley, Tirap, Lohit, Changlang and East Siang districts. Mithun are reared mainly in Papum-pare, Kurung-Kumey, Lower Subansiri, East Kameng, Upper Subansiri, West Siang and Upper Siang. Thin population of Mithun is recorded from remaining districts except Changlang where Mithun are not reared. Cattle, goats and pigs are reared across all the districts of Arunachal Pradesh. Besides Yak and Mithun the people of the state rears a large variety of other livestock species like cattle, goats, sheep, pigs and buffaloes across different districts of Arunachal Pradesh. Livestock population of Arunachal Pradesh as per the 18th (2007) and 19th (2012) livestock census is given in the Figure below.

9.2. Pig Population :

Arunachal Pradesh possesses a huge pig population of 3, 49,890 numbers ranking next to cattle population (Livestock Census, 2012). Of these total pigs, 2, 79,045 numbers accounts for indigenous pigs and 35,556 numbers as crossbred pigs in the state. This indicates that the majority pig population reared by the farmers in the state is non-descriptive indigenous breeds.

Table 9 : Agro-climatic zone and District-wise pig population of the state :

Zone	District	Cross bred		Indigenous		Total
Temperate and alpine	Tawang	-	149	323	543	1015
	West Kameng	232	1429	1096	3898	6655
	Dibang Valley	-	-	653	1347	2000
	Total	232	1578	2072	5788	9670
Sub-tropical	Lower Subansiri	720	1562	5139	15218	22639
	Upper Subansiri	985	2634	3707	15632	22958
	Kurung Kumey	-	406	4121	31016	35543
	Upper Siang	736	1760	2343	14265	19104
	West Siang	1328	866	12137	26297	40628
	Anjaw	628	1603	2855	10125	15211
Total	4397	8831	30302	112553	156083	
Tropical Zone	East Kameng	-	-	3381	25717	29098
	Papum Pare	1318	2780	10260	23706	38064
	East Siang	1649	3115	4821	25723	35308
	Lohit	1950	2426	5844	11929	22149
	Changlang	Changlang	2353	3287	2706	19895
	Tirap	776	227	1424	16513	18940
	Lower Dibang Valley	716	524	5546	5551	12337
Total	8762	12359	33982	129034	184137	

Table 10 : Details of exotic and indigenous Pig Population in different districts of Arunachal Pradesh.

District	Exotic/Crossbred			Indigenous			Total Pigs
	Male	Female	Total	Male	Female	Total	
1 Tawang	79	70	149	443	399	842	1015
2 West Kameng	938	723	1661	2216	2523	4739	6400
3 East Kameng	0	0	0	13507	15591	29098	29494
4 Papum Pare	2353	1745	4098	16864	15828	32692	36790
5 L/Subansiri	1051	1230	2282	8877	11367	20244	22526
6 U/Subansiri	2195	1424	3619	9726	9128	18854	22473
7 Kurung Kumey	134	272	406	15615	18930	34545	34951
8 West Siang	1388	806	2194	18573	19525	38098	40628
9 East Siang	3349	1291	4640	1747	13985	30436	35308
10 Upper Siang	1426	1070	2496	9773	7645	17418	19914
11 Dibang valley	-	-	-	858	1015	1861	1871
12 Lohit	830	410	1240	6199	4937	11136	12376
13 Dibang Valley	2623	1753	4376	9059	8349	17408	22149
14 Anjaw	1096	1137	2231	6486	6521	12980	15211
15 Changlang	3663	1488	5151	4757	3308	8065	13216
16 Tirap	641	362	1003	1036	7572	17937	18940
Total	21772	13790	35556	124736	144623	279045	333262

9.3. Characteristics of some major pig breeds in demand and Indigenous pigs.

- Hampshire (Purebred):** This breed was developed in the U.S.A and is now one of the world's most important breeds. The Hampshire is a black Hog with a white band around the body at the shoulder including the front legs and feet. The head, tail, legs and back are black. The ears are erect and the face is longer and straighter compared to other breeds. Hampshire sows are very prolific, have extra longevity, and make good mothers. They have been used extensively in crossbreeding because of their good carcass quality- popular for their lean, meaty carcasses. They were noted and criticized for their large size, but admired for their prolificacy, hardy, vigour, foraging ability and outstanding carcass qualities. Sows give birth to a large litter of 10 piglets with 1 kg birth weight, but some sows have been known to have litters of up to 16 piglets. Adult boar weighs around 230 to 340 kg and sows 200 to 290 kg.
- Large White Yorkshire (Purebred):** It is a native breed of U.K imported to India from U.K, New Zealand, and Australia. It is large in size with a long and slightly dished face. Body is covered with fine white hairs, free from curls. Skin is pink in colour and free from wrinkles with long and moderately fine coat. Ears are thin, long and slightly inclined forward and fringed with fine hair. Neck is long and full to the shoulders with deep and wide chest, shoulders are not too wide. Back is slightly arched, and loins are long and broad with a well developed wide rump. Ham is fleshy extending up to hocks. Tail is set high. Pasterns are strong and straight with clean feet. It has the capacity to thrive well under different climatic conditions that is why it is extensively used for crossbreeding and breed up-gradation.
- Large Black:** Large Black originated from the Old English Hog. The breed is large framed, solid black in colour, hardy and docile. This breed of pig has a long and deep body. The black skin makes the breed very good at coping with sunburn and a popular choice in hot climate. They are very docile. Despite the breed's size, handling is not a problem and hence, it is ideally suited for all kind of managemental systems.
- Indigenous Arunachalee Pig :** This is a small sized native pig germ plasm found in Arunachal Pradesh. They are predominantly black in colour with pot bellied appearance. The mature body weight ranges between 40 to 50 kg and litter size about 5 to 6 numbers. These pigs are mainly raised in Extensive (backyard) and semi-intensive system. They have good mothering ability, early maturity, tolerance and resistance to parasites and diseases and thrive in low nutrient. These indigenous pigs are yet to be characterized with proper scientific intervention. There is a gradual decrease in the population of these local pigs due to lack of conservation efforts and scientific breeding for their improvement. Because of this there is increased interest of farmers towards faster growing crossbred pigs. However, conservation of the indigenous pigs with proper strategy is of great importance to preserve the highly desirable genes of mothering ability, disease resistance and adaptability in harsh feeding and managemental condition.

10. LIVESTOCK PRODUCTION AND LIVELIHOOD OPPORTUNITIES :

As per the sample Survey 2016-17 of Arunachal Pradesh, the milk, meat and egg production of the state are 54.09 thousand tones, 21.09 thousand tones and 559 lakh, respectively. Livestock rearing is a year round activity and no much seasonal variation in livestock and poultry production is observed in the state. However, productivity of livestock and volume of production is quite low resulting in a big gap between the production and demand of the animal products in the state. Therefore productivity improvement of the animals through genetic up gradation is one of the major thrust areas of the state using a well knit breeding policy.

Economy of Arunachal Pradesh is basically agriculture based and farmers follow mixed farming system with extensive system of livestock production for sustainable livelihood and income generation. Livestock rearing is an important activity of the farmers besides agriculture which includes cultivation of rice, maize, millets, pulses and other tuber crops. Farmers mostly cultivate rice as it is the staple diet of the people which are grown in wet rice fields in terrace system in up hills in addition to pig, goat and Mithun husbandry. Most of the Arunachalee farmers do subsistence farming for their own consumption and livestock such as pigs, Mithuns, yak are reared for the immediate cash.

Pigs reared in the villages are mostly indigenous and mixed breed types or crossbreds. The local people prefer the meat of indigenous pigs and crossbreds with black coat colour as it has high back fat thickness and has good preservative value.

