

Government of Kerala

Abstract

Animal Husbandry Department - Breeding Policy -Report of the committee to Evaluate and formulate Livestock Breeding Programme and policies in the State of Kerala approved - Orders issued.

AGRICULTURE (AHE) DEPARTMENT

G.O. (MS) No. 144/98 AD Thiruvananthapuram. Dated: 10.7.1998.

Read: G.O. (Rt.) No.80 97 AD Dated 18.1.97.

ORDER

The average yield per crossbred cow in Kerala has steadily increased from 3.94 lts/day in 1985 to 6.50 lts in 1996. Nevertheless, there is a general feeling among the farmers that the productivity is not high enough and that methods should be evolved to increase the productivity dramatically.

- Milk production is not merely a function of genetic quality alone. Other aspects such as management practices, feed and fodder, etc. All contribute to increasing the productivity⁵! ' If other aspects such as management practices, feed and fodder etc.. are improved through appropriate extension machinery as well as supply of inputs, it would be possible to lift the productivity from the present average of 6.50 lit/day. While this would be continued to be attempted in the IX Live year Plan, there would appear to be a strong case for trying to introduce a further increase in productivity through genetic upgradation. Raising the exotic blood content level from the generally accepted 50%, introduction of new exotic breeds that are suitable for tropical conditions etc. have often been mentioned by enlightened farmers as possible means of achieving this. It was therefore felt that the entire issue should be looked into by an expert committee.
- Accordingly. Government vide G.O. cited constituted an Expert Committee to review the existing breeding policy in the State of Kerala and suggest changes thereto with the following members.
 1. Dr.G.Mukundan, Prof.(Rtd) Sreenilayam. Ollukkara, Thrissur - 680 655 - Chairman
 2. Dr. Sosamma Iype, Director-in-charge centre for Advanced studies in Animal Genetics and Breeding. College of Veterinary and Animal Sciences, Kerala Agricultural University, Mannuthy.
 3. Director Animal Husbandry. Thiruvananthapuram.
 4. Dr.M.K.Rao, Principal Scientist (Animal Breeding) National Dairy Research Institute, Regional Station. Adugodi. Bangalore.
 5. The Managing Director. Kerala Livestock Development Board. Pattom. Thiruvananthapuram. Convener.
- The Committee after detailed study of all aspects having held discussions with all the concerned agencies including dairy farmers and (Government Departments submitted its final report on March 1988.
- The Executive Summary of the recommendations of the committee indicating the agencies who now have to initiate action on each is enclosed as Appendix-II.
- The report of the committee has been discussed by the Government with the members of the Committee, eminent persons in the field and the various implementing agencies. Government are pleased to accept the recommendations of the Committee.
- The agencies indicated in Appendix-I will initiate action on each point and obtain formal orders/approval of the Government wherever such order is necessary.

- To monitor the progress of the implementation of the recommendations. Government are pleased to constitute a Co-ordination Committee with the following as members to oversee the progress of implementation of the breeding policy initiatives.
 1. Secretary (Animal Husbandry & Dairy) Government of Kerala. Chairman.
 2. Director of Animal Husbandry. Kerala.
 3. Dean. College of Veterinary and Animal Sciences. Kerala Agricultural University, Mannuthy.
 4. The Managing Director. Kerala Co-operative Milk Marketing Federation.
 5. The Managing Director. Kerala Livestock Development Board - Convener.
 6. Dr.G.Mukundan. Prof.(Rtd.) Sreenilayam, Ollukkara, Thrissur
- As recommended by the Committee the following R&D programmes shall be taken up.
 1. Karyotyping of bulls used in Artificial Insemination (Kerala Livestock Development Board and Kerala Agricultural University)
 2. Percentage control of breeding bulls (Kerala Livestock Development Board and Kerala Agricultural University)
 3. Studies to find out the percentage of various solids in the milk of crossbred cows (Kerala Agricultural University)
 4. Projects for germ plasm preservation (Kerala Agricultural University)
 5. Studies to find out the impact of the breeding operations and the economics of milk production (KAU, CDS, IMG. etc.)

