ANIMAL HUSBANDRY
& VETERINARY DEPARTMENT
Government of Assam

STATE CATTLE AND BUFFALO BREEDING POLICY 2020

ANIMAL HUSBANDRY AND VETERINARY DEPARTMENT
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CATTLE AND BUFFALO BREEDING POLICY OF ASSAM, 2020

1. INTRODUCTION

The economy of Assam is agrarian where more than 70 per cent of the population are engaged in agriculture, animal husbandry. Fishery, sericulture etc. The livestock sector plays a key role in the farmer's economy. This sector is responsible for providing food and nutritional security of the people by producing milk, meat, egg etc. More than 90 per cent of the population of the state are non-vegetarian and depend on animals for fulfilling their protein requirement through various animal products which are rich in essential amino acids and are easily digestible.

The cattle and Buffaloes are the main source of milk in the state besides their immense contribution to the farm economy as draught animal.

Assam is a deficient state in food grain production as well as food of animal origin. Although the state has recently made efforts for self-sufficiency in production of paddy, the state needs to take massive programme to increase foods of both agriculture and animal origin by way of utilizing all its resources.

The programme taken by the state govt. to attain self-sufficiency in food grains and other agricultural products have an indirect impact also in the development of animal resources sector due to availability and surplus agricultural product and by products as animal feed.

For augmentation of milk production of cattle and Buffaloes in the state several factors need to be considered so that the gap between the production of good genotype (Breed/Strain) provision of optimum environment which includes proper nutrition better management health care/disease control etc. As the basic cattle population of Assam is a breed with low production potentiality, their genetic improvement has become a priority area. The buffaloes are basically swamp types which are distinctly different from the riverine buffalo available in other states of the country.

The milk production potentiality is although very low in these buffaloes in comparison to riverine buffalo, the milk in swamp buffalo is rich in butter fat and the bullocks are of high quality draught animals used for every farm operation.

In order to make genetic improvement of cattle and buffaloes in the state a well defined policy need to be formulated so that production is augmented and the desirable genes of local animals are preserved.

2. ASSAM AT A GLANCE

2.1 Geographical data and climate

Assam is the 14th largest state in India and has a total geographical area of 78438 square K.M. (7.84 million hectare). It is situated in the Eastern Himalayan Region between 24^0, to 28^{0}18 north latitude and 89^{0}50 to 97^{0}4 east longitude. The climate of Assam is hot and humid with high rainfall. The average humidity ranges from 85 to 90% or more in majority of the districts.

The state has a mean annual maximum temperature ranging from 30^0 to 33^{0}C in the month of July/August and the minimum temperature ranging from 6^0 to 12^{0}C in the month of December/January.

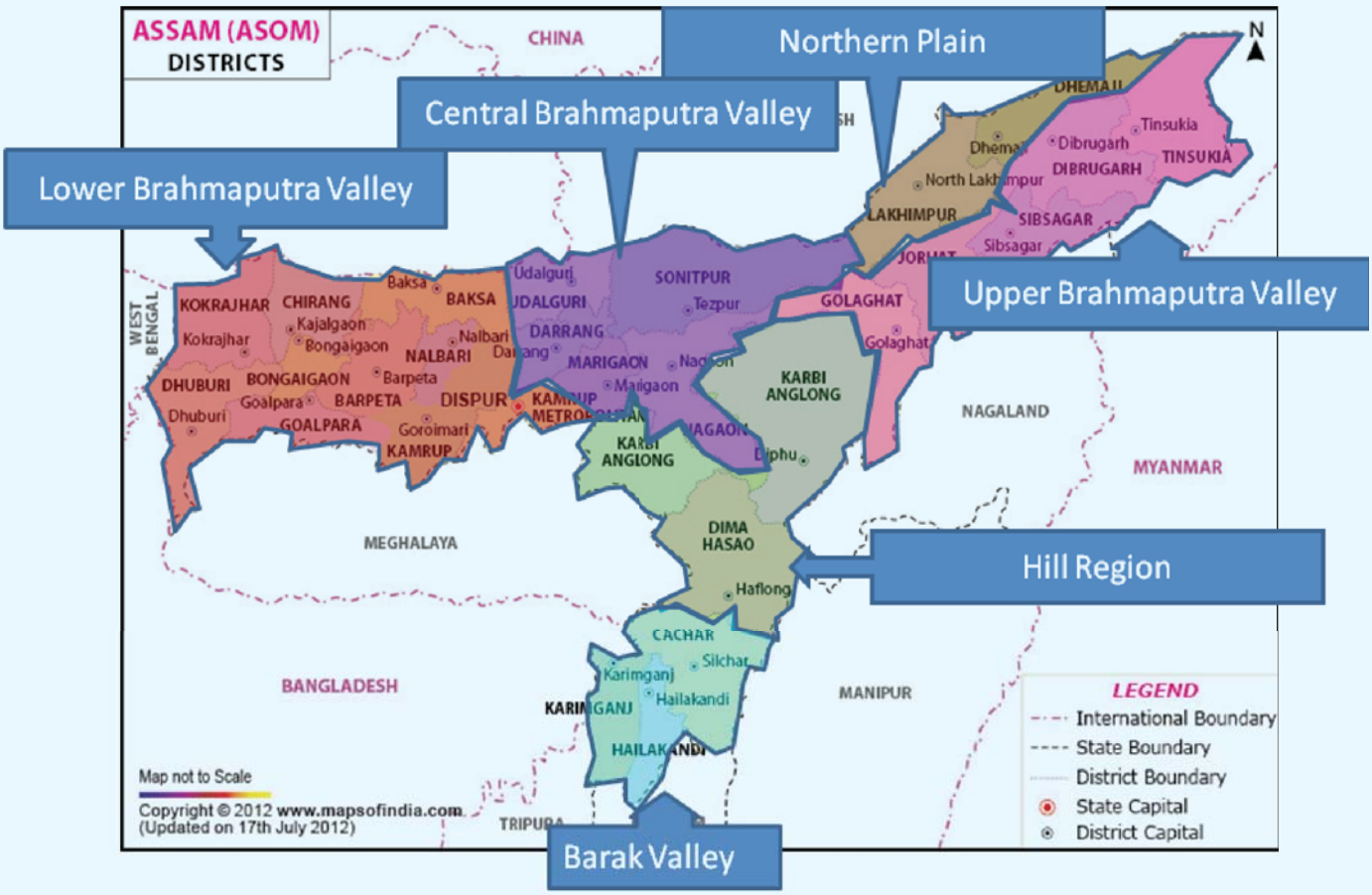
The average annual rainfall that is considered normal for Assam is 2584.5 mm, and the average normal rainfall during winter, summer monsoon and post-monsoon season are respectively, 66.2, 648.9, 1702.0 and 167.4 mm.

2.2 Agro Climatic Zone

Table: 1

ZONES	DISTRICTS (Also see Figure 1)
North Bank Plains	Lakhimpur, Dhemaji, Darrang, Udalguri, Sonitpur and Biswanath with an area of 14421 km^2.
Upper Brahmaputra Valley	Sivasagar, Charaideo, Jorhat, Majuli, Golaghat, Dibrugarh and Tinsukia with an area of 16,192 km^2.
Central Brahmaputra Valley	Nagaon, Hojai, and Morigaon with an area of 5561 km^2.
Lower Brahmaputra Valley	Kamrup (Metro), Kamrup, Dhubri, South Salmara, Bongaigaon, Nalbari, Barpeta, Kokrajhar, Chirang, Baksa and Goalpara with an area of 20148 km^2.
Barak Valley	Cachar, Hailakandi and Karimganj with an area of 6922 km^2.
Hill Region	Karbi Along, West Karbi Anglong, and Dima Hasao with an area of 15322 km^2.

FIG 1: MAJOR REGION CLASSIFICATION AS PER TOPOGRAPHY:



3. DISTRICT WISE CATTLE & BUFFALO POPULATION OF THE STATE

Table: 2:- PROVISIONAL CATTLE POPULATION AS PER LIVESTOCK CENSUS 2019* (IN THOUSAND)

SL. NO.	DISTRICT	TOTAL EXOTIC	TOTAL INDIGENOUS	TOTAL CATTLE	TOTAL BUFFALO
1	BAKSA	16998	347108	364106	813
2	BONGAIGAON	28243	228709	256952	1240
3	BARPETA	72846	409669	482515	20629
4	BISWANATH	11072	351192	362264	13108
5	CACHAR	24685	330158	354843	50447
6	CHIRANG	10246	197422	207668	1745
7	DARRANG	21560	435866	457426	37070
8	DHEMAJI	1161	525819	526980	16654
9	DHUBRI	12643	343414	356057	12427
10	DIBRUGARH	19087	321537	340624	12533
11	DIMA HASAO	8254	14322	22576	34068
12	GOALPARA	9543	324078	333621	8531
13	GOLAGHAT	45881	565572	611453	30549
14	HAILAKANDI	10587	121641	132228	19215
15	HOJAI	68023	230771	298794	1221
16	JORHAT	20910	411485	432395	21097
17	KAMRUP	33427	466510	499937	7076
18	KAMRUP (M)	36305	83947	120252	953
19	KARBI ANGLONG	31651	223405	255056	3884
20	KARIMGANJ	22412	256755	279167	27530
21	KOKRAJHAR	6388	327203	333591	7833
22	LAKHIMPUR	15640	613388	629028	11666
23	MAJULI	223	123539	123762	6245
24	MORIGAON	28047	327432	355479	4317
25	NAGAON	89224	537227	626451	16304
26	NALBARI	31460	218751	250211	5814
27	SIBSAGAR	7720	258311	266031	14829
28	SONITPUR	37585	476399	513984	7162
29	SORAIDEU	1948	86661	88609	916
30	SOUTH SALMARA	3868	138050	141918	4548
31	TINSUKIA	25108	357422	382530	9747
32	UDALGURI	9082	374050	383132	2717
33	WEST KARBI ANGLONG	7122	112477	119599	8827
	TOTAL	**768949**	**10140290**	**10909239**	**421715**

Source: 20th Livestock Census$ (DADF, GOI)

*: Provisional

4. BREEDS OF ASSAM AND RECOGNIZED EXOTIC BREEDS

LAKHIMI Female

LAKHIMI Male

Male Jersey

Female Jersey

Male Holstein Frisian

Female Holstein Frisian

5. GENETIC STRUCTURE AND PRODUCTION POTENTIALITIES OF THE CATTLE GERMPLASM :

The indigenous cattle are small but hardy and are known for their adaptability to the local hot and humid climate conditions. They are also less prone to the parasitic infestations and microbial infections and are heat tolerant. Although their productivity is less as compared to the genetically superior improved exotic germplasm, the above mentioned qualities adds value to these indigenous animals. That is why, it is though that the improvement strategy of the cattle sought mainly through introduction of exotic inheritance should go hand in hand with parallel efforts to conserve and improve the indigenous germplasm through planned breeding and selection.