11. DEPARTMENT OF ANIMAL HUSBANDRY & VETERINARY AND DAIRY DEVELOPMENT, ARUNACHAL PRADESH.

The Department of Animal Husbandry & Veterinary and Dairy Development, Government of Arunachal Pradesh looks after the activities of animal breeding, husbandry, production, health care and disease control, animal improvement and welfare. The department endeavors to enhance productivity of livestock and poultry in the state in order to increase production and per capita availability of proteins of animal origin by implementation of various central and state government programmes and schemes. The vision, mission, mandate and objectives of the department are as follows:

Vision : The Department of Animal Husbandry, Veterinary & Dairy Development is marching ahead with renewed vigour to face complex challenges and to harness domestic and national opportunities for the welfare of the farmers, consumers and other stakeholders in the food-supply chain by making the animal resources healthy and disease free. The efforts would be to become a leading department in the state, which is responsive, vibrant and sensitive to the needs of its stakeholders.

Mission: Harness power of science and education with a human touch for higher and sustainable livestock production & maintenance of healthy stock.

Mandate of the Department :

1. To increase productivity of Milk, meat, wool, eggs and other bye product.
2. To provide livelihood through farm activity.
3. To minimize poverty.
4. To upgrade indigenous livestock by scientific breeding.
5. Disease control and health services.
6. Training to livestock farmers for farm activity.
7. Ensure safe protein chain supplement for all.

Objectives of Department :

- To provide veterinary health care and diagnostic facilities.
- To provide quality breeding services to enhance productivity.
- Up gradation and conservation of indigenous breeds.
- Quality control of Feed, Milk and Milk products.
- Veterinary Extension, Education and Training.
- Promotion of Dairying for self-employment.
- Special livestock production programme for social up liftment.
- Fodder Production.
- Miscellaneous activities related to Livestock development in the state.
- To strive to generate self-employment opportunities and training programmes among unemployed youths through different types of farming.

11.1. Veterinary institutions of the Department :**Table 11: Different Veterinary institutions of Arunachal Pradesh AHV & Dairy Development Department.**

(Veterinary hospital-(VH), Veterinary Dispensary-(VD), Veterinary Aid Centre –(VAC), Cattle Upgrading centre (CUC), Disease Investigation Lab (DIL), DDL- District Diagnostic laboratory).

District	V. H.	V.D	VAC	CUC	AI Centre	DIL	DDL	LN Plant	Pig Farms	Slaughter house	Milk plant
Tawang	01	08	08	08	-	-	01	-	01	-	-
W/Kameng	01	23	05	15	-	-	01	01	-	-	01
E/Kameng	01	16	08	13	-	-	01	-	01	-	-
Papum Pare	01	13	13	06	01	01	01	01	01	-	01
L/Subansiri	01	12	14	04	-	-	01	-	01	-	-
Kurung Kumey	-	03	07	01	-	-	-	-	-	-	-
Kra-Daadi	-	02	09	0							
U/Subansiri	01	15	31	11	-	-	01	-	-	-	-
W/Siang	01	21	06	19	-	01	01	-	-	-	-
Upper Siang	01	13	06	03	-	-	—	-	-	-	-
E/Siang(Inclu. Siang)	01	13	01	0	01	-	01	01	02	-	01
Dibang Valley	01	04	01	01	-	-	-	-	-	-	-
Lohit	01	07	09	09	-	01	01	01	01	-	01 proposed
L/Dibang Valley	01	10	05	07	-	-	01	-	01	-	-
Anjaw	01	06	03	02	-	-	-	-	-	-	-
Namsai	01	06	-	06	-	-	-	-	-	-	-
Changlang	01	13	06	08	-	-	01	-	03	-	-
Tirap	01	07	02	07	-	-	01	-	-	-	-
Longding	-	04	02	04					-		
Total	16	196	136	124	02	03	12	04	11	-	03

Besides the above institutions there are 30 Key Village centres, 2 Mobile veterinary units and 2 Mobile AI units in the state.

11.2. Pig Breeding Farms :

There are 11 (Eleven) Government Pig Breeding Farms in the state of Arunachal Pradesh in different districts catering the piglet requirements of the farmers. Of these, there exists a Central Pig Breeding Farm at Karsingsa catering the pigs and piglet requirements of state capital -Itanagar and a Regional Pig Breeding Farm at Loiliang (in Lohit district) fulfilling the requirement of piglets of the Eastern sectors of the state.

The followings are the objectives of the state Govt. pig farms :

1. To maintain swine breeds of superior germ plasm aimed at up-grading local animals at farmer level to enhance productivity and production.
2. To serve as the demonstration farm to progressive pig farmers of the state.
3. To generate Revenue for the State.

Table 12 : State Pig Breeding Farms of Arunachal Pradesh.

Sl. No.	Pig Breeding farms & Location	Stock position at the end of year up to March 2016-2017							
		Adult stock		Young		Piglet		Total	Breeds
		Boar	Sow	Young Boar	Gilt	G	F		
1.	CPBF, KARSINGSA (Papum Pare)	10	90	03	05	53	87	248	Yorkshire, Gunguroo, Doom
2.	REPBF, LOILIANG (Lohit)	05	57	02	04	122	92	279	Yorkshire, Doom, Gunguroo, landrance
3.	DPBF, TAWANG	02	07		08	-	-	17	Ghunguroo, Doom
4.	DPBF, JOMLO (West Siang)	03	14		01	-		18	Yorkshire, Doom
5.	DPBF BERUNG (E/Siang)	02	14		02	8	6	32	Yorkshire, Doom
6.	DPBF, ROING (Lower DibangValley)	01	03					04	Yorkshire, Doom
7.	DPBF, WESSANG (East Kameng)	01	03	02	07	01	5	19	Yorkshire, Doom, local
8.	DPBF, BORDUMSA (Changlang)	01	08			10	48	67	Yorkshire, Doom
9.	DPBF, KHEMINIANG (Namsai)	01	04		01	2.	13	21	Yorkshire, Doom
10.	DPBF, JAIRAMPUR (Changlang)	02	38			19	73	132	Yorkshire, Doom and Gunguroo
11.	DPBF, SIRO, (L/Subansiri)	01	04					05	Yorkshire, Doom
		TOTAL						592	

11.1. Establishment/Set up of the Department :**Table 13 : Number of different Officers and Sub-ordinate staff**

Sl. No.	Designation	Numbers	Place of posting	Responsibility
1	Director	1	Directorate, Nirjuli	Overall in charge of the department
2	Jt. Director	4	Nirjuli :3 VTI, Pasighat :1	In charge of individual sector
3	Deputy Director	5	Nirjuli : 3 Tezu & Dirang :2	In charge individual branches
4	DVO (Marketing)	1	Nirjuli	NPDD programme
5	Manager	5	Nirjuli : 3, Sagalee :1 Jairampur :1	In charge of each state level livestock farms
6	Animal Breeder	1	Nirjuli	Look after the breeding section.
7	DIO	3	Nirjuli, Tezu & Aalo	Looks after the Disease investigation sector
8	Sr. Veterinary Officer	1	Naharlagun	In-charge, Veterinary Hospital, Naharlagun.
9	District AH & Vety Officer	20	Each District	They are district head of the Department.
10	Vety Officer	135	All over the state	All works pertaining to AHV & DD sector
11	FDO	1	Directorate, Nirjuli	Fodder Development activity
12	Paravets	512	All over the state	Provide Vety care & assists Vety Officers.