These agencies may undertake such studies and make the results available to the State Government, the Director of Animal Husbandry, Kerala Livestock Development Board, Kerala Co-operative Milk Marketing federation. Director of Dairy Development etc. from time to time. If funds from the Government are necessary for undertaking such R&D programmes, specific proposals may be sent to the Government.

By Order of the Governor

K.JOSE CYRIAC, SECRETARY TO GOVERNMENT

APPENDIX I

EXECUTIVE SUMMARY

Government of Kerala in their order No.G-0.Rt.80/97/AD dated 18.1.97 have constituted an Expert Committee to review the existing breeding policy of cattle and suggest changes if any required.

The Committee interacted with many professionals, farmers, non-governmental organisations and people of reputation in the field to collect useful information.

Kerala has seen revolutionary changes in the field of cattle breeding over the last 3 decades against many factors that are hostile to cattle development. Programmes for development of the non-descript cattle of Kerala which are not famous as milk producers, started as early in 1951 with the launching of premium bull distribution scheme and key village scheme. These programmes were converted during 60s as intensive cattle development projects. The crossbreeding programmes started as part of ICAR programme in Chalakudy & Neyyattinkara, the hill cattle development scheme for the development of the cattle in the high

ranges of Kerala, the Indo Swiss Project Kerala started for augmenting milk production in the high ranges of Kerala, the special employment programme for massive AI in all the Panchayats in Kerala and continued genetic improvement of the new breed Sunandini by the KLDB are all programmes in the past for developing this sector.

As a result of the planned and continuous breeding programme implemented in the State, substantial increase in the share of GDP from animal husbandry & dairying was achieved over the years (the share of GDP rose from 5.95% in 1986-87 to 10.26% in 1995-96). The plan allocation to the animal husbandry sector remained more or less static at around 1 to 1.5%: through all the plan periods. The recent livestock census (1996) indicates that the number of cattle has decreased from 34.24 lakh in 1987 to 33.96 lakh in 1996. However there was an increase among the total adult females from 17.01 lakh to 17.96 lakh during the same period. The percentage of crossbred has increased from 49.71 % (1987) to 67.33% (1996). There was a drastic reduction in the proportion of adult males among total adult cattle. The buffalo population has declined from 3.29 lakh to 1.29 lakh during the period 1987 to 1996. According to the 1996 census 68.2% of the total animals in milk are crossbred cows, 28.6% ND cows and 3.1% she buffaloes.

Though the number of adult female cattle per km² has increased from 35 in 1977 to 46 in 1996, the relation between adult female cattle and human population remained at around 60 per 1000 humans all through these years. The milk production in the State has increased from 2.05 lakh tons in 1956 to 21.18 lakh tons in 1994-95 and the milk availability (g/d/p) has increased from 33 in 1964-65 to 192 in 1994-95. The results of the field milk recording carried out in 3 agro-climatic zones have indicated that the first standard lactation milk yield of the crossbred cows increased from 1483 kg. in 1983 to 2196 kg. in 1996. The sample survey estimates have also shown similar trends in the daily yield of the crossbred cows which has increased from 3.94 litres in 1985 to 6.5 litres (quick estimate) in 1996. With the formation of the KCMMF, the organised attempts in milk marketing has picked up momentum. As on March 1997 there are 2663 dairy cooperatives in the State having a total of 6.25 lakh members pouring 2.59 lakh tons of milk annually. The share of milk handled by the society has increased from 8.92% in

1988-89 to 10.91% in 1996-97.

A slight improvement in the average age at first calving of the animal could be noticed (41.6 months in 1983 & 39.6 months in 1996) though far below the satisfactory ranges. Also the ratio of animals in milk to dry and not calved is not optimum. The 1996 figures indicate an alarming increase in the number of adult males used for breeding. This will very badly affect the genetic improvement of the cattle in the State.

The AI delivery system in the State provides one AI centre for every 800 adult females. However the number of inseminations conducted in the State is not increasing to commensurate with the increase in the number of AI centres.