Over the years the population of cattle and buffalo in Assam had shown a steady increase. This increase was observed at a time when there has been tremendous pressure from human population growth. In the last decade or so the human population of Assam registered phenomenal growth resulting in encroachment of traditional grazing lands for dwellings and crop cultivation, and also denudation of forest coverage. The numbers of cattle and buffalo per thousand human population in Assam are respectively 350 and 13.. The increase in growth of human population has undoubtedly exerted pressure on livestock. Even then the annual growth rate of cattle and buffalo continued to sustain mainly because of economic compulsion and increased realization on the part of the farmers about the value of the animals, and also the fact that various dreaded diseases of animals and poultry could be effectively controlled by the efforts of the veterinarians. This growth rate, however, does not necessarily reflect their improvement in terms of efficiency of production per animal.

Table: 3: Population trend of cattle and buffalo in Assam

Sl No	Species	Year			% Change
		2007	2012	2019$	
1	Total Cattle (Lakhs)	10041.27	10307.7	10900.0	5.61
	Cross bred (Lakhs)	440.47	395.90	768.95	48.5
	Indigenous (Lakhs)	9630.80	9911.80	10140.3	2.25
2	Buffalo (Lakhs)	499.91	435.27	421.75	-3.2

$: Provisional

Table: 4: Provisional Cattle and Buffalo per 1000 human population in Assam (District Wise)

DISTRICT	HUMAN POPULATION	CATTLE	BUFFALO
BAKSA	9,50,075	384	1
BONGAIGAON	7,38,804	348	2
BARPETA	16,93,622	285	13
BISWANATH			
CACHAR	17,36,617	205	30
CHIRANG	4,82,162	431	4
DARRANG	9,28,500	493	40
DHEMAJI	6,86,133	767	25
DHUBRI	19,49,258	183	7
DIBRUGARH	13,26,335	257	10
DIMA HASAO	2,14,102	105	160
GOALPARA	10,08,183	331	9
GOLAGHAT	10,66,888	573	29

DISTRICT	HUMAN POPULATION	CATTLE	BUFFALO
HAILAKANDI	6,59,296	201	30
HOJAI			
JORHAT	10,92,256	396	20
KAMRUP	15,17,542	329	5
KAMRUP (M)	12,53,938	96	1
KARBI ANGLONG	9,56,313	267	5
KARIMGANJ	12,28,686	227	23
KOKRAJHAR	8,87,142	376	9
LAKHIMPUR	10,42,137	604	12
MAJULI			
MORIGAON	9,57,423	372	5
NAGAON	28,23,768	222	6
NALBARI	7,71,639	324	8
SIBSAGAR	11,51,050	231	13
SONITPUR	19,24,110	267	4
SORAIDEU			
SOUTH SALMARA			
TINSUKIA	13,27,929	288	8
UDALGURI	8,31,668	451	4
WEST KARBI ANGLONG			
TOTAL	**3,12,05,576**	350	14

Source: 20th Livestock Census $ (DADF,GOI), Human Census 2011(Dir. of Econ. & Stats.)

5.1 DIFFERENT BREEDS FOUND IN ASSAM

Lakhimi

Sahiwal

Gir

Jersey

Holstein Fresian

5.1.1 LAKHIMI: Lakhimi of Assam are distributed in entire state and reared for milk and draught purposes by local people. Total population is about 79 Lakhs. Animals are small sized, horned and have relatively short legs. Coat colour is variable mainly brown and grey. Hump is medium in size and the backline is slightly curved. Udder is small and bowel shaped. Bullocks are excellent draft animals especially for pulling cart and for plough especially in the muddy fields The lactation milk yield of these animals are low ranging from around 300 to 600 kg in a lactation length of around 205 days..

5.1.2 SAHIWAL : The Sahiwal is a famous milk cattle breed of India. The native tract of this breed is Sahiwal district of Punjub province in Pakistan. In India it is found in Ferozpur, Amritsar and Sri Ganganagar. Total lactation milk yield ranges from 2725 to 3175 litres in an average lactation period of 300 days.

5.1.3 GIR : The Gir is a famous milk cattle breed of India. The native tract of the breed is Gir hills and forests of Kathiawar including Junagadh, Bhavnagar, Rajkot and Amreli districts of Gujarat. Total lactation milk yield averaged 2 063 litres in an average lactation period of 300 days.

5.1.4 JERSEY: The Jersey breed originated from the isle of Jersey, in Great Britain. Jersey cows are fawn in colour, with or without white markings. They are the smallest of the major dairy breeds, but their milk is the richest, containing on the average 5.2 percent butterfat. The average milk production is about 4000 lt. per lactation of 300 days.

5.1.5 HOLSTEIN FRIESIAN: The Holstein Friesian breed originated in the Netherlands. It is black and white in colour and large in size. Holsteins give more milk than any other breed; The average milk production is about 8000-10000 lt. per lactation of 300 days. The average butterfat content is 3.7 percent.

5.2 GENETIC POTENTIALITIES OF CATTLE :

LAKHIMI

The local cattle of Assam are known to have long age at sexual maturity, age at first calving and inter calving period. The lactation milk yield of these animals are low ranging from around 300 to 600 kg in a lactation length of around 205 days. Thus, with long age at first calving and inter calving period and low lactation yield, these animals can hardly be economical for commercial farming. However, their small body size and high adaptability and heat tolerance make them convenient for rearing under poor managemental conditions by the rural households. These are the potential animals which can better the living conditions of the poor millions provided due attention is paid on improvement of their generic merit. Jersey and their crosses with indigenous cattle indicate that there is a quantum jump in the performance of halberds over the indigenous in terms of various production and reproduction traits. Apart from the practical difficulties in multiplying the pure Jersey stock, the performance of the graded animals has not been found much superior to the half breads. Besides, Jersey in its pure form as well as graded animals with level of Jersey inheritance were found to be poorer in regards to overall fitness/adaptability

5.3 GENETIC POTENTIALITIES OF BUFFALO:

Murrah

Surti

Swamp(Luit)

The buffaloes of Assam are considered to be of swamp type and are at variance with those of the Riverine buffaloes inhabiting the Indian subcontinent west of Assam. These indigenous buffaloes of Assam are hardy and suitable for agricultural works in wet lands, paddy fields, etc. They are also the source of large quantum of milk. Considerable studies have so far been made on the performance and milk quality traits of these animals. Also sizeble works on the characterization of these animals in terms of body conformation have also been made. The performance of swamp buffaloes of Assam is as follows (D.Das, 1993 Adhoc Project report).

Table 5: Performance of swamp buffaloes of Assam in regards to production, reproduction and milk quality traits,

Trait	Swamp
Age at first calving (m)	59.03 _+ 0.42
1st lactation Milk Yields (kg)	509.63 _+ 4.20
1st lactation Length (d)	282.87 _+ 78
1st lactation peak yield (kg)	4.09 _+ 0.04
Days to attain 1st peak yield (d)	58.28 _+ 0.93
Persistency 1st lactation	0.88 _+ 0.01
Lactation milk yield (kg)	505.95 _+ 3.14
Lactation Length (d)	283.43 _+ 1.44
Peak yield (kg)	4.08 _+ 0.03
Days to attain peak yield (d)	57.89 _+ 0.68
Dry period (d)	224.58 _+ 2.17
Service period (d)	181.75 _+ 2.39
Gestation period (d)	325.85 _+ 0.42
Inter calving period (d)	507.80 _+ 2.39
Birth weight (kg)	32.06 _+ 0.10
Specific gravity of milk	1.0296 _+ 0.0002
Fat % of milk	8.478 _+ 0.069
S.N.F. % of milk	9.910 _+ 0.039
Total solids % in milk	17.675 _+ 0.088

Limited numbers of outstanding riverine breeds of buffaloes namely *Murrah* and *Surti* have also been introduced in Assam through organized Govt. farms by the state A.H. & Veterinary Department. Although the performance of these animals in terms of milk yield were found satisfactory by a number of workers when compared with the indigenous swamp type, as far as reproductive performance the superiority of these riverine breeds over the swamp was not readily tangible. The diploid chromosome number of swamp is 48 as against 50 for riverine buffaloes. Crossing of Murrah buffalo with Swamp buffalo is possible. However, the fertility status of the crossbreds will never be the same with those of the pure riverine and swamp buffaloes. Although the study in this direction is warranted attempt the indigenous swamp buffaloes through planned breeding and selection rather than crossing with improved rivering breeds appear more justified.

6. PRODUCTION AND MANAGEMENT SYSTEMS FOR CATTLE AND BUFFALO OF ASSAM :

Farmers rear cattle in Assam in traditional system of management. The individual units are normally small and practice of record keeping us non-existent. At the time of independence the state had large areas of Govt. reserved land used for grazing the animals. At that time, cattle were mostly reared under free range system. To-day the reserved grazing lands are getting dwindled primarily due to human dwelling and crop cultivation. This has forced the farmers to go for intensive and semi-intensive system of management, of which the later is the most common practice. The intensive system is seen in areas where crossbreds are popular.

Buffaloes in Assam are reared in three different systems of management viz, 'Khuti' is a temporary shelter for these herbs of animals. Buffaloes are also reared in intensive or semi intensive system by the villagers in small units as a backyard venture in their home. In some areas, it is seen that the buffaloes graze freely in the fields and jungle as if they are wild. These animals come to the farmer only for little bit of salt and water and may be little bit of feeds, and at that they are milked. These buffaloes are considered semi-domesticated.

7. CATTLE AND BUFFALO DEVELOPMEN STRATEGIES IN ASSAM.

7.1 STRATEGY FOR CATTLE DEVELOPMENT :

In Assam, the first organized attempt to improve the indigenous cattle for enhancing milk production was made during the First five-year Plan with the introduction of key Village Scheme in 1953-54. Under this scheme bull form recognized zebu breeds of cattle like Red Sindhi and Haryana were distributed in the villages covered under Key Village Blocks for infusion of better genes in the local cattle. Although this scheme helped to some extent in developing some pockets of good quality animals, the scheme was not met with much success because of the vast magnitude of cattle population and inadequate coverage under Key Village Scheme. The production potentiality of the local cattle also could not be improved significantly because of low production potentiality of these Indian breeds in comparison to exotic breeds.

Subsequently, the intensive Cattle Development Project (ICDP) launched in 1968-69. Under this Project, keeping conformity with the national cattle breeding policy, upgrading of indigenous cattle by superior exotic Jersey breed was attempted. Although this policy was responsible for generation of sizeable graded animals of superior genetic worth, results were not very encouraging. Since the policy did not prescribe any fixed level of exotic inheritance to be infused in the crossbreeds, upgraded cattle of varying level of Jersey inheritance were produced. The crossbreeds with higher Jersey inheritance were not found suitable in rural situation. Besides, a properly implemented field progeny-testing programme for selection of superior bulls under local environment was felt wanting.