Table 14 : Manpower status - Trained personnel in the related field

Name of the Cadre	No. Posts	Utilization within the Cadre Posts	Total
Joint Director	01	Joint Director, Plan (HQ)	1
Dy. Director	01	Dy. Director, Regional Pig Breeding Farm,Loilliang	1
Managers	02	Central Pig Breeding Farm, Karsingsa	1
Vety Officer(Farms)	04	Vety Officer, Regional Pig Breeding Farm,Loilliang	1
		Vety Officer, Central Pig Breeding Farm,Karsingsa	1
		Vety Officer, Wessang	1
		Vety Officer, Jairampur	1
Total	07		7
Livestock Inspectors	02	Central Pig Breeding Farm, Karsingsa	1
		Regional Pig Breeding Farm, Loilliang	1
Asstt. Veterinarians	11	In all Pig Breeding Farms	11
Stockman	23	In all Pig Breeding Farm (With minimum 2 SMS)	23
Pig record keeper	02	Central Pig Breeding Farm, Karsingsa	
		Regional Pig Breeding Farm, Loilliang	
Skilled Labour	89	Medicine Carrier, Packers, Dreesers, Mali etc.	89
	133	Animal Attendant	133
	10	Senior Lab Technicians	10
	11	Lab Attendants	11
Total	269		269
Grand Total	276		276

Piggery Development Manpower of the Department :

The piggery development is manned by a Joint Director in the Directorate office (Hq) and respective Managers of the Pig Breeding Farms in the state, In the district level, the pig farms are manned by the Veterinary Officers and the field staffs under the supervision of the District AH & Vety Officers of the respective districts of the state. The manpower availability of the department is furnished in Table 13 and 14.

12. GAPS AND CONSTRAINTS TO BE OVERCOMED :

It is a traditional practice for most of the Arunachalee farmers in villages to rear 1-2 pigs in their backyard as a source of subsidiary income to meet exigency expenses. However, the state is yet to attain self-sufficiency in pork despite the fact that pig rearing has been a age old traditional practice by the local people for its socio-economic association since time immemorial. Pork constitutes 60 percent of the total food of animal origin including egg and milk requirement and for which the state is still dependant on other states.

Several reasons have been identified for the failure to meet the gap and constraints in attaining self-sufficiency in pork production. The existing pig population generally reared by most farmers in the state of Arunachal Pradesh is indigenous non-descript which is yet to be characterized to establish as the recognized breed. These animals have got themselves established over time through self-propagation resulting from exchange of genes among various swine breeds. Pig farmers of the state generally do not practice systematic scientific breeding, feeding and managements due to lack of awareness on improved breeding and management practices. There are many villages without breeding boars and the villager source piglets from other places. This is because of the fact that they do not maintain breeding boars, rather male piglets are castrated at an early age as most farmers prefer to rear them as fatteners rather than for breeding purpose. Hence, the inbreeding problem is a common phenomenon leading to congenital deformities, stunted growth of piglets and even high piglet mortality in local pig population.

Some of the most important issues faced by the farmers are non-availability of quality piglets with defined genetic traits and lack of awareness on disease control measures resulting in heavy morbidity and mortality of pigs which discourage them to upscale their pig holdings.

The genetic potential of the available swine population requires up-gradation and improvement. The state department had made several attempts to improve the available pig germ plasm of the state by introducing recognized and improved exotic breeds of pigs such as Hampshire, Large Black and Yorkshire sourcing these from available stock within the country and even by importing from Europe. Therefore it is high time to review the pig development programmes vis-à-vis framing of a new breeding policy to have a positive impact for the development of the existing pig population and the germ plasm using the animals of superior breeds and genetic merit for productivity enhancement.

12.1. Constraints faced by farmers and entrepreneurs in pig production :

1. Lack of awareness about scientific rearing of pigs, improved management system and training.
2. Non availability of good quality piglets having superior pork production potentiality for rearing under different management systems.
3. Lack of capital to invest in good breeding stock of pigs, housing, feed and veterinary care.
4. Economic disadvantage of rearing local indigenous pigs due to very low growth rate even though the meat is highly preferred and fetches same price as crossbred larger sized breeds.
5. Occurrence of Diseases - farmers did not want to increase production scale because of fear of epidemic, e.g. frequent attack of Swine fever due to which about 10 – 15 percent pigs dies every year or two in households.
6. Non availability of vaccines against diseases particularly Swine fever in required doses for timely vaccination is a limiting factor towards economic pork production.
7. Concentrate feed is not readily available and costly besides transport bottleneck to reach the farmers.
8. In rural areas pigs are maintained in poor shelters. Improvement in housing facility is a dire need under extensive and semi-intensive production system.
9. Difficulty in getting veterinary medicines and service as and when required by the farmers and pig rearers needs to be removed.
10. Large sized crossbred pigs have faster growth rate and attain market age early but are more fatty, have better feed conversion efficiency in pork production and provide economically viable farming option. But section of pork consumers opined that the meat of these pigs is not as tasty as smaller size and local and black variety of pigs.

Exotic and crossbred pigs with their proven feed conversion efficiency, faster growth rate and higher litter size are preferred for modern pig farming, but when it comes to consumer's preference of pork; it is the indigenous pig meat because of its flavor and juiciness. A breeding policy therefore, is the need of the hour to harness the best out of the available indigenous swine population of the state through scientific and well planned breeding policy and its implementation. Identification of pigs with better genetic make up for selective breeding may be required in order to achieve optimal production and productivity. It will be important to consider the preference and ability on the part of the farmer while designing a breeding policy.

12.2. Requirement on pig genetic material and breeding services:

There were very few studies carried out on pig germ-plasm available and required improved genetic material and breeding services in the state of Arunachal Pradesh. Some of the observations in this regard from the breeders and farmers' point of view are enlisted below:

1. Genetically improved breeds of pigs, exotic and crossbreds with indigenous should be added to the gene pool of the state as per demand and preference for better and economic productivity and generating income for sustainable livelihood of the farmers and entrepreneurs associated with the industry and the value chain.
2. All farmers need to improve their awareness and knowledge on pig breeds, crossbreds and breeding operations. Farmers need to be trained about improved management system for the optimum performance of the pig breeds made available in their places under local husbandry condition.
3. Introduction of improved reproduction technology like Artificial Insemination (AI) should be disseminated to the field and the breeders associations, piggery cooperatives should be formed to aid in all these aspects.
4. Knowledge and know-how on techniques of raising and management of breeding sows and boars and breed selection, including castration techniques must go to farmers.
5. Government support should be extended from the breeding and multiplier farms to farmers in order to supply breeding pigs and breeding services as well as piglets for fattening.
6. Medium sized and preferably black coloured crossbred pigs with reasonable lean and fatty meat as per location specific demand and preference for its tasty meat needs to be generated, propagated and reared.

The Arunachal Pradesh Pig Breeding policy is framed looking into all these criteria and as well as for its easy implementation.

13. OUTLINE OF RECOMMENDED PIG BREEDING POLICY FOR ARUNACHAL PRADESH

The Arunachal Pig Breeding Policy has been framed with the mission and target to improve genetic potentiality of the indigenous pigs of the state for increased productivity and conservation by adopting advanced breeding, reproduction and management technologies besides using improved exotic pig breeds for cross breeding. This will be supported by appropriate production system ensuring optimum and economic feeding and management of the animals, adequate animal health care and disease control, assured and organized market for animal products, adequate post-harvest processing and value addition of the products and sustainability of pig farming.

The breeding policy has been framed for different locations and production systems in the state considering agro-climatic conditions, availability of the feed and other resources, farmers' preferences, public demands and market.

13.1. Objectives of the Arunachal Pradesh Pig breeding policy :

1. Genetic improvement of the indigenous pigs of Arunachal Pradesh for productivity enhancement by crossbreeding with exotic breed(s) of pigs to a desired level of combination of exotic and local inheritance.
2. Improvement and Conservation of Indigenous Arunachalee pigs by selective breeding.
3. Establish and maintain pure germ- plasm pool of exotic breeds suitable for the state to meet the requirement of crossbreeding.
4. Maintenance of well-planned crossbred animals at farmers' field.
5. Expansion of infrastructure and support mechanism to propagate the elite germ plasm of exotic breeds and crossbreds and adoption of Artificial Insemination (AI).
6. Ensure that the breeds introduced and crossbreds produced and propagated in the state are adapted to local environmental conditions and emerging climatic challenge.
7. Strengthen support mechanism and development of the sector in respect of feeding, housing and health care besides value addition and marketing of the produce with value chain development.