The results of the interaction of the committee with the field veterinarians, farmer representatives, NGOs and other officers including faculty members of the veterinary college have indicated that the breeding policy should be a general one throughout the State with the percentage of exotic inheritance around 50 from Jersey & HF breeds. They have given valuable suggestions on improving the efficiency of the breeding operations, management improvement and research and development. The committee has taken serious note of all the suggestions.

The proposed breeding policy and programmes are summarised below:

1. Considering all aspects and the liking of the farmers in the State it is proposed that only Jersey and Holstein Friesian be used as exotic donor breeds and Jersey and its crossbred lines be used in larger proportions.
2. It is proposed that the level of exotic inheritance be limited to around 50%. However for commercial dairy farmers semen of high value pure breeds and proven Sunandini bulls shall be made available using the existing premium bull AI programme.
3. The committee do not recommend any change in the present bull selection programme.
4. As crossbreeding is picking up momentum in other parts of the country, it would be possible to get crossbred bulls from other sources before long. This possibility should be explored on a regular basis.
5. The programme of F1 bull calf production using superior quality semen of Jersey and Holstein Friesian breeds imported from abroad on zebu cows should be strengthened.
6. The committee proposes to replace around 20% of the exotic bull stock annually with exotic bulls of higher genetic merit and preferably from unrelated sources.
7. It is recommended to incorporate embryo technology also in the production of breeding bulls used for AI in the State.
8. The committee recommends to cull and remove about 2% of the Sunandini population for poor milk production and 1% for delayed first calving age annually adequately compensating the loss of the owners.
9. The committee proposes to include proven bulls of the PT programme also in the premium bull list and to use them extensively among elite cows
10. 10. The disparity in the availability of AI centre between north-south may be eliminated by relocating the available centre and taking proper care while allotting new centres.
11. The mobile AI programme may be implemented in all AI centres by the close of the 9th Five Year Plan in a phased manner.
12. It is important and essential that the AI technicians are subjected to refresher courses on a regular basis, at least once in 5 years.
13. The quality of the semen doses should be checked at the level of the Regional Semen Banks before being distributed to the AI centres. Random samples of semen doses may also be checked by drawing samples from the AI centres on a regular basis for bacterial load, motility, etc.
14. The committee proposes to take urgent and intensive measures to sterilise the unselected breeding bulls used for natural services in all areas where AI facilities are provided by invoking the provisions of the livestock improvement act 1987.
15. The present system of providing pedigree details of the bulls whose semen is supplied for AI may be strengthened and details also supplied to the farmers by redesigning the present receipt form incorporating these details as well.
16. The farmers' training programmes may be strengthened and expanded for providing know how on easy to adopt scientific management packages.
17. Fodder production programme needs a thorough restructuring with the involvement of the gram panchayats so that good quality fodder is made available to the cattle.
18. It is recommended that the special livestock breeding programme be expanded to cover at least 15% of the female calves born in the State annually.
19. A massive programme to achieve 'zero sterility' should be launched for improving the reproductive efficiency of the cattle.
20. It is proposed to establish 'pasubhavans' in selected areas to be expanded in a phased manner to collect information on the production and productivity of the livestock sector.

21. The buffalo breeding programme should be continued using superior Murrah bulls.
 22. The breeding programme for goats may be strengthened by supply of superior bucks and does and providing AI service.
 23. The committee propose to constitute a coordination committee with following members to oversee the progress of the breeding operations and to identify and recommend areas for applied research.
 - Secretary (AH & Dairying) Government of Kerala, Chairman
 - Director of Animal Husbandry, Kerala
 - Dean, College of Veterinary & Animal Sciences, Mannuthy
 - Managing Director, KCMMF
 - Managing Director, KLDB
 - A reputed scientist specialised in animal breeding
- The following R&D programmes shall be taken up
 1. Karyo - typing of bulls used in AI
 2. parentage control of breeding bulls
 3. studies to find out the percentage of various solids in the milk of crossbred cows
 4. projects for germ plasm preservation
 5. studies to find out the impact of the breeding operations and the economics of milk production

APPENDIX II

PROPOSED BREEDING POLICY & PROGRAMMES

With a view to meet the growing demands for milk and milk products it is necessary to increase the productivity of the livestock in the State. Productivity enhancement also enables for higher returns for the farmers engaged in the livestock production activities. The projected need of milk in the State is to the tune of 3.5 million tons by the turn of the century. It is to be expected that the demand for milk and milk delicacies will be higher than what is projected based on the nutritional requirements on account of the changing food habits and the increased purchasing power of the people.