Fig : 2 **CATLLE BREEDING POLICY 1980**

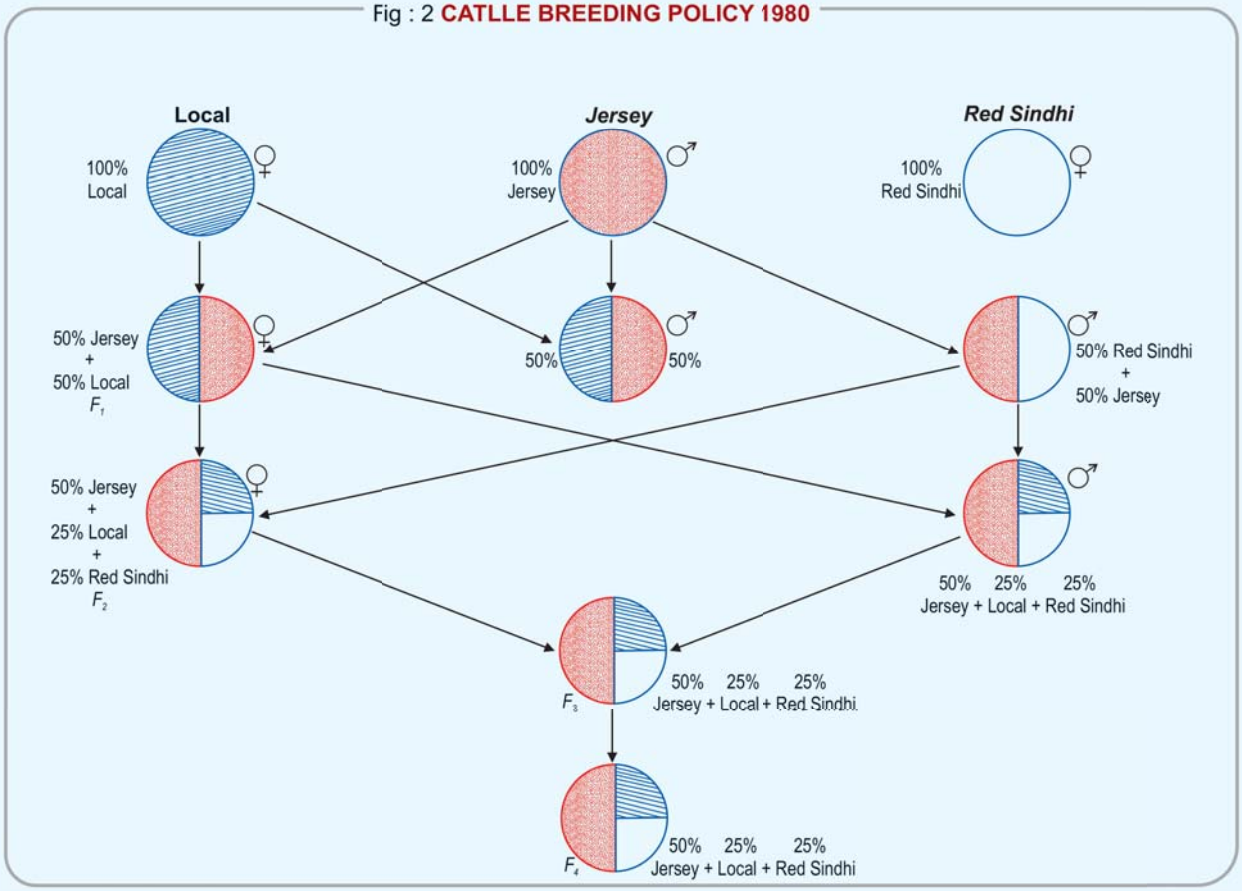


FIG: 2 Cattle Breeding Policy 1980

Reviewing results of the cross breeding programme under ICDP, the policy was modified in 1980 and the new policy was proposed to produce crossbred animals by utilizing inheritance from three different genetic groups of cattle viz. Jersey, Red Sindhi and indigenous cattle of Assam (Fig. 2). The crossbred animals so produced should possess the level of inheritance of 50 per cent from Jersey. 25 % from Red Sindhi and 25

% from local cattle. The main idea of the modified policy was to make the animal efficient producer of milk with reasonable draught capacity, disease resistance and heat tolerance. The essence of this policy was to improve the milk yield as well as draft ability of the crossbred, but it had some drawbacks, and was complex in nature to implement in real term. In order to implement the policy it was necessary to maintain pure breed herbs of Red Sindhi and Jersey animals to produce required numbers of both these generic groups. It was time consuming, expensive and the whole process of crossbreeding involving three genotypes was a complex one.

Due to its own inherent flows the above cattle breeding policy of Assam could not be implemented as was envisaged and the outcome was not satisfactory. As such necessity to review the whole cattle breeding scenario of the state was strongly felt so that a policy that is reasonably simple could be worked out for easy implementation. Therefore, it has been decided to modify the 1980 cattle breeding policy to make it simple and easily operable, and at the same time to realize the following goals:

1. To produce milch cattle economically in large number to meet the per capita demand of milk as per nutritional needs of the state.
2. Conservation and improvement of indigenous local germplasm.
3. To combine productivity and adaptability with disease resistance including reasonable draftability to need the local requirements.

7.2 STRATEGY FOR BUFFALO DEVELOPMENT :

The indigenous buffaloes of Assam are considered mostly to be of swamp type. These buffaloes of Assam are extremely good as draft animals for carrying out agricultural activities in wet lands, reasonably good producer of high quality milk and they are not tangibly inferior to riverine buffaloes in respect of reproduction performance. In an attempt to increase the milk yield, *Murrah* and *Surti* breeds of riverine buffaloes were introduced in the state in limited number which are still being maintained under organized farm condition. But the possibility of infusing the blood of these riverine breeds into local population of swamp type buffaloes has not been assessed so far in Assam. Any attempt to increase production efficiency of indigenous buffalo population by infusion of genes of riverine breeds will require through assessment due to inequality of chromosome complements.

Under the circumstances the breeding policy for the improvement of buffaloes of Assam should aim at –

i) Conservation and improvement of indigenous swamp buffaloes by selection and planned breeding. This would necessitate effective progeny testing programme and establishment of elite herds to be used as bull mother farm. Young bulls can also be procured from farms for testing. There must also be a machinery for large scale only limited and selected areas may be covered. While talking of conservation, protection of traditional grazing lands of the state also become imperative.

ii) Establishment of organized herbs of outstanding riveine breeds with known performance under Assam condition. *Murrah* and *Surti* could be the breed of choice.

iii) Evaluation of the productive, reproductive and work performance of the crosses of swamp and riverine buffaloes which are known to be fertile with doubtful reproductive efficiency.

7.3 DEVELOPMENT STRATEGY FOR CATTLE AND BUFFALO SECTOR:

The local cattle and buffalo are of low genetic potential for milk production which discourages the farmer to take up dairy trade as a viable commercial venture. So to achieve maximum level of productivity from our low productive cattle, cross breeding/ up gradation with recognized dairy breed is the only way and to achieve that the state attempted to formulate a suitable policy for augmentation of the milk production. Various development strategies for cattle and buffalo sector will be adopted. **(Annexure-I)**

8. District wise milk production:

Table: 6. ANNUAL ESTIMATES OF MILK PRODUCTION OF ASSAM 2017-18 (in Ltr.)

SL.NO.	NAMES OF THE DISTRICT	CROSSBRED	NON DESCRIPT/ INDIGENOUS	BUFFALO	GOAT	TOTAL
1	*2*	*3*	*4*	*5*	*6*	*7*
1	Goalpara	3684182	13787325	1728473	291675	19491655
2	Dhubri	7154215	28596044	4155660	777375	40683294
3	Kokrajhar	2045009	17922095	3049763	497811	23514678
4	Chirang	1652668	5734460	2176867	274713	9838708
5	Bongaigaon	3978831	11034174	1155707	501220	16669934
6	Barpeta	19802817	28470621	7935848	1070870	57280157
7	Nalbari	11781752	9357574	1819069	494983	23453378
8	Baksa	9042603	11412653	887360	545998	21888614
9	Kamrup	55570206	33877619	7361448	1739054	98548327
10	Darrang	6856343	10726361	7055580	485938	25124222
11	Udalguri	3643597	12517064	994571	404062	17559293
12	Sonitpur	19982793	50474980	11093475	1343957	82895205
13	Lakhimpur	2274883	16036352	5348470	576503	24236208
14	Dhemaji	596640	12815375	3740148	479193	17631356
15	Morigaon	5913649	15749508	1696120	465469	23824746
16	Nagoan	35368490	38246844	3735594	1478861	78829789
17	Golaghat	9346083	17462135	3355159	760910	30924286
18	Jorhat	13434842	30231824	4647789	861656	49176111
19	Sibsagar	6735904	16303425	6965840	624889	30630058
20	Dibrugarh	7430647	31164864	9393376	1088273	49077161
21	Tinsukia	12530551	16628560	7139870	561597	36860578
22	Karbi Anglong	9484984	17914739	3990270	1052886	32442879
23	Dima Hasao	1529306	2873671	4310342	200437	8913756
24	Karimganj	11858726	16346710	5803810	351946	34361191
25	Hailakandi	8750075	9087976	4797335	662645	23298031
26	Cachar	20452681	19973765	7469395	715719	48611561
ASSAM TOTAL		**290902478**	**494746719**	**121807342**	**18308637**	**925765177**

Source: ISS report 2017-18

9. FODDER PRODUCTION FARM IN ASSAM :

The production of Livestock particularly that of ruminants depends on availability of good quality fodder. Good quality grass/ fodder crops help in increase production of milk and meat at cheaper rate. The Cultivation of quality fodder in Assam is very less and the quantity is also very less as because most of the farmers are of small land holders.

PRESENT STATUS OF FODDER CULTIVATION IN ASSAM

Total Geographical Area of Assam	78,43,800 hectre.
Forest Land	20,12,319 hectre
Area not cultivable	24,5555,613 hectre
Total crop area	3694000 hectre
Cultivable wasteland	88043 hectre
Annual requirement of Fodder (For Cross bred only)	2315925 MT
Total annual fodder production	85633 MT
Total shortfall in production (For Cross bred only)	2230292 MT

Source: Fodder Development Officer, Chenikuthi, A.H & Vety. Department.

Table: 7: DISTRICT WISE DEPARTMENTAL FODDER FARMS WITH AREA

District	Name of the Farm	Total area of Land (Bighas)	Cultivable area (Bighas)	Fodder cultivated
Kamrup	Fodder Demonstration Farm, Sonapur	11 Bighas	10 Bighas	Napier, Guinae, Pennisetum and Reena
Nalbari	Fodder Demonstration Farm, Nalbari	30 Bighas	16 Bighas	Napier and Reena
Barpeta	Fodder Demonstration Farm, Barpeta	50 Bighas	30 Bighas	Napier, Pennisetum and Reena
Goalpara	Regional Seed Production Farm, Goalpara	150 Bighas	20 Bighas	Napier,
Karbi Anglong	Fodder Demonstration Farm, Karbi Anglong	225 Bighas	225 Bighas	Napier, Guinae, Pennisetum and Reena

Source: Fodder Development Officer, Chenikuthi, A.H & Vety. Department.