13.2. POLICY RECOMMENDATIONS :

The recommended Pig Breeding policies are as follows to fulfill the objectives as laid down for the state of Arunachal Pradesh:

13.2.1. OBJECTIVE: GENETIC IMPROVEMENT OF THE INDIGENOUS PIGS OF ARUNACHAL PRADESH FOR PRODUCTIVITY ENHANCEMENT BY CROSSBREEDING WITH EXOTIC BREED(S) OF PIGS TO A DESIRED LEVEL OF COMBINATION OF EXOTIC AND LOCAL INHERITANCE.

For the purpose of improving genetic potentiality of the indigenous Arunachalee pigs, crossbreeding of these pigs will be done with exotic breed(s). Boars of pure exotic breed will be utilized for breeding of the gilts and sows of indigenous pigs of the state.

Choice of exotic breeds :

The choice of the exotic breed(s) for a locality/zone in different altitude and production systems has been made depending upon their performance, farmers' preference, consumers' demand and adaptability of the breed under the prevailing conditions and available resources. The exotic breeds of choice for the state are mainly Hampshire, and Large White Yorkshire (LWY). However, the Large Black breed of pigs may also be maintained for crossbreeding of indigenous pigs in selected areas looking in to the demand of the consumers for black colored pigs.

Foundation stock of pigs for breeding in field/farms of the state :

Indigenous Arunachalee pig population is the foundation stock for genetic improvement using superior exotic/improved pig breeds through Artificial Insemination/Natural mating. Selective breeding within the populations of indigenous/crossbred pig and culling of poor meat producers owned by the farmers will be attempted to achieve sizable gains both in genetic and economic terms.

Development of nucleus herds of Exotic and Indigenous pigs:

Nucleus herds for the exotic breeds viz, Hampshire and LWY, Indigenous Arunachalee and crossbreds besides Large Black will be established in the Government Pig Breeding farms and also with the private participating entrepreneurs to carry out pig development programme in the state. Required number of animals of the exotic breeds will be imported to strengthen the breeding programme and to introduce superior genes and increase variability in the population.

The nucleus herd in the govt. farm will consists of 30 to 100 sow units depending upon the carrying capacity of the existing farm or newly established farms. Foundation stock will be procured from pedigreed herd of organized farms or reliable sources from different locations of the state and the country. The technical committee to be constituted for implementation of the breeding programme will fix the procurement criteria, number, age and body weight of animals to be procured, criteria of selection of the stock etc. Mating plans avoiding inbreeding will be designed by the farm management to breed the best animals to ensure optimum number of farrowing and to produce sizable number of piglets in each farrowing as per breed norms. Standard procedure will be followed for weaning of piglets. Selected sows will be bred and maintained up to 3rd or 4th farrowing depending upon performance. The replacement stock for both male and female will be selected on the basis of litter traits of dams, weaning weight, body weight gain and number of functional teats. Data recording on various growths, reproductive and productive traits will be made using standard formats. After keeping the required number of selected piglets, gilts and boars, the rest of the animals will be provided to the multiplier farms and field units. Sire replacement will be a regular feature from new sources or on rotational basis to eliminate inbreeding effects.

For efficient use of the exotic breeds in crossbreeding programme, import of the new improved germ-plasm/semen to the state is recommended to increase genetic variability.

Exotic inheritance level in crossbreds :

The level of exotic inheritance in crossbreds of exotic breed and indigenous pigs of Arunachal Pradesh will be ranging from 50 percent to 87.5 percent depending upon the production system followed in a particular location/zone and availability of inputs required for the animals' optimum performance. Based on these situations suitable recommendations have been made while framing the breeding policy. In the Government Pig Breeding farms pure exotic pig breeds will also be bred as per need for maintaining pure lines besides the crossbreds generated using the exotic and indigenous pigs of the state.

Breeding Policy under Extensive Production system of pig rearing :

- (1) Upgrading of indigenous local pigs may be done by using exotic boars of suitable breeds viz., Hampshire and/or LWY in remote areas where pigs are reared in open ranging conditions in different zones without any scientific inputs in the form of feed or improved management and depends only on naturally available resources. The use of exotic breed in different zones will depend on the adaptability of that breed, choice of farmers and consumers' demand, feed resources and other input availability.
- (2) In the areas where crossbred pigs are maintained by the small holders in households having some shelters for pigs constructed with local materials or penning system and provides very little feed from household and agricultural wastes the breeding policy recommended is cross breeding of these pigs with the boars of pure exotic breed or improved Crossbreds. Inter se mating of the selected crossbreds may be followed for fixation of desired genes for higher productivity and adaptability.

Breeding Policy for Semi intensive Production system of pig rearing :

Rural and semi urban pig farms maintained by the farmers with small to medium herd size under semi intensive production system having good housing or shelters and providing some amount of compounded feed and maintain or capable to raise good crossbred animals, the breeding policy recommended is to practice cross breeding of indigenous female stock with boars of Hampshire/LWY or Large Black up to 75 percent or more of exotic inheritance. The breed for a particular location will be selected according to suitability and adaptability of the breed.

Breeding Policy for Intensive Production system of pig rearing :

In agro climatic zones of tropical to temperate climate where well accessible medium to large herd of crossbreds and exotic pig farms are maintained under intensive rearing system in urban and peri-urban areas with provision of modern housing system, good quality feeding and management, the recommended breeding policy are as follows:

- (i) For commercial farming of improved exotic purebred and crossbred pigs of proven potential, elite populations of pigs of Hampshire and LWY/or Large Black may be maintained as per market demand for providing quality germ plasm.
- (ii) Commercial farming of improved crossbred pigs with proven potential may be encouraged under intensive production system.

Crossbreeding of Indigenous local pigs with exotic breed may be carried in different areas as per consumer/market demand.

- (a) The level of inheritance may be fixed at 50 percent for both the exotic and indigenous pigs. *Interse* mating of the half bred may be done for fixation of the genes with 50 percent exotic level of inheritance.

- (b) In elite herds of organized farms under intensive production system, the inheritance level of exotic breed can be raised to 75 percent or more for higher growth rate and body weight gain to attain maximum weight at market age.
- (iii) Lines of selected exotic breeds and crossbreds may be maintained in the government Pig Breeding farms with the required mating plans for production of breeding stocks to be supplied to the multiplier pig farms for production of piglets and distribution in field for fattening.

Targeted locations/production systems and recommendations :

For a clear understanding of the pig breeding policy by implementers and farmers, the prevailing classified three broad categories of pig production systems in Arunachal Pradesh have been shown and their recommendation made as under:

Sl. No.	Targeted Pig Production systems	Breeding policy recommendations
1	Remote rural pig rearing/farming : Characterized by availability of indigenous breed/ poor quality cross bred pigs reared under open ranging/ tethering/ penning system and managed by smallholders for subsistence purpose with a little or no compounded feed inputs.	For this type of farmers/production system, the proposed policy is to conserve meritorious Indigenous germplasm of Arunachalee pig in their native breeding tracts by establishing nucleus breeding herd.
2	Rural semi-intensive pig rearing/ farming : Characterized by availability of crossbred pigs reared under moderately intensive/ semi-intensive system and managed by small holders partly for commercial purpose under low input-low output system.	For this type of production system, the policy is to promote cross breeding of Indigenous/ Local stock (female) with Hamp-shire or Large White Yorkshire or Large Black (male) with 50 percent level of exotic inheritance. The breed of choice will be according to farmer's preference and demand.
3	Urban/Peri-urban and well accessiblerural pig farms : Characterized by availability of good quality cross-bred or poor quality exotic pigs reared under intensive system and managed by progressive farmers, mainly for commercial purpose under high input-high output system.	For this type of farming system theSuggested policy is to promote pure Hampshire, LWY or their crosses with indigenous pigs of Arunachal Pradesh.