Milk production enhancement in the State is possible by:

- improving the genetic potential of the animals including cattle, buffaloes and goats
- increasing the proportion of high yielding crossbreds in the population
- enhancing the reproductive efficiency of the female stock
- augmenting the overall management of the animals
- identifying field problems in the sector and taking corrective measure
- expanding the market facilities for the milk and milk products efficiently

6.1. Genetic improvement

6.1.1 . Breeds to be used

As per the breeding policy in force, Jersey, Holstein-Friesian and Brown Swiss breeds are used as exotic donor breeds in varying proportions. Jersey though not the highest yielding dairy breed of the world, due to the advantage of smaller size, high fat content in milk, heat tolerance and disease resistance is preferred by majority of the farmers. Considering the acute shortage of roughage, high cost of imported concentrate feeds, the preference and economic advantage of high fat milk, Jersey will continue to be the preferred breed by

majority of farmers. However for farmers and areas where feeding is less expensive and more roughage based. Holstein Friesian would be suitable. Considering all aspects and the liking of the farmers in the State it is proposed that only Jersey and Holstein-Friesian will be used as exotic donor breeds. It is also recommended that the Jersey and its crossbred lines be used in larger proportions.

6.1.2. The level of exotic inheritance

The committee considered the views of the farmers, professionals and scientists in the sector. Results of field crossbreeding programme in Kerala and other parts of the world were also studied. It is evident from the studies and the discussions that increasing the percentage of exotic inheritance to levels above 50% does not commensurate with increase in profitable milk yield without adequate management support. Considering the present inputs offered by farmers in the dairy sector and limitations for drastic improvement in management in the coming decade, there will not be much economic advantage in increasing the inheritance level of exotic breeds. It may even be counter-productive at the hands of the average dairy farmers of today. As such it is proposed that the level of exotic inheritance be limited to around 50%.

There are farmers in different parts of the State having high input, commercial and specialised dairy farms. These farmers will be able to maintain animals of higher exotic inheritance. For such farmers semen of high value pure breeds (Jersey / HF) and proven Sunandini bulls shall be made available at a differential price using the existing scheme of premium bull allotment programme.

The results and economic advantages of the resultant offspring shall be monitored to get more information in future.

6.1.3. Genetic selection

A systematic genetic selection programme is implemented in the State continuously from 1977 with the assistance and guidance from the Government of India. The results obtained from the milk recording areas in the State indicate that there is an average annual increase of 56.6 kg milk in the first standard lactation yield of the crossbred cows belonging to the farmers since 1983. In the population of Sunandini cows in Kerala, where the generation interval is almost 1.7 times that of pure exotic breeds in developed dairying countries, young bull programme gives genetic gains equal to that of a conventional progeny testing programme. As such the committee do not recommend any change with present bull selection programme. The committee recommends to intensify the selection of the bull mothers using procedures like cow index and to include dairy conformation also a criteria for selection.

6.1.4. Bringing in of superior germ plasm from outside sources

One of the recommendations in the previous report was to procure crossbred bulls from sources outside Kerala and include them in the breeding programme. It is evident that there are not many sources in India to supply crossbred bulls with required qualifications. However as crossbreeding is picking up momentum in other parts of the country, it would be possible to get bulls from other sources before long. This possibility should be explored on a regular basis.

The programme of F1 bull calf production using superior quality semen of Jersey and Holstein-Friesian breeds imported from abroad on the well-recognised dairy zebu cows should be strengthened.