10. ANIMAL BREEDING AND HEALTH MONITORING SYSTEM:

10.1 Information Network for Animal Productivity & Health (INAPH):

Presently Information & Communication Technology (ICT) along with veterinary technical knowledge are extensively used for efficient field data management for comprehensive monitoring & evaluation of the cattle breeding programme. For this National Dairy Development Board (NDDB) has developed an IT application named "Information Network for Animal Productivity & Health" (INAPH). INAPH is a field IT application that facilitates for capturing of real time reliable data on Breeding, Nutrition and Health Services delivered at farmer's doorstep. There are several services and modules under INAPH. One of the main services is Animal Breeding.

Some of the major benefits that INAPH provides are like unique identification of animal along with the pedigree facts, lactation yields and owner details; keeping the records of all activities related to Breeding, Nutrition & Health Identification of superior bull & elite female; tracking disease outbreak & disease pattern for different species/breed/village/district; assess the efficiency & effectiveness of AI services & Ration Balancing Advisory Services; monitor and follow up genetic improvement programmes. With all these benefits the farmers get the increase earning from the healthier and productive animals that registered under INAPH.

10.2 National Animal Disease Reporting System (NADRS) :

The NADRS involves a computerized network, linking each Block, District and the State/UT Headquarters in the country to the Central Project Monitoring Unit (CPMU) in the DADF at New Delhi. The Department had modified the earlier application version based on the inputs of the end user making it user friendly for the data entry. Further, analyzing the capture of information at block level and various reports, Department further reoriented the application on the technical and operational fronts and launched modified NARDS 2.0 application with new features like an android based mobile application for capturing of Animal disease

information in terms of First Information Report(FIR), Daily Incidence (DI) cases and Vaccination coverage from the Block Veterinary Officers with validation by District Veterinary Officers and State Veterinary Officer based on the modified NARDS 2.0 application has been developed.

11. SOME IMPORTANT POINTS CONSIDERED FOR FORMULATION OF BREEDING POLICIES :

11.1 Choice Of Breed Of Cattle :

Three exotic breeds of cattle viz, *Jersey, Holstein Friesian (HF)* and *Brown Swiss* (BS) have been used extensively in India in her efforts of germ plasm improvement. In the context of Assam, so far, relied mainly on *Jersey* breed. *Jersey* will be the breed of choice in the foreseeable future too. *Jersey* is preferred to other two breeds because of the following qualities:

i) High milk yield and butter fat percentage in milk.

ii) High breeding efficiency and life time production, Indian experience show that the *Jersey* crosses have better reproductive efficiency than other temperate breed crosses.

iii) Heat tolerant and adaptable.

iv) Compatible body size and less calving difficulty.

v) Low age at sexual maturity.

vi) Study also show that the male halberds of *Jersey* with indigenous has comparable draftability with that of indigenous males.

Although, *HF* yields more milk than *Jersey*, the performance of *HF* halfbreds in the Brahmaputra and Barak Valley can hardly be satisfactory because of low adaptability and heat tolerance. However, in hilly terrain where ambient temperature is relatively low *HF* inheritance may be infused to enhance milk yield. Also progressive farmers with better knowledge of scientific cattle management and possessing means to provide better housing feeding and health coverage can go for *HF* halfbreds. Since *HF* male hafbreds are not much suitable as draft animal they can be sold for beef in areas having potential market.

11.2 ADVANCE BREEDING AND REPRODUCTION TECHNOLOGY :

The scientific selection procedures and the breeding systems will ever remain the most potent tools for livestock improvement. The modern biotechnologies can make these tools even more effective by increasing the reproductive efficiency of breeding animals. Besides A.I. some of these biotechnologies available for use in animal improvement strategies are cryopreservation of semen and embryo, multiple ovulation and embryo transfer technology (MOET), cloning etc.

Of all these biotechnological methods, A.I. has found an important place in the animal improvement programme. Once a genetically superior male is identified, it can be used to inseminate thousands of otherwise inferior females by A.I. technique. The technique thus help in increasing the generic merit of a population at a rapid stride. A.I. is extensively used in cattle and buffalo. By use of A.I. best of the best bulls are indentified by progeny testing and these bulls are then used for large scale insemination of cows again by using same technique.

Embryo transfer technology (ETT) is the other biotechnological method that is gaining importance in cattle improvement programmes. Embryo transfer refers to the techniques by which fertilized ova are collected from a female called donor and transferred for development to term to another female called recipient. The main objective of ETT is the improvement of animal population through better utilization of superior females. The technique allows expansion of desirable gene pool for the females for breed improvement. Using current technology of Multiple Ovulation and Embryo Transfer (MOET), it is feasible to obtain large number of calves from a single cow over a period of one year. The intensity of genetic selection of females can thus be enhanced by MOET, since it is possible to obtain several daughters from a single mating of a superior dam using recipients of a lesser genetic value as foster mothers.

Out of these two techniques AI and MOET AI is more advantageous. It is because, the technique provides a means for efficient selection of superior males (Bulls) and that a much higher selection intensity in male is achieved. Besides the technique it is cheap, easy and more reliable. Of course, use of MOET as an adjunct to

AI ought to be a better option. However, as on date, MOET is very expensive and for commercial purpose it may not always be economical and hence justified.

11.3 Level Of Exotic Inheritance :

Exotic inheritance of around 50 per cent is thought to be the most ideal for growth, reproduction and milk yield. There is a fear that increasing the level, productivity of animal decreases. It is because, higher level of exotic inheritance results in loss of heat tolerance and general adaptability making the animal unfit to withstand the physiological stress of production and reproduction. Most of the works carried out to study the performance of half-bred with 50 % *Jersey* and higher grades with 75 % *Jersey* inheritance were carried out under scientific and optimal management conditions with organizational support. Even under such optional conditions, increasing the *Jersey* inheritance beyond 50 % did not appear to have accrued additional advantage.

For want of an organized farm of indigenous cattle of Assam authentic on their performance is lacking. The lactation yield of indigenous cattle of the State in a lactation length of 250-300 days is considered to be around 400 to 500 Kg. in the higher side, infusion of 50 per cent Jersey inheritance results in about 300 per cent increase in production performance over the indigenous. However, infusion of 75 per cent Jersey inheritance in the crossbreds (higher grades) did not result in appreciable enhancement of performance over the halfbreds. This is in spite of the fact that the higher grades have the advantage of maternal heterosis which is not inflated by matenal effect. As such, even without genetic cause higher grades should have excelled the halfbreds.

There is another point that is relevant while comparing halfbreds with the higher grades. In addition to the sampling variation, the mean differences in performance of halfbreds and higher grades are often confounded with environmental differences between years and influenced by factors like location effect.

On the basis of above observations, the level of Jersey inheritance should be fixed preferably at 50 per cent only.

Two other points needs consideration while fixing the Jersey inheritance at 50 per cent. The first is heterotic effect, if any. The heterosis expected in F_1 generation in the half breds will be halved in F_2 generation and maintained thereafter. The second point is the maternal heterosis. The F_1 animals will be free from the advantage of maternal heterosis for reasons explained earlier. Thus loss of heterotic effect (general) will be countered by maternal heterosis in generations subsequent to F_1.

12. CATTLE BREEDING POLICY

Policy for milk production: Enhancement of milk production will be achieved through infusion of exotic inheritance. The reeds of choice will be the *Jersey i*n the entire state and *Holstein Friesian* in some specified areas/herds.

12.1. Breeding policy using Jersey :

Area of coverage – All the district of Assam

Level of exotic inheritance –

12.1.1. 50 % ***Jersey*** – As a policy matter, the level of *Jersey* inheritance will be fixed at 50 per cent. This will apply to the entire state – Large scale production of halfbreds (50 % *Jersey* 50 % indigenous) will be the main goal. This will act as the backbone of the milk enhancement strategy of the state.

12.1.2. 62.5 % ***Jersey*** – In areas of plentiful of fodder availability, good market channel, educated entrepreneur with knowledge and capability for providing better management, level of *Jersey* inheritance may be raised to 62.5 %. This will be done in a limited scale on demand from farmer in some areas / herds, but will generally be discouraged to avoid complexity in implementation and loss of adaptability.