BREEDING PLANS :

1. Pure bred boars and/or semen of 100 percent exotic inheritance from nucleus herds of Hampshire, LWY or Large Black will be provided to multiplier farms and to commercial /progressive farmers for breeding their animals and to produce 50 percent crossbreds.
2. Boar/semen of 50 percent exotic inheritance produced in multiplier farms will be supplied to farmers to breed their local animals or to rear for commercial purpose and to increase the number of good quality piglet production which are in great demand.
3. Boars of selected Indigenous Arunachalee pigs from nucleus herd will be provided to farmers in the rural areas and locations for breeding of their Indigenous animals.

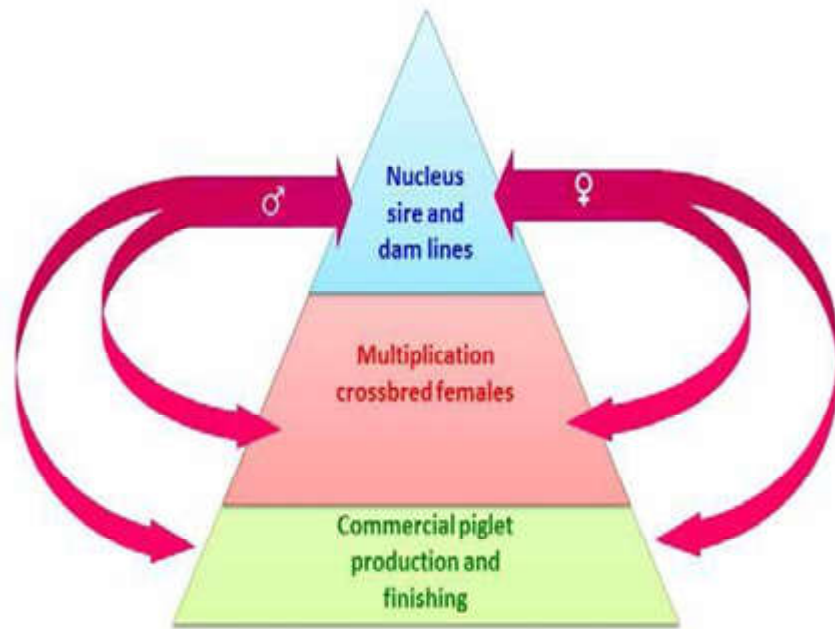
For attaining the targets of cross-breeding programmes at the farmers' level following efforts will be initiated at the govt. Departmental level :

- The existing Government Pig Breeding farms will be converted into nucleus/ multiplier farms at the state level.
- Private entrepreneurs will be encouraged to start multiplier farms for producing 50 percent crossbreds of exotic and indigenous pigs of Arunachal Pradesh.

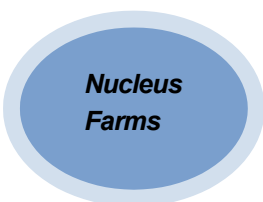
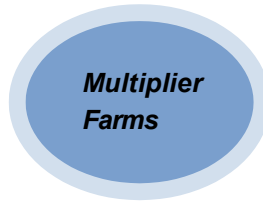
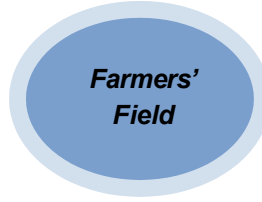
Breeding plan to be followed in the state :

The breeding programmes will be followed as structured in the breeding pyramids through the Central Nucleus Breeding Scheme (CNBS) as depicted in Figures below:

Figure 1: Breeding pyramid



Technical breeding Programmes :

Level	Jurisdiction	Activities
 <p>Nucleus Farms</p>	<p>State Level Nucleus Farm In indifferent regions as per demand & Pig populations</p>	<p>It will maintain Grand Parent (GP) Stocks of particular Breed.</p>
 <p>Multiplier Farms</p>	<p>Multiplier Farms will be the State Govt. Pig Farms in different regions of the State based on requirement</p>	<p>It will maintain Parent (P) Stocks of particular Breed</p>
 <p>Farmers' Field</p>	<p>Mass scale propagation of region/zone specific pigs and local pig entrepreneurs (Commercial Farms), will be monitored by regional multiplier Farms.</p>	<p>Will be regularly monitored by State Deptt. and co-operative based marketing will be ensured.</p>

Schematic Diagram For Pig Breeding Programme in Arunachal Pradesh

EXOTIC NUCLEUS HERDS :

At least four (4) new nucleus herds of Hampshire, and LWY breeds will be established in different locations under organized public/private sector besides the existing Government pig breeding farms. At least one Nucleus herd will also be established for Indigenous Arunachalee pig. These herds will be established as detailed below:

- To establish a nucleus herd (parent stock) of 100 Sow lines of Hampshire, and LWY pigs separately, 150 female and 15 male piglets of each breed will be sourced from pedigreed herds from different locations of organized farms.
- The age of the piglet at procurement should be 2-3 months age having body weight of more than 12 kg.
- Out of 150 gilts, 120 selected will be used for breeding to ensure 100 farrowings.
- Allotment of boar will be made in such a way that inbreeding could be avoided for a considerable period of time.
- Weaning of piglets will be practiced at 40-45 days of age.
- Reproductive parameters i.e. age at sexual maturity, date of service, date of farrowing, litter traits and growth data will be recorded.
- Breeding sows will be maintained up to 3rd or 4th farrowing. Replacement stock for both male and female will be selected preferably from 2nd to 3rd crop piglets on the basis of litter traits of sows, weaning weight, body weight gain and number of functional teats (14) of individual.
- The first, third and fourth crop piglets will be sold or disposed to multiplier farms /Government/ entrepreneurs either for cross breeding or pure breeding.
- Nucleus herd of Indigenous Local Arunachalee pigs shall be established under organized public/private sectors after getting them phenotypically and genetically characterized and registered. In this case, apart from conservation of these pigs in the station condition, selected animals shall be supplied to farmers with incentives to promote conservation *in situ*.
- It is also recommended that depending upon the local demands and popularity in the area, two (2) nucleus herds of Large Black pigs may also be raised separately in location as per demand of the farmers to boost the commercial pig farming in the state at the exotic nucleus herd level.

Breeding plan at Govt. Pig breeding farms :

Policy recommended for Government pig breeding farms and strategies suggested for implementation of the breeding programme are as follows:

- (a) Purebred lines of the pigs of chosen exotic breeds may be bred/maintained and produced in organized Pig breeding farms of the State Department of Animal Husbandry and Veterinary.
- (b) Artificial insemination will be followed for breeding besides natural mating by developing suitable facilities and required trained manpower. Semen will be collected from selected boars on the basis of their performance and superiority in the farm for the purpose. Rotational use of boars will be made with other farms in order to avoid inbreeding and introduce genetic variability. Frozen semen technology will be introduced after its standardization. Purebred exotic boars/ Frozen semen may be imported to introduce superior genetic merit of desired traits from other countries/sources.
- (c) Selection of breeding boars may be made by evaluating their performance in respect of litter size and body weight at birth and weaning, age at first farrowing, body weight and body measurements and weight gain of the initial crops of progeny. Selection Index will be designed by the farm for efficient selection of the animals of outstanding merits.
- (d) Elite crossbreds of superior genotypes with designated inheritance level of exotic breeds with local will be produced and raised with planned breeding for production of breeding boars, gilts and piglets for distribution to the multiplier farms and field.
- (e) Animals for breeding should be certified by the Department of AH & Veterinary for which necessary guidelines will be developed.