6.1.5. Superior exotic bulls

The infusion of superior germ plasm from exotic donor breeds of Jersey and Holstein Friesian should be a continuous programme to widen the genetic base and to keep the population open for bringing in the positive

selection responses obtained elsewhere in the world it) the Sunandini breed. The committee proposes to replace around 20% of the exotic bull stock annually with exotic bulls of high genetic merit and preferably from unrelated sources. The breeding value of bulls thus introduced should be above that of the bulls in stock.

6.1.6. Use of embryo technology

There is evidence to show that embryo technology can contribute to the genetic progress in a population, more significantly, when used in the production of bulls used for AI. Studies conducted in Kerala indicate that this programme can add / supplement in the genetic improvement. It is recommended to incorporate embryo technology also in the production of breeding bulls used for AI in the State.

6.1.7. Elimination of genetically poor female stock

A large variation between animals will be there for characters controlled by quantitative genes. All through the years genetic improvement in the population was attempted only through introduction of superior germ plasm from outside sources and selection among males used in AI programme. The culling and elimination of poor milk producers owned by the millions of farmers were never attempted. It is needless to mention that substantial gains both in genetic and economic terms can be obtained by culling and elimination of poor milk producers and reproducers. As such the committee recommends to cull and remove about 2% of the Sunandini population for poor milk production and 1% for delayed first calving age adequately compensating the owners. Government shall draw up a suitable programme to this effect.

6.1.8. Proven Sunandini bulls semen for premium AI

It is reported by the KLD Board that about 3000 doses each from 4 proven bulls every year are available in long storage. A small quantity of this semen is used for nominated mating of the elite stock. However due to the very limited requirement of frozen semen doses for nominated mating, a sizable quantity can be made available for AI on elite cows. The committee proposes to include these bulls also in the premium bull list and to use them extensively among elite cows. Thus the genetic superiority of the proven bulls be directly employed in the general herd of the State, including the test herd.

6.2. Breeding operations

6.2.1. AI centers

The number of AI centres in the State has increased to around 2300 during 1997-98 resulting in providing one AI centre for every 809 breedable female cattle. However considering the need for effective coverage of the entire state, it was recommended to reduce the no. of breedable females per AI centre to 500 by providing more no. of AI centres. This committee endorses the view. The AI centre should not limit its activity to the mere conducts of AI, only but should function as a centre for guidance to the farmers in aspects of breeding, feeding, management, health care and product marketing.

A scanning of the distribution of AI centres over districts reveals that the northern districts and high ranges have lesser no. of AI centres per adult female. This disparity may be eliminated by relocating the available centres and taking proper care while allotting new centres.

6.2.2. AI at the doorstep of the farmer

It is felt that the reproductive efficiency can be improved if the breeding services are provided at the abode of the cows, rather than taking them to the AI centre through the busy traffic. The farmers always prefer to have the cow inseminated at his doorsteps due to reasons of better conception rate, difficulties in taking the

cows in peak yield through the roads, non-availability of personnel to take the cow, etc. The farmers would not hesitate to pay some additional charge for the service at his doorstep. It is recommended that the AI service be made available at the door step of the farmers at their request at a differential rate. The mobile AI programme may be implemented in all AI centres by the close of the ninth five year plan.

6.2.3. Training of the AI technician

All the technicians involved in the AI programme should be basically trained in AI and all related aspects. A study conducted in Kerala has clearly indicated that the between centre variation regarding conception rate was far too high than the within centre variations. This indicates that the major actor who can change the success rate of AI is the AI technician. Investments in equipping him optimally for the conduct of the business will pay back suitably. As such it is important and essential that these technicians are subjected to refresher courses on a regular basis, at least once in 5 years.

6.2.4. Quality of frozen semen at AI centre

The frozen semen collected at the semen production stations is handled at different places before being used for insemination. Strict quality control measures are to be exercised at all levels for obtaining maximum results. The quality of the semen doses should be checked at the level of the Regional Semen Banks before being distributed to the AI centres. Random