Fig : 3 **CATLLE BREEDING POLICY 2002**

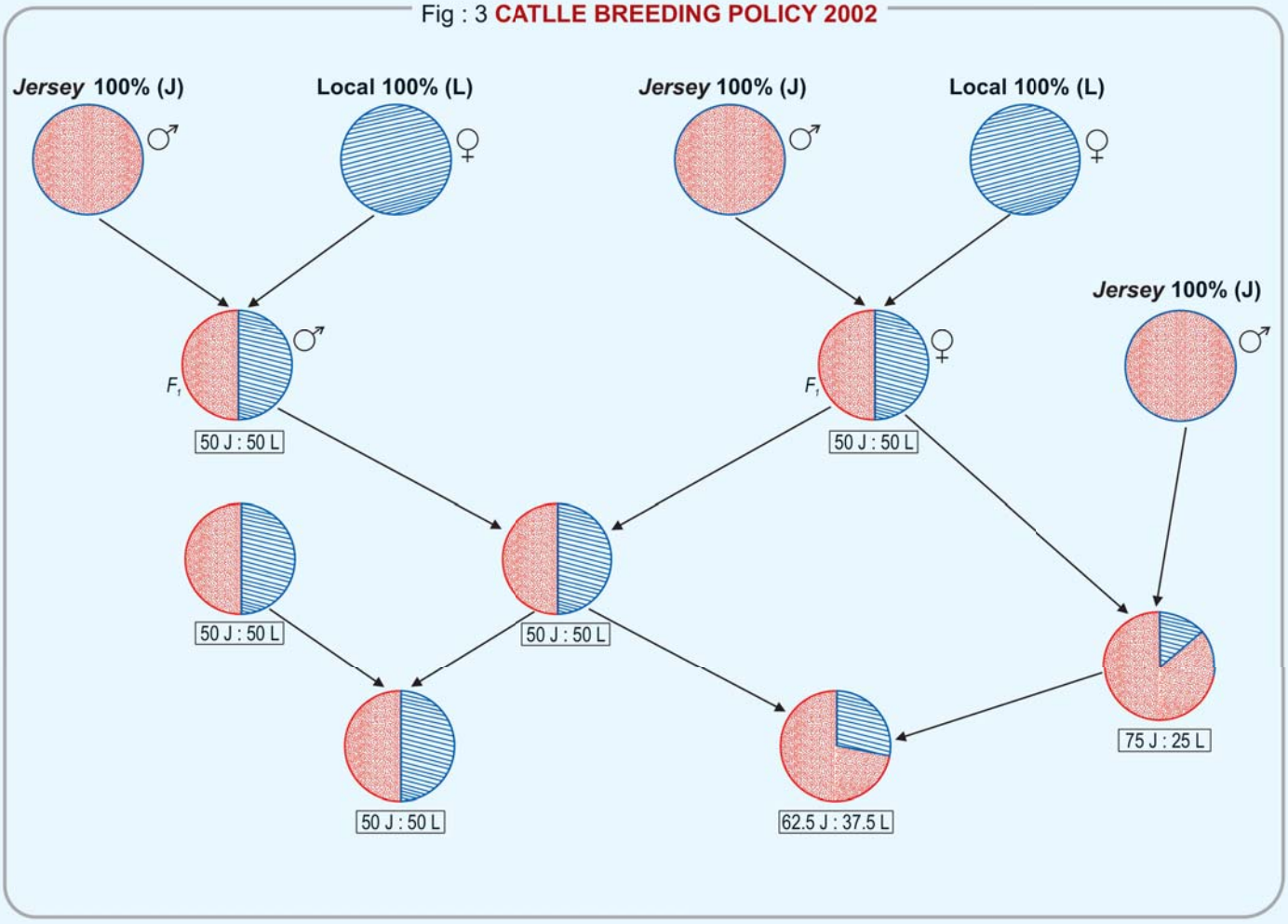


FIG:3 Reviewed Cattle Breeding Policy

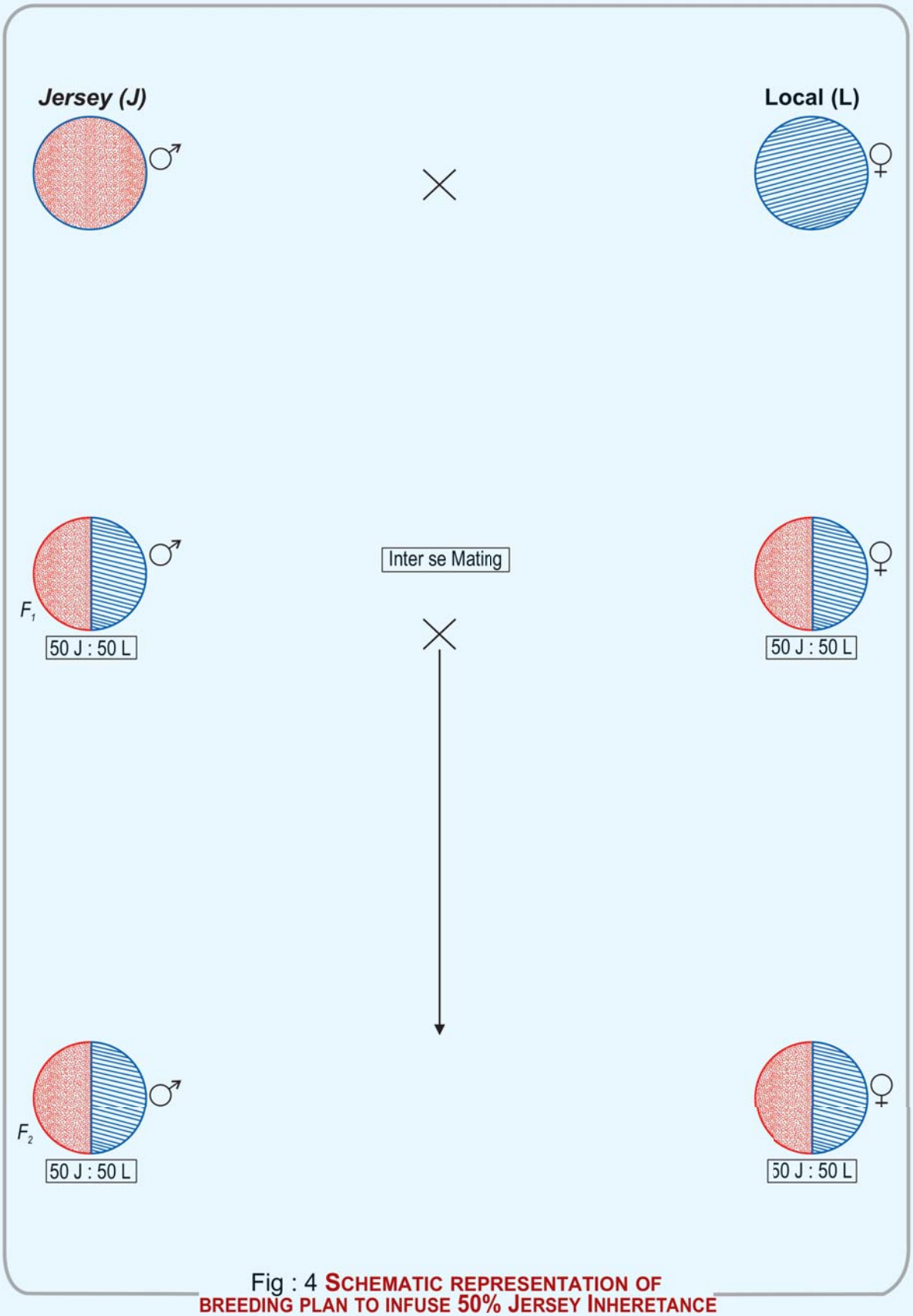


Fig : 4 SCHEMATIC REPRESENTATION OF BREEDING PLAN TO INFUSE 50% JERSEY INHERETANCE

FIG: 4 Schematic Representation of breeding plan to infuse 50% Jersey Inheritance

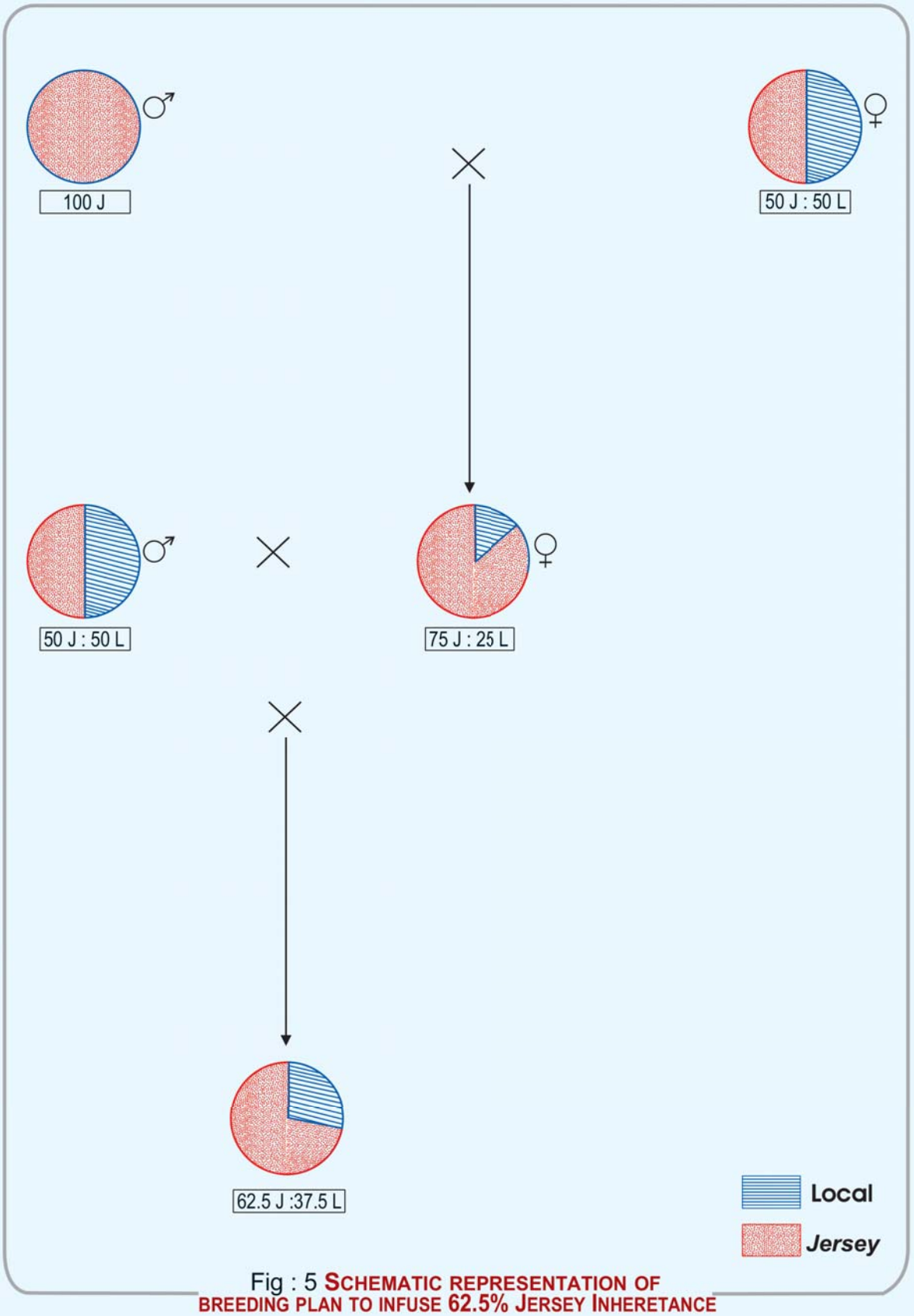


Fig : 5 SCHEMATIC REPRESENTATION OF BREEDING PLAN TO INFUSE 62.5% JERSEY INHERETANCE

FIG: 5 Schematic Representation of breeding plan to infuse 62.5% Jersey Inheritance

13. Breeding plan:

13.1: 50 per cent Jersey — The cattle breeding policy for enhancement of milk yield proposes crossing of *Jersey* sire with indigenous female to produce halfbreds, and subsequent inter-se-mating of halfbreds with concomitant selection. This will ensure level of *Jersey* inheritance at 50 % with fixation of desirable genes. The policy emphasizes large scale production of halfbreds and development of a high yielding genetic group suitable to local environment through an effective selection and progeny testing programme.

13.2: 62.5 per cent — To achieve 62.5 % *Jersey* inheritance, the halfbreds (50 % Jersey & 50 % Indigenous) females will be crossed with *Jersey* bull. The female progeny of this cross possessing 75 % *Jersey* and 25 % Indigenous will be backcrossed to halfbred bull. The progeny so generated will have 62.50 % *Jersey* and 37.5 % Indigenous inheritance. Maintenance of *Jersey* inheritance at 62.5 % in subsequent generations will necessitate inter-se-mating in this genetic group. This plan will be optional to the interested farmer and would not be covered under the generalized programme/policy.

It is advocated that in a limited scale, semen of high value bull from breed like sahiwal may procured outside the stste for crossing with indigenous non-descript cattle in defined geographical areas .[1]

In Order to avoid indiscriminate crossing in the execution of the Artificial Insemination programme, cluster approach is suggested. In cluster approach, different types of breeding plans are advocated [2]

Establishment of Breeders' Association and involving them actively with artificial insemination activities along with proper record keeping adopting advance digital record keeping technology. [3]

Schematic presentations of breeding plans are made in (Fig. 2, 3 and 4).

14. Progeny Testing :

14.1: ***Jersey* and *Jersey* x Local halfbreds (50 % Jersey)**: Progeny testing will be carried out for selection of both *Jersey* and halfbred breeding bulls to consistently improve upon the genetic merit of the population. In absence of an effective progeny testing programme, degeneration and dilution of characters in subsequent progeny generations would be inevitable. Pure Jersey bulls as well as halfbred bulls will have to be progeny tested continuously. Number of young bulls put to test and numbers finally selected will be worked out from time to time as per the need and availability of infrastructure and man power.