Multiplier farms :

Multiplier farms will be established in Govt. and private sector to produce crossbreds with 50 percent inheritance level of Hampshire and Indigenous, LWY and Indigenous besides multiplication of pure line Hampshire, LWY and Indigenous Arunachalee pigs.

The technical programme to establish the multiplier farms will include:

- At least 20 Multipliers Farms (10 for Hampshire Cross and 10 for LWY Cross) to be established in different locations besides the existing Large Black Cross based on farmers requirement.
- The herd size will be of 30 to 50 sows in each multiplier farm.
- The exotic boars of Hampshire and LWY (besides Large Black in designated locations) will be maintained for production of 50 percent exotic-50 percent indigenous (Half-bred) in the ratio 1: 4.
- The Multipliers Farm will maintain 50 percent exotic inheritance level by adopting *Inter-se* mating.
- Exchange of breeding boar will be practiced among the Multipliers Farms to avoid inbreeding in the farms.
- The Progenies of such farms will be supplied to Commercial Farms or 2nd line of Multipliers for production of 50 percent exotic-50 percent indigenous pigs.
- Excess animals other than breeding stock will be slaughtered for pork or marketed.

Selection of breeding/replacement stock :

The nucleus pig breeding farms are advised to design their own selection indices and following guidelines are to be followed for selection of their breeding animals:

Stages of selection	Selection of male pigs	Selection of female pigs
First	Two (2) male piglets to be selected from each litter at weaning age.	Three (3) female piglets to be selected from each litter at weaning age.
Second	Select 2 numbers of male pigs against each sire line at the age of 6 months to make a total of 20 males with the target to utilize 10 Boars of 10 sire lines for breeding purpose	Select 15 numbers of females against each sire line (considering not more than 2 gilts per dam) at the age of 6 months to make a total of 150 females for breeding to ensure 100 farrowing.

Disposal of Non-selected/unproductive animals :

- All non-selected male should be castrated before selling.
- Selected surplus male should be sold preferably to existing boar rearers to replace their poor quality stock.
- Animals for breeding should be certified by the Department, by following guidelines (to be developed by the Farm Advisory Committee).
- Un-productive sows and those which complete 3rd or 4th farrowing should be sold and disposed.

Identification and traceability :

A systematic process of identification, registration and recording of animals will be done to keep track of the individual breeding animals. On successful operation of the above, attempts will be made to implement a traceability system to keep track of the value chain in respect of germ plasm and food safety protocols.

13.2.2. OBJECTIVE : IMPROVEMENT AND CONSERVATION OF ARUNACHALEE PIGS THROUGH SELECTIVE BREEDING.

Policy for improvement and conservation of Indigenous Arunachalee pigs :

1. In order to conserve and improve Arunachalee pigs, a Government pig breeding farm will be established and developed as Nucleus farm for the germ plasm where selective breeding will be practiced to produce good quality piglets.
2. This breeding farm will initially be started as a 30 sow unit which will be expanded gradually by adding required infrastructure facilities. Best quality boars and gilts/sows of Arunachalee pigs will be procured from the breeding tracts of the state to start the farm. Animals from different tracts will be procured in order to avoid inbreeding.
3. In the native breeding tracts and localities where the Arunachalee pigs are available these animals will also be bred pure for conservation and improvement *in situ* through selective breeding.

4. In rural and remote hill areas where crossbred pigs as well as improved variety of Arunachalee pigs are maintained by the small farmers under extensive or semi-intensive production system having very little facility in regard to shelter and feed it is recommended to adopt cross breeding of these pigs with the boars of specified exotic breeds/selected crossbreds.
5. In selected breeding tracts of Arunachalee pigs, these pigs will also be bred pure for their conservation and improvement through selective breeding.

Indigenous Arunachalee pig Breed registration :

1. The state department will take necessary steps for breed registration of indigenous Arunachalee pig breed/germ plasm in collaboration with ICAR-NRC on Pig and ICAR-NBAGR, Karnal.
2. Nucleus breeding farm for such type of indigenous registered germ plasm need to be established in its breeding tract separately. Breeding pyramid should be followed for indigenous prized germ plasm also.
3. Prized animals may be collected from farmers' field/state/central Government farm to the nucleus herd.
4. Pedigreed animals should be propagated only by the interested farmers who want to keep local germ plasm. No crossbreeding should be allowed to farmers' field for these prized animals. Separate rates and incentive from the state department may be provided to such farmers.
5. Most of the indigenous germ plasm is smaller in size with less litter performance. However, in specific cases, indigenous animals with higher litter size and body weight, if available, may be used for up gradation of non-descript animals with proper plan.

13.2.3. OBJECTIVE: ESTABLISH AND MAINTAIN PURE GERM PLASM POOL OF EXOTIC BREEDS SUITABLE FOR THE STATE TO MEET THE REQUIREMENT OF CROSSBREEDING.

In order to implement the policies, creation of a gene pool of different breeds of exotic pigs and crossbreds to be utilized in various breeding programmes under different production systems, purebred lines of the recommended exotic breeds will be maintained in organized farms of the Department. Pig breeding farms will be established in the following line:

- (iv) A state of art state level Pig Breeding farm may be established with all modern facilities in an ideal location with a capacity of housing initially about 5000 pigs at one point of time.
- (v) New Pig breeding farms may be established in each zone/district for production and supply of breeding boars, gilts/sows as per demand of the state. The locations of these farms will be decided by the state department of AH and Veterinary. Two mandates of these farms are (a) each of the new farm will be started with about 30 sow units of selected exotic breeds for pure breeding to raise the required number of breeding animals, and (b) to produce required numbers of suitable crossbreds of exotic and indigenous pigs following selection and inter se mating of suitable crossbreds in the state.

13.2.4. OBJECTIVE : MAINTENANCE OF WELL-PLANNED CROSSBRED ANIMALS AT FARMERS' FIELD.

Crossbreds produced by using boars of exotic breed mated with Indigenous pigs as mentioned above with desired level of inheritance may be maintained and bred by *inter-se* mating for fixation of the genes at farmers' field. Selection of breeding boars may be made by evaluating their performance in respect of litter size and body weight at birth and weaning, age at first farrowing, body weight and measurements and weight gain of the initial crops of the progeny.

In order to generate the required number of pigs for slaughter to meet the demand of pork in the state, a three pronged development strategy is advocated as mentioned below-

- (a) Each district of the State should set up at least one field level "Seed Stock Farm" to provide superior germ-plasm to the Multiplier Pig Farms/Self Help Groups / Farmers' Societies.
- (b) Each sub-division should have at least two field level "Multiplier Farms". However, thickly populated districts where piggery is popular should have at least three such farms.
- (c) In addition, each sub-division of the districts should form at least 100 Self Help Group/Farmers' Societies/Clubs who will take up this pig-rearing venture.
- (d) Under a specialized scheme to be developed by the Department, interested and trained pig farmers in field may be provided with good quality improved crossbred piglets/gilts/sows/boars of desired breed combinations from the Pig breeding and nucleus farms for scientific rearing, breeding and production of piglets for maintenance by small holders for fattening and production of pork.

13.2.5. OBJECTIVE: EXPANSION OF INFRASTRUCTURE AND SUPPORT MECHANISM TO PROPAGATE THE ELITE GERM PLASM THROUGH ARTIFICIAL INSEMINATION (AI).

Artificial insemination (AI) technology will be introduced and strengthened in all the Government Pig breeding farms as well as in some village herds initially by adopting nearby villages from the Pig breeding farms and multiplier farms. Initiation will be made by using fresh semen for the purpose and gradually frozen semen will be used based on the facilities available and created. Besides collection of semen from superior boars of selected breed, efforts will also be made to import frozen semen from other countries to develop elite herds and improvement of local germ plasm.

Some of the existing Pig breeding farms, initially at least four in number may be selected by the state department to start the activity by developing suitable infrastructure and other required facilities.

Pig semen laboratories will be established in these farms along with a state level central laboratory for procurement of frozen semen of outstanding quality from outside sources, processing and preservation of locally collected semen from good quality boars of different breeds at regular interval.

Man power development will be made to implement the AI programmes through training of required number of personnel.

13.2.6. OBJECTIVE : ENSURING THE BREEDS INTRODUCED AND CROSSBREDS PRODUCED AND PROPAGATED IN THE STATE ARE ADAPTED TO LOCAL ENVIRONMENTAL CONDITIONS AND EMERGING CLIMATIC CHALLENGE.

The exotic pig breeds introduced in the state from time to time namely Hampshire, and LWY, Large Black are found to be adapted for crossbreeding with local indigenous and pigs. These breeds/crossbreds while breeding to propagate the future generations, efforts will be made to make them adaptable to the emerging climate change without losing their productivity and resistance to environmental changes and diseases.

Information on meteorological data like atmospheric temperature, humidity and rainfall will be regularly maintained and analyzed from time to time on the changes on seasonal/yearly basis to correlate it with performance of the animals in regard to their growth, reproduction and production traits and disease pattern. Accordingly measures on breeding management and housing will be taken up from time to time so that productivity of the animals is not affected adversely. Efforts will also be made to monitor and regulate the reproductive traits of the animals by ameliorating the stress factors due to probable climate change. Pig shelter and housing parameters will be designed for optimum comfort along with improvement in management systems to minimize climate stress.

13.2.7. OBJECTIVES: STRENGTHENING OF SUPPORT MECHANISM AND DEVELOPMENT OF THE SECTOR IN RESPECT OF FEEDING, HOUSING AND HEALTH CARE BESIDES VALUE ADDITION AND MARKETING OF THE PRODUCE WITH VALUE CHAIN DEVELOPMENT.

(I) Infrastructure Development:

The following infrastructure will be developed to implement the breeding policy:

- A state of art state level Pig Breeding farm may be established with all modern facilities in an ideal location with a capacity of housing initially about 5000 pigs at one point of time.
- Nucleus herds of required numbers as recommended for exotic/crossbred Pigs, each consisting of two exotic breeds in different locations.
- In similar lines, nucleus herd of Indigenous Arunachalee pigs for local need to be established in the respective native breeding tract/s.
- Development of sheds for farrowing, grower, replacement and parent stock separately for each breed.
- Potable water plant and distribution system to individual pen.
- Sewage treatment plant.
- Boar shed constructed specific to each breed provided with semen collection amenities.
- Semen processing laboratory with semen bank and establishment of satellite centers to propagate the elite germ plasm through Artificial Insemination (AI).
- Feed Mixing plant with a capacity of 10-15 quintals production per day and with a storage capacity of 500 quintals.
- Provision for production of feed and fodder crops.
- Quarantine/ isolation sheds.
- Strict bio-security measures for pig herds.
- Postmortem facilities and incinerator.

(ii) Animal Health, Disease Control and Bio-security measures :

- Disease surveillance and monitoring for incidence of diseases in animals may be strengthened. Regular reporting may be made for control of important diseases for sustainable production.
- Periodical health care and vaccination camps may be organized in the field/livestock rearing areas.
- Interstate check post may be strengthened to provide strict vigilance with facilities for screening of the animals before certification for movement.
- Some of the important facilities to be created in order to prevent disease incidence and to tighten the bio-security measures are: Setting up of check gate and quarantine stations at the point of entry to Arunachal Pradesh. Regular vaccination against prevailing and other emerging diseases in pigs (Classical Swine Fever, FMD etc.), Standard operating protocol to prevent spread of Exotic diseases like (PRRS) and prevention of infection, and Postmortem facilities and incinerator for disposal of carcasses.

(iii) Manpower requirements :

Support in terms of human resource will be required to implement the policies and programmes and manage the livestock breeding and development scenario in the state. Required number of officers and staff in each farm has to be placed for various categories such as Farm Manager, Animal Breeder and reproduction specialists, Assistant Farm Manager, all having the required qualifications and training in related fields. Livestock Supervisor, Veterinary Field Assistants for Farm, Laboratory, fodder field, feed mill, health care etc. will have to be also provided besides the required number of Farm, Animal and laboratory attendants, office staff.

Support in terms of Human Resource Development will be required to manage the whole system as detailed below:

- Farm Manager with specialization in Animal Genetics and Breeding/Livestock Production and Management or minimum 5 years of experience in related activity.
- Veterinary Officer (Production) with specialization in Animal Genetics and Breeding/ Livestock Production and Management or with a B.V.Sc & A.H. degree having training and experience in related field.
- Veterinary Officer (Lab) with specialization in Reproduction and Endocrinology or a B.V.Sc & A.H. degree with training in related field.
- Laboratory Assistants trained in related field from a recognized institute.
- Veterinary Officer.
- Stockmen
- Laboratory Attendant (Grade IV)
- Farm attendant (Grade IV)/MTS
- Other staff as per requirement.

(iv) Training and capacity building :

In order to properly implement and execute the breeding policy, suitable human resources are to be placed in various positions and regular training has to be imparted in the state or outside for the followings:

- Training of trainers and officers on Breeding management, Farm management, Traceability, Food safety, Value addition and value chain in pig industry, Artificial Insemination(AI) technology, Semen processing and preservation, Health and disease management, Training for Para-vets on Training boards for semen collection, Disease management, Farm management, Feed processing etc.
- Training and refreshers' courses periodically for the Field Veterinary Officers as well as the Para veterinarians, entrepreneurs and farmers.
- Training for community level workers on awareness creation and community mobilization, Awareness and training for farmers on care and management of pigs, marketing, food quality and safety including zoonosis.
- Training of farmers, unemployed youths, women, SHG members on management practices and technology providing suitable package of practice on breeding, feeding, management, marketing etc. to be provided.
- A package of practice on management and control of diseases for different categories of animals may be evolved and suggested for field application.

- Training to be imparted to the following key staff members to manage the technical programme and properly implement the breeding policy:
 - Training for officers on:
 - Farm management
 - Breeding management
 - Semen processing and Artificial Insemination (AI) technology
 - Health and disease management
 - Training for Para-vets on:
 - Training boards for semen collection
 - Disease management
 - Farm management.
 - Pig Husbandry practices.
 - Training for community level workers on:
 - AI technique
 - Awareness creation and community mobilization

(v) Marketing/disposal of animals :

- Development of organized marketing network may be made for disposal of the farm produce by the farmers.
- Incentive price may be fixed by the Government for the animal products in the State so that the farmers get remunerative price for economic farming and earn their livelihood.
- Proper guidance in the marketing procedures is felt essential and hence Government may initiate a Livestock and Poultry corporation to deal with all these matters.

(vi) Follow up action by a group of experts in an effective way :

- Effective follow up action will be taken up by the Department to monitor the progress of implementation of policies and achievements made. A Technical Committee may be constituted for the said purpose by the Government.

(vii) Extension Network:

- The success of any project like genetic improvement of livestock and poultry in a state would largely depend on proper execution of the programmes and peoples participation besides farmers' acceptance. The extension network of the state A.H. & Veterinary Department has to play a vital role in this regard. The information wing of the department must organize programmes from time to time to disseminate the information and technical knowhow to the people.
- Awareness programmes should be undertaken at regular interval with the aid of Information and Communication Technology (ICT), audio-visual display, film shows, distribution of pamphlets, radio talk, display boards, shows, fairs etc.
- Awareness about mixed/integrated and organic farming may be made amongst the farming community through various extension networks.
- A package of practice on management and control of diseases for different categories of animals may be evolved and suggested for field application.