Young *Jersey* bulls for progeny test will be produced locally in the state to avoid genetic slippage. For this, one or few elite herds of *Jersey* as bull mother farm will be established.

The halfbred bulls for progeny testing will be obtained from the farmers herd on the merit of pedigree performance.

14.2: **Graded *Jersey* cross (62.** %): For maintenance of *Jersey* inheritance at 62.5 %, progeny test bulls of three genetic groups viz., *Jersey*, halfbreds and 62.5 % *Jersey* will be necessary. *Jersey* and halfbred bulls will be progeny tested as explained earlier.

The young bulls with 62.5 % *Jersey* and 37.5 % Indigenous inheritance can be procured from farmers: herd and progeny tested in the same manners that for halfbred bulls for areas where demands for such bulls exist. However, this programme is not recommended to be included in the general policy to avoid implementation problems.

14.3: Use of progeny test bulls :

Extensive use of top ranking progeny tested bulls will be ensured through a well-conceived A.I. programme. For this the already available infrastructural facilities of the state Animal Husbandry and Veterinary department will be revamped and put to use to the maximum extent possible. Also, large scale production of semen doses from top bulls and their cryopreservation will be ensured. This will meet the farmers' demand of quality semen year round, and also help in preserving valuable germplasm for posterity

14.4 Genomic selection: The Genomic selection can also be a process of another potential tool for breed improvement. Genomic selection can have a major impact on animal breeding programs, especially where traits that are important in the breeding objective are hard to select for otherwise. Genomic selection provides more accurate estimates for breeding value earlier in the life of breeding animals, giving more

selection accuracy and allowing lower generation intervals. The rates of genetic improvement could increase from 20 to 100 % and hard-to-measure traits can be improved more effectively.

15. Breeding policy using *Holstein Friesian*:

Holstein Friesian (HF) inheritance will be infused only in limited scale in some defined geographic areas/ herds. Areas where fodder production and its availability is more promising with a well-developed milk marketing channel, in town areas having higher market demand of milk, and in areas of high elevation with congenial climate will be earmarked for *HF*. Also in areas where sizable number of improved (Graded) animals already exist *HF* inheritance may be infused, if desired by the farmer. It may be noted that in areas where *HF* is infused in selected herds, use of *Jersey* will also continue concomitantly in herds of indigenous animals. The level of inheritance of *HF* in the crossbred will be fixed at 50 % by inter se mating of the crossbreds coupled with selection of superior F1 animal. There are three probable strategies for implementation of this policy.

i) Rearing and production of *HF* bulls in a bull mother farm, their testing and production of semen for A.I. (ii) Use of frozen semen of proven bull imported or procured from within the country for A.I. (iii) Procurement of crossbred F1 bull calves from the farmers' herd, selection of the good quality bulls through progeny testing or other reliable selection methods. The first 'strategy mentioned above will involve lot of capital expenditure and infrastructure development. Besides, when the use of *HF* will be limited to only some specified area/herds, this would prove to be uneconomical and hence unwarranted. Therefore, the second strategy is recommended for the time being along with the third option which can be adopted without. much difficulty for fixation of genes and continuance of production of HF Local- halfbreds (*HF* 50% Local 50%).

16. Breeding Plan:

Crossing of *HF* sire with indigenous female to produce half-bred and subsequent inter mating of half-bred with concomitant selection is proposed. This will ensure level of *HF* inheritance at 50 % and would result in generation of a high yielding group of cattle. For execution of this breeding plan there will be two options.

Option 1: A pure elite herd of HF will have to be established in the state by importing the foundation stock that would act as a bull mother farm. The young bulls produced from this elite herd will be put to progeny test. The top ranking progeny test bulls will be used to cross with the indigenous and/or upgraded cows/ heifers. The *HF* halfbreds so produced will be subjected to inter se mating in subsequent generations. Progeny tested halfbred bulls will be used for inter se mating. For this, young bulls with 50 % *HF* inheritance will be procured from farmers on the basis of pedigree and dam's record and put to test mating

Option 2. : *HF* semen may be imported/purchased from outside the country/state from reliable and certified; sources. The halfbreds so produced will be mated inter-se generation after generation. For inter-se-mating locally produced progeny test halfbred bulls with 50 % *HF* inheritance will be used. Progeny testing will be done the same way as explained.

17. Progeny testing and Bull mother farm:

A bull is said to be half the herd. The success of a cattle breeding policy will depend on the genetic worth of the breeding bull. Progeny testing is the best method for assessing the genetic merit of a bull. Progeny testing, therefore, is an indispensable component of cattle breeding programme. Progeny testing is to be done not only for purebred bulls, but also for halfbreds to be used as breeding animal. There is a necessity' to produce and test bulls locally in the environment in which their progeny are to perform to avoid genetic slippage and to improve the genetic potential. Also, in absence of selection of halfbred bulls through progeny testing, degeneration and dilution of characteristics is inevitable due to segregation of genes. Young halfbred bulls for progeny testing can be obtained from farmers But for generation of purebred young bulls, establishment of elite herds as bull mother farms is an essential requirement for implementation of the breeding policy.

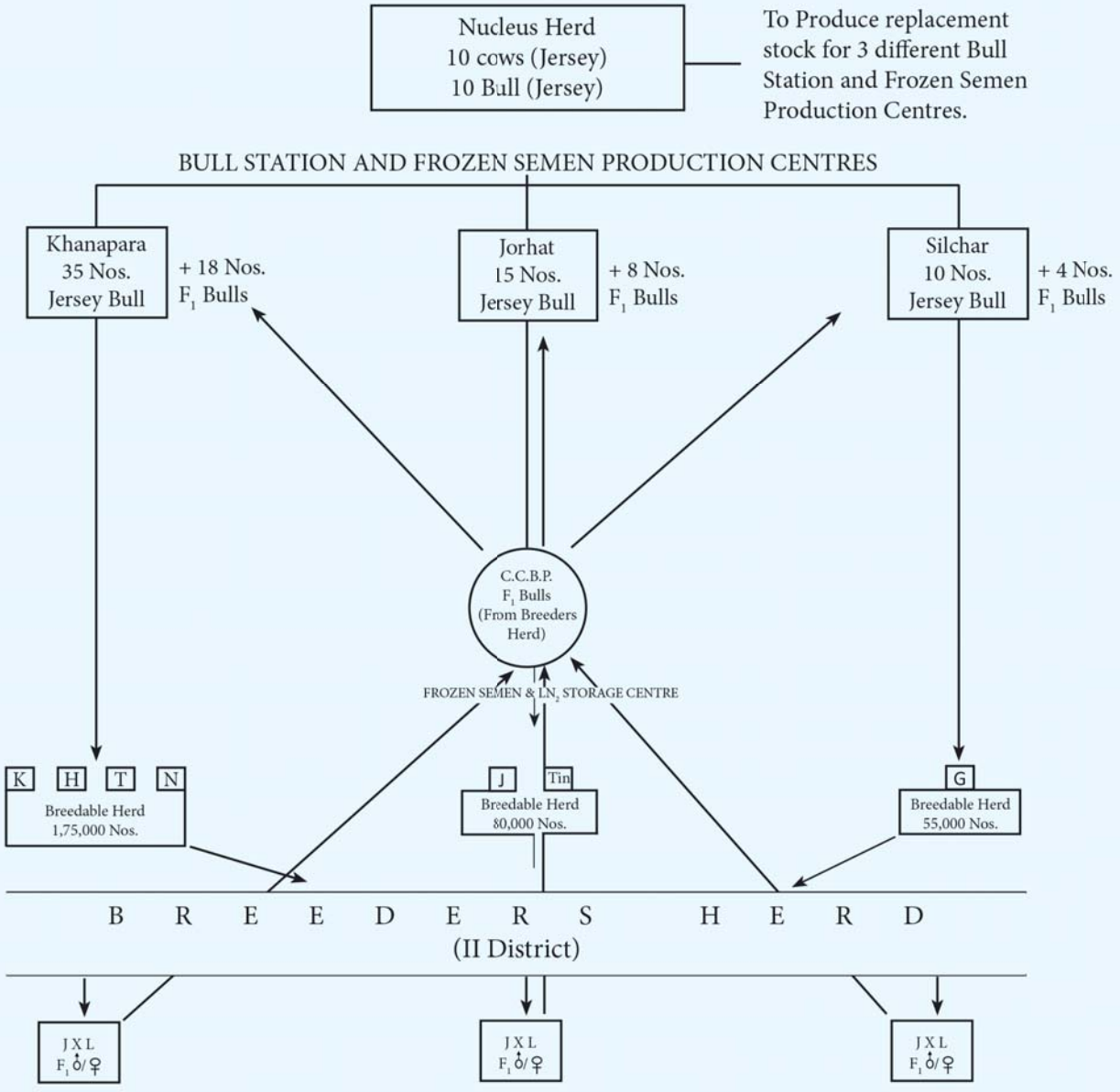
The progeny testing programme, which is an integral part of existing breeding policy, needs to incorporated suitably with the AI programme so that progeny tested bulls of required type can be locally procured. Required database be developed to avoid genetic slippage. [4]

18. Work plan:

For execution of the breeding plan, detailed work plan has to be worked out. A representative work plan involving livestock farm, Barapeta (as a bull mother farm, Coordinated Cattle Breeding Project coordinator of progeny testing programme), bull stations and farmers herds is reproduced here from the report of the Task force, ARIASP (Dr. D. Das committee, 1999), which may be used as a guide line (Fig 6.).

DIAGRAMMATIC WORK PLAN

BULL MOTHER FARM, BARAPEITA



Male progency are selected from the best 3% dam's on their milk yeild (1st lactation) for test mating programme at Ca-ardinated cattle Breeding Project (C.C.B.P.), Khanapara.

Abbreviation = K- Khanapara, H-Howly, T - Tezpur, N - Nagaon, J- Jorhat, Tin-Tinsukia, G- Ghungoor.

FIG: 6 Diagrammatic Work Plan

19. Field recording system:

For genetic improvement of cattle and buffalo population of the state, use of outstanding bulls of superior breeding merit is essential. For progeny testing which is considered to be the best method for proper evaluation of the breeding worth of an animal, female progenies produced by each bull are to be identified in the field for keeping their records in regards to various production and reproduction traits. Besides, some information in regards to the status of the farmers and management systems are also required.

Some important Information to be recorded are as follows:

(A) **On the farmer**:

i) Occupation and education of the farmer
ii) Land-holding and area devoted to fodder production
iii) Number of animals - age and species wise
iv) Housing system
v) Management - stall feeding or grazing
vi) Identification of animals

(B) **On animal:**

(I) Data on Dams

i) Lactation number
ii) Date of A.I.
iii) Date of conception
iv) Date of calving
v) Sex of calf
vi) Test day milk yield at monthly intervals
iv) Fat percentage in milk

(II) Data on progeny:

i) Date of birth
ii) Pedigree of the animal
iii) Date of insemination
iv) Date of conception
v) Date of calving
vi) Milk production at monthly interval
vii) Quantity and type of fodder at monthly interval
viii) Quantity and type of concentrate at monthly interval.