(viii) Animal production/performance data and Health information system:

- Data collection and performance recording system may be developed and meticulously followed in the farms and field. Farmers may be made aware of the importance of data recording and trained from time to time along with other training programmes.
- The Department may adopt a policy to collect information in regards to different aspects of animal production, animal health, developmental activities etc. through MIS/INAPH/GIS technology. Under this Animal Production and Health Information System, a computer based networking system may be established enabling faster flow of information. The network is to cover all the districts of the state.

- The Department of A.H. & Veterinary may also launch and update its own website to provide access to vital information and activities pertaining to the department and the programmes. The computer network facilities and the website will help the farmers, breeders, planners, veterinarians and others providing easy information access for successful implementation of the policies.

(ix) Livestock Insurance :

- The department should initiate a comprehensive livestock insurance scheme in collaboration with appropriate agencies to extend the benefit of insurance cover of the valuable animals reared by the farmers. The animals purchased by the farmers under Bank loan/DRDA/CSS Livestock Insurance scheme are generally insured by the Insurance Companies. The Department of A.H. & Veterinary should streamline the entire issue of livestock insurance to protect farmers' interest.

(x) Collaboration :

- In order to be successful in implementation of the breeding policies close collaboration of the Department of A H & Veterinary of Arunachal Pradesh with different other States of North Eastern Region; National Research Centres on Pig, ICAR, located in the NE Region; ICAR complex, Barapani; NBAGR, Karnal, Agricultural Universities located in the region, etc. would be made as and when required.

14. ADDITIONAL RECOMMENDATIONS TO IMPLEMENT THE POLICIES :

The following additional recommendations are made for proper implementation of the Pig breeding policy :

- (1) Required fund for proper implementation of the policies and development of infrastructure may be allocated and provided as per the programmes.
- (2) The proposed breeding policy for the state of Arunachal Pradesh will be implemented by the A.H. & Veterinary Department. Any effort for Piggery development by individuals, public organizations and non-government organizations etc. must be in conformity and within the purview of the proposed policies. Thus, the policies will be mandatory for the state of Arunachal Pradesh.
- (3) In order to develop a pool of improved germ plasm of livestock/breeds as envisaged in the policy, provisions may be made for procurement/import of breeding stock/semen from national and international organizations/sources.
- (4) A technical committee may be constituted to monitor and evaluate the implementation of the policies. This committee will also act in the advisory capacity.
- (5) Each Breeding farm will have a Farm Advisory committee to see the progress of the farm and provide suggestions from time to time.
- (6) Artificial Insemination may be carried out by the veterinarians or trained technicians (Para veterinarian) under the supervision of the qualified veterinarians.
- (7) The A.H. & Veterinary Department Arunachal Pradesh will carry out farmers' awareness programme on the policies and record keeping system. Necessary formats for keeping records in farms/stations and also in field by the farmers be developed and distributed.
- (8) Human resource development and management must get priority in the state so that the qualified and trained manpower can be increased and utilized effectively to handle the policies successfully.
- (9) An organized marketing system with the required facilities may be developed in collaboration with all concerned agencies and corporations.
- (10) Impetus may be given to the small scale as well as large scale industries to handle the animal products for value addition and marketing.

15. WORK/ACTION PLANS TO BE PREPARED BY THE DEPARTMENT :

For implementation of the policies, detailed work/action plans with appropriate time frame may be prepared in accordance with the guidelines of the policies by the experts and State Departmental officials for the followings:

- (1) Establishment and revamping of Pig Breeding farms as per need of the policy. Identification and utilization of the existing breeding farms for the purpose.
- (2) Action plan for identifying the areas where a specific breeding plan and breed(s) to be introduced in different districts/zones/agro-climatic zones/production systems.
- (3) Detail plans for breeding and evaluation of breeding boars as well as females.
- (4) Work plan for semen production in different production centres and distribution.
- (5) Establishment of elite herd(s) of indigenous pigs for their conservation.
- (6) Cultivation of maize for production of pig feed and Tapioca in a massive scale which is relished by pigs may be taken up.
- (7) Farmers training, training of unemployed youths and women, awareness camp for implementation of the policy, data recording system in field, etc.
- (8) Animal production and health information system, computerization, data bank and networking, website updating.
- (9) Scheme for Insurance, credit, etc.
- (10) Restriction/check in movement of animals from and to the State by crossing state and international boundaries.

16. Operationalization of the breeding policy :

The Arunachal Pradesh Pig breeding policy framed needs to be approved by the state government, which shall be followed by notification and declaration. The following activities shall succeed the notification for implementing the policy:

- (1) Sourcing and import of germ plasm particularly the exotic breeds of pigs. Import of exotic germ plasm of Hampshire, Large White Yorkshire breeds, from reputed source after all bio-security checking.
- (2) Developed breed-specific nucleus herd of imported germ plasm for subsequent use in crossbreeding programme.
- (3) Development of implementation strategy, detailed project report and work plan.
- (4) Allocation/Mobilization of resources.
- (5) Constitution of Expert Advisory Committee.
- (6) Constitution of Farm Advisory Committee.
- (7) Establishment of new and development and modernization of old infrastructure.
- (8) Deployment of manpower.
- (9) Capacity building /training.
- (10) Development of own feed resources and through linkages/purchase.
- (11) Set up multiplier farms under government/private sector.
- (12) Setting up of delivery mechanism to supply good quality germ plasm (piglets, semen) from the nucleus herd/multiplier farms to the farmers through government network and private entrepreneurs.
- (13) Set up satellite AI centers at government and private level.
- (14) Incentivize castration of inferior male pigs in the field.
- (15) Incentivize conservation/rearing of indigenous pig germ plasm.
- (16) Establish data collection mechanism for performance evaluation in the field and for impact assessment.

CONCLUSION

The Arunachal Pradesh Pig breeding policy has been framed to augment productivity of indigenous pigs of the state by selective breeding and crossbreeding using exotic breeds for higher production of pork and other products. The policy is also framed for sustainable adoption of suitable breeding and production systems for economic up-liftment of the farming community and boosting the piggery industry for attaining self-sufficiency in animal protein requirements of the people of the state. This policy will be mandatory for the state and once implemented will raise production and contribute towards sustainable pig husbandry practice and provide income generation with assured livelihood to the farmers, youths and women of the state. Besides recommending strategies for pig genetic improvement, some important recommendations have also been made for development of work plans as per need for fruitful implementation of the policy. The implementation of the policy would improve the pig production system with better adaptability of the genetically improved animals under changing climatic condition and management needs. It is also expected that once implemented the breeding policy will gradually minimize the gap between production and demand of pig meat and other value added products in the state and ultimately lead the state towards self-sufficiency. The programmes developed as per the policy recommendations will be supported by appropriate production system ensuring optimum and economic feeding and management of the animals, adequate animal health care and disease control, assured organized market for animal products, adequate post-harvest processing and value addition of animal products for sustainability of livestock farming and economic up-liftment of farming families as a whole. The policy once implemented will raise production and contribute towards sustainable pig husbandry practices, enhance rural livelihood, industrialize the piggery sectors thereby enhancing Gross Domestic Product (GDP) of the state of Arunachal Pradesh.

Implementation of the State Pig Breeding Policy will not only target socio-economically weak communities including women folk in terms of their sustainable livelihood security but also will address the issues of pig production system under changing climatic scenario by improved production and productivity. As the pig sector enterprises are dynamic and global scenario is also changing rapidly, periodical review of this policy in an interval of five years is recommended.