19.1 Milk recording system: Milk recording in the field may be done by casual milk recorders on contract basis at monthly interval on test progenies and in dams of the progenies and bull mothers etc. both in morning and evening. At least one milk recording on each test progeny should be done in the presence of senior technical staff. Milk records will be compiled by the milk recorder and sent to the executing centre with one copy to the owner of the field animals.

19.2 Insemination, pregnancy diagnosis and Identification:

All the breedable females will be bred through Al from semen obtained from the. identified bulls in the project. Proper records of AI, pregnancy diagnosis (PD) and calves born will be maintained at the centre. Each animals covered under the progeny testing programme will be registered and issued a card where all information in regards to that animal will be recorded anti maintained at the Al centre as well as at the executing centre.

All the female progeny born will have to be identified by alpha-numeric code by ear-tag. Male calves born

of the elite class may be identified, selected and purchased as per requirement on weaning and enlisted for future use.

Recording of different information of animals will be made ready to three different agencies viz. Executing centre, A.I. centre and Farmer and also uploading in the INAPH, NADRS and NAIP portal. All information in regards to the Al. records, Bull records, calving records, heath records are to be maintained at the A.I. centres. It is important to note that the farmers maintain their female progeny covered under the project at least up to completion of their first lactation. Appropriate Performa for keeping certain records of the Dam and progeny are to be maintained by the farmers also.

20. OPEN NUCLEUS BREEDING SYSTEM (ONBS) :

This system envisages formation of a nucleus population of breedable animals of exceptionally high genetic merit. The outstanding breedable males are to be let out from the nucleus herd or flock to the farmer or breeders in the neighboring areas to bring about genetic improvement of their animals.

This system is useful in developing countries where field progeny testing and Artificial Insemination have not yielded much success for want of necessary infrastructure and lack of field performance recording.

20.1 Plan of work for ONBS:

1. Screening of the unrecorded base population for identifying some outstanding females.
2. Collection of the outstanding females to form a nucleus herd which would be used as test group of animals.
3. Super ovulation of the elite animals from the outstanding herd and in vitro fertilization with semen of superior sires.
4. Transfer of the resulting embryos to the test group in the nucleus herd as well as to the females in the unrecorded base population.
5. The best males are selected on the basis of their own performance as well as on siblings' performances. They are then extensively used in the field.
6. The female offspring are next considered as potential elite females to donate embryos by MOET for the following cycle after their appraisal against elite cows already present in the nucleus herd and used upon for MOET.

   ONBS can be used as an alternate way of testing young bulls at an early age of about 3-4 years instead of 7 years in conventional breeding plane.

   ONBS can be followed for genetic improvement of both purebred and crossbred population.

   In Assam ONBS can be tried for genetic improvement of crossbred population for which some Nucleus herds of about 200 animals are to be established in different region of the State considering the magnitude of the crossbred population. These nucleus herds will be formed by the animal collected from the field after their screening as outstanding animals. In the Nucleus herds, besides other, facilities for proper recording systems must be there so that the best males can be selected on the basis of available records of their Dam, Sibling and own records. Simultaneously, a system should also be there for recording of at least these females' progenies, which would be collected and used as replacement stock in the field.

   Establishment of nucleus breeding herd(s) of indigenous cattle with its foundation stock selectively drawn from different regions of Assam that are of high production potential.

   Establishment of nucleus herd(s) for outstanding Indian milch breed like Sahiwal may also be tried, primarily to gain experience and to have some ideas of adoptability of such breed in Assam environment.

   Steps are to be taken for facilitation of import of semen or even embryos of high yielding breeds like Jersey and Holstein Friesian to interested Dairy Entrepreneur for establishment of breeding of such pure breeds.

   Specific programme for improvement and production of drought animals no longer appear very justified, particularly when draft ability is negatively associated with milk production capacity of animal.

It is advocated that in a limited scale, semen of high value bull from breed like Sahiwal may be procured from outside the state for crossing with indigenous non-descript cattle in defined geographical are

21. PROPOSED BUFFALO BREEDING POLICY:

In Assam, buffalo is a major source of milk as well as work power. The buffalo population of the state is primarily of swamp type. Though, in regards to milk yield, these buffaloes are not at par with those of improved riverine breeds, the milk of the swamp buffaloes are very rich in fat and protein content. Whole milk and- milk products of swamp buffaloes of Assam are always valued for quality. As a draft animal, buffaloes of Assam are excellent. They are particularly suitable for ploughing in low lying wetland and swamp area. Irrespective of sex, these buffaloes are used extensively in Brahmaputra and Barak valley for carrying out different agricultural activities.

Swamp buffaloes of Assam are distinctly different from the riverine breeds not only in behavior but also in respect of chromosome number. In spite of this difference, they are interbreeding. Although the Fl hybrids and the subsequent filial generations are known to be fertile, they may not be as fertile as that of their parental genotypes because of the inconsistency in chromosome number. In the light of the above observations, the buffalo breeding policy for the state of Assam is proposed as under.

21.1 Straight breeding of swamp buffalo with selection:

Improvement in the genetic potential of indigenous swamp type buffalo of Assam will be sought through selection and straight/pure breeding. For this, few elite herds of swamp type buffalo will be established. Basis of selection of the breeding animal in these herds will be consolidation of type and milk yield. Emphasis will be on achieving maximum genetic gain by way of selection of breeding bulls and their extensive use by A.I. (or natural service in absence of Al facilities).— The breeding bulls will be selected through a progeny testing programme. The progeny testing will involve two stage selection of bulls-preliminary selection and final selection. Young bulls born in the elite herd or born in the farmers house will be selected on the basis of conformation. general health and pedigree for the purpose of test mating. This is preliminary selection. Final selection will be carried out by field progeny testing on the basis of progeny performance. Number of young bull to be selected for infusion in test mating and the number of progeny tested bull to be finally selected will be worked out on the basis of requirements, infrastructure and man power availability and any other important considerations.

This breeding policy of indigenous swamp buffalo of Assam will fulfill three basis requirements. These are

a) Conservation of germplasm.-

b) Meeting a major part of the draft animal requirement for agricultural activities.

c) Augment production of quality milk

Pt-(i) In general, the indigenous buffaloes of Assam are to be bred true for milk and also draft animal. It may be noted that although the *Swamp type* buffaloes of Assam are often blamed for low milk yields, their milk quality is very good and that they produce milk at a very harsh conditions of feeding and management. Also, for enhancing their milk yield, crossing of *Swamp type* buffaloes with improved riverine breeds is not suggested because of chromosomal incompatibility.

21.2 Purebreeding of Murrah:

Two outstanding riverine breeds of buffalo viz. *Murrah* and *Surti* were found to have performed satisfactorily under organised farm environment in the agro-climatic conditions of Assam. Educated entrepreneurs and well to do farmers may be encouraged to rear these two riverine breeds in scientific manner under intensive system of management. The State Govt. will maintain at least one elite herd of each of *Murrah* and *Surti* as a source of germplasm. Initially the already existing *Murrrah* herd at Barhampur livestock farm may be strengthened for the purpose. Outstanding riverine breeds like *Murrah* may be allowed to induct and rear under intensive system

A.I in buffalo rear under intensive system is taken up in a phased manner.

21.3 Crossbreeding of *Swamp* with *Murrah* :

The possibility of crossing *Murrah* bull with Swamp female to enhance milk production is kept open. In absence of sufficient data on the performance and fertility status of swamp x riverine crossbreds, the approach to such a crossbreeding programme has to be cautious. Therefore, initially such a crossbreeding programme will be taken up experimentally in limited scale using the bulls of organized elite herds of *Murrah* and crossing them to swamp females. The future of this crossbreeding programme will rest on the performance of the crossbreds under farm and field conditions.

Production of Carabeef (buffalo meat) from indigenous *Swamp type* buffalo and their cross with reverine breed(s) is to be explored. This may be the thrust area in buffalo breeding in Assam in due course promoting export market.

Indigenous buffaloes of Assam found to possess 50 nos of chromosomes (2N=50) on screening may be crossed by A.I. with reverine buffalo like *Murrah* in a phased manner to increase milk yield.

It is recommended that a project on crossbreeding of *Swamp a*nd *Murrah* buffalo be taken up in collaboration with the College of Veterinary Science to assess the genetic merit of the crossbreds and to study the behavior of chromosome segregation in F1 and subsequent generations. In this experimental programme, *Murrah* bull will be crossed with *Swamp female*. The F1 and subsequent generations will be mated inter se. Study will include production and reproduction traits and also karyotyping besides other physiological traits.

Screening of diseases and disease free status of animal for entry permission to the state will be required for induction of animal (Cattle & Buffalo) in to the state. Animals inducted in to the state must be free of all communicable diseases. The department of Animal Husbandry & Veterinary, Assam will have the authority to provide permission for new induction, based on certificate of disease free or pathogenic organism free animal.

The recommended amendments as well as existing policy provisions would necessitate proper plan of works to be chalked out separately in order to ensure proper implementation of the policy. Therefore policy recommends taking up of action plan accordingly.

Work/action plans to be prepared

For implementation of the policies, detailed work/action plans with appropriate time frame be prepared in accordance with the guidelines of the policies by the experts and state departmental officials for the following

- Establishment and revamping of bull mother farm(s) for production of Jersey, Holstein Frisian Sahiwal, Jersey, and Holstein cross bulls with indigenous cattle.
- Details plans of field progeny testing of Jersey, Holstein Frisian Sahiwal, 50%Jersey, Sahiwal bulls.
- Work plan for production in different centres and distribution.
- Breeding plans for 50% HFbulls.
- Breeding plans for straight breeding of Swamp buffalo with selection
- Breeding plans of crossing of Swamp buffaloes with Murrah and Surti bull in station condition.
- Plan for implementation of data and milk recording system for progeny testing of bulls.
- Plan for open nucleus breeding system(ONBS) in designated area.
- Establishment of elite herd(S) of indigenous cattle for their conservation.
- Schemes for adoption of MOET in designated areas.
- Farmers training, trainings of unemployed youth and women , awareness camps for implementation of the policy, data recording system in field etc.
- Animal production and health information systems data bank and networking through computers.
- Schemes for health insurance and credit etc.

ANNEXURE-I

STRATEGY PAPER ON CATTLE AND BUFFALO DEVELOPMENT POLICY OF ASSAM

Assam does not possess a high yielding milch breed of its own. The local cattle are of low genetic potential for milk production which discourages the farmer to take up dairy trade as a viable commercial venture. So to achieve maximum level of productivity from our low productive cattle, cross breeding/ up gradation with recognised dairy breed is the only way. And to achieve that the state attempted to formulate a suitable policy for augmentation of the milk production. Cattle breeding programme was started in Assam since 1st. Five Year plan. It gained momentum in 1968 following the introduction of Frozen semen technology and implementation of ICDP in the state. By the end of 1985-86, the department had been able to establish 11 (eleven) ICDP and related infrastructural network in rural areas with a potential coverage of 1.1 million breedable cattle in Assam. It covers 11 nos. ICDP, 26 nos. Regional Artificial Insemination centre (RAIC) and 547 nos. of stockman centre. The Deep Frozen Semen Bank was established under Indo-Australian Cattle Breeding project at Khanapara, Guwahati-22, was commissioned in March/1976 with a view to replace chilled semen with Frozen semen and to assured supply of semen from proper inheritances as per state cattle breeding policy. During the year 1983- 84, with the assistance of Govt. of India, expansion of frozen semen bank at Khanapara along with setting up to new Frozen semen storage bank of Howly, Kokrajhar and Tezpur were taken up. Under ARIASP, the department has started A.I. activity with frozen semen in 15 districts with 513 A.I. centres and 166 Gopal mitras. Under ARIASP 7 Frozen semen Banks were renovated and established in 7 strategic locations to cater the need of the 15 districts. Under World bank project Bull Mother Farm Barapetta was also renovated. During the year 2004- 05, Assam Livestock Development Agency(ALDA) renovated the Frozen semen bull station at Khanapara under NPCBB Phase – I as per the standard set by Minimum Standard Protocol(MSP) of Govt of India. ALDA introduced

A.I. facility to the all districts (including two hill districts and Lakhimpur , Dhemaji, BTAD areas etc) of the state as per guideline of Govt Of India. It introduced A.I. in 300 non A.I. departmental centers with A.I. facilities in 2 phases. Recently under Rastria Krishi Vikash Yojna (RKVY) the A.I. network has been expanded to total 1275 centers. ALDA established a new state of the art semen station at Barapetta under NPCBB Phase – II which is the only A graded semen station of entire North East region. Presently AHVD breeding network is covering about 22 to 25% of breedable animal under AI in the plain districts and the coverage is 2 to 10% in hill as well as tribal districts with an "A" graded semen station established at Barapetta under NPCBB Phase – II and 16 regional frozen semen banks covering about functonal 850 AI centres across the state catering to the need of dairy farmers.

Strategies to be taken for Cattle and Buffalo development in Assam are as follows-

1. By converging Town Milk Supply Scheme (TMSS) , Assam Livestock Development Agency (ALDA) & Animal Husbandry and VetyDeptt.
2. Intervention of APART.
3. Popularising Buffalo Breeding InAssam.
4. Developing the existing BuffaloKhutis.
5. Impetus on introducing Area Development Scheme (ADS) & Dairy Entrepreneur Development Scheme (DEDS) in every district of Assam.
6. Improving the reproductive and productive health of the breeding animal
7. Popularization of Dairy enterprise as a viable commercial venture
8. By conversion of un-organise milk sector to organise milk sector
9. By Converging Un-Organised Milk Sector To Organised Milk Sector
10. Establishing Heifer Rearing Unit And Heifer Rearing Schemes for Steady Availability of Quality Seed.

Strategy No-1 : The convergence of Town Milk Supply Schemes(TMSS) and Assam Livestock Development Agency (ALDA)- A society will be form under the guideline of AMMES to maintain a mother account and the child account will be maintained by the management committee of the TMSS. The TMSS will look after the hygienic milk collection and regular price recovery to the farmers on the basis of spot milk testing. The process is going on for digitisation of milk procurement , storage, sale and payment to the farmer in the model of KANCHI. The first pilot will be done in Sitajhakhala and Kamdhenu DUSS.

The convergence with Animal Husbandry and Veterinary Department (AHVD) will be adopted through ALDA based TMSS centric service approach where the co- ordination committee will sit twice in a month for a synergistic operation. ALDA will be providing AI service to the individual as well as societies operating under the TMSS. ALDA also coordinate vaccination and feed and fodder services to the farmers. ALDA will utilize their fund resources for the purpose from the central sector scheme viz- NPBB and NMBP and also from RKVY.

The Monitoring of the AI service delivery and breeding operation will be done by ALDA with the help of INAPH funded under NPBB and NMBP. Apart from these AI activities, feeding and vaccination, ALDA will also oversee the breeding requirement i.e need base infusion of genetic inputs specific to areas as instructed by state breeding policy and bovine breeding act. The following chart depicted the present status of TMSS operating in ASSAM-

Strategy No-2 : APART Intervention

Apart under World Bank Phase-III has a big intervention in 16 district in two categories. The formal sector covering 13 district handle by WAMUL and informal sector covering 16 district co-ordinated by Dairy Department. The AI service of the informal sector will be delivered by ALDA and AHVD will look after the health coverage and other management system including monitoring through INAPH. In the formal sector, health coverage part will be look after by AHVD. Under the APART intervention, the 16 district for informal and 13 district for formal sector will be covered in cluster based approach.

Strategy No-3 : Popularizing Buffalo Breeding in Assam

Assam is blessed with swamp type of buffalo with 48 nos of chromosome which is different from its counterpart from other state i.e reverine type having 50 nos chromosome, Swamp buffalo are dual purpose animal having less productivity than the reverine one and generally are of semi wild in nature available in forest fringe areas and swampy land of Khutis. According to a national seminar on improvement and conservation of Swamp Buffalo held in 2005 suggested line breeding of this breed in a nucleus breeding system for breed improvement as well as conservation. The strategy for buffalo development is pure line breeding of the both breed, open nucleus breeding in selected village, AI with Murrah semen to the farmer rearing the Murrah breed for milk production.

Strategy No-4 : Buffalo Khuti area Development

In Assam cattle and buffalo was reared in an open grazing method by farmers residing nearby villages. The animals are reared by purly extensive method and does not have any systematic procedure for breeding and husbandry practices. So effort has been started to access the Khutis and their needs to bring them under the organised husbandry sector for scientific breeding, health coverage, and marketing of their produces.

Strategy No- 5 : Area Development Scheme (ADS) and Dairy Entrepreneur Development Schemes (DEDS)

Agriculture is the main activity of the rural people in Assam, simultaneously livestock in Assam is livelihood- oriented and is generally owned by small and marginal farmers and agricultural labourers who forms more than 90% of the households in the state. NABARD recognizing the importance of agriculture allied activities like Dairy, Piggery and Goatery, especially given the steady profitable income, has taken the initiative to facilitate formulation of Area Development Schemes in all the district of Assam, from 2018-19 to 2022-23, under various sectors. NABARD has converged the Area Development Scheme

with its Joint Liability Group Program in many districts. Area Development Scheme in different districts of Assam have been prepared with an objective to provide employment opportunities.

Area Development Scheme would provide a platform for all concerned viz. farmers, bankers, NGOs and line departments to work in a co- ordinated manner and would also fulfil the objective of scientific lending and creation of quality assets through infrastructural and other promotional support from state government and credit support by commercial bank and regional rural banks with technical and refinance assistance from NABARD in the scheme area. District A-H & veterinary officer will take necessary step for proper selection of beneficiaries to make the scheme successful, also would provide necessary extension through their dispensaries, Block Veterinary field assistants. NABARD will prepare banking plans, ensure implementation of the plans in association with participating banks and line departments.

Strategy No-6 : Dairy Entrepreneur Development Schemes-

The DAHD-F, Govt. of India launched a pilot schemes for Dairy and poultry in the year 2005-06. The main objective of the scheme was to extend assistance for setting up small dairy farms and other components to bring structural changes. This schemes was revised and rename it to Dairy Entrepreneur Development Schemes. The revised Schemes has come in to operation with effect from 1st sept.2010. The objectives are –

1. To promote setting up modern dairy farms for production of clean milk.
2. To encourage heifer calf rearing.
3. To bring the structural changes in the unorganised sector.
4. To up-grade the quality and traditional technologies.
5. To generate self employment to the unorganised sector.

The strategy here is to facilitate the willing farmer, DCS, NGO etc with the financing institution for availing the facility provided under this schemes. As the objective of the schemes is for overall development of Dairy sectors, the members of DCS, Farmers etc will be motivated to take dairy farming as well as processing, marketing etc as a viable option for sustainable livelihood programme

Strategy No-7: Improving The Reproductive And Productive Health Of The Breeding Animal:-

Apart from the routine health coverage against some important disease like FMD, HS. BQ etc. the cattle sector will emphasises more in the reduction of reproductive and production diseases by organising health camp for reproductive and production diseases in the district. The milch animals are frequently encountered with some sorts of reproductive ailment losing its potential productivity. These are associated mainly with nutritional deficiency, faulty management practices, infectious diseases etc. which needs immediate attention for correction with proper diagnosis. It is proposed that reproductive health management camps will be organized with professional experts in the related field under active participation of the Local Veterinary Network of the Department Each dispensary under the block of a district will organise reproductive and mastitis management camp.

De-worming Camp:-

De-worming against parasitic diseases is vital for productive health of an animal and also require for a calf to grow smoothly in to a good heifer in shorter time. It is proposed to provide anthelmintic support to the newly born AI and local calf and also to the cows and heifer for proper growth for future

Strategy No-8 : Popularizing Dairy Enterprise As A Viable Commercial Venture :-

Dairy farming or enterprise as a viable commercial venture, is now a days a popular venture among many unemployed educated youth because of many reasons. It is a safe business as it is eco-friendly and does not cause environmental pollution. As compared to other industries the skilled labour requirement is less and milk and milk product is active round the year. Minimum investment is required on inventory. Financial institutions like NABARD are now very active in this venture.

To popularize this venture this sector proposed to organise nos of training camp on scientific Dairy farming amongst unemployed educated youths and farmers in the potential areas of the state.

Strategy No-9: By Converging Un-Organised Milk Sector To Organised Milk Sector :

The small holder milk producers are the back bone of India's milk production system. In the present market driven economy , it is necessary to have producer centric institution i.e Dairy Co-operative Society, that could provide rural producer a great access to the organised market. Hence, it is proposed to form one Dairy Co operative Society in each Veterinary Dispensary per year so that the rural producer could get access to the organise market.

Strategy No-10. Establishing Heifer Rearing Unit And Heifer Rearing Schemes for Steady Availability of Quality Seed :-

So far the availability of quality seed for replacement stock and for beginners' is concerned, the breed up- gradation through cross breeding could not cater the need of the producer for replacement of their old stock as well as the need of the beginners due to improper management of heifers in the small holdings. The small holders and the marginal farmers of the state has found difficulties in induction of cows from other state to cater the needs of stock for them. The management and care of heifers in small holdings is not at all scientific as the farmers are not at all aware of the common package of practices. Hence heifer rearing schemes and establishment of heifer rearing unit to cater the need of replacement stock and for beginners' is essential at this hour. Keeping this in mind it is proposed to established heifer rearing unit and popularising scientific heifer rearing through govt schemes in the district.

GOVERNMENT OF ASSAM

ANIMAL HUSBANDRY AND VETERINARY DEPARTMENT
ASSAM:: GUWAHATI-781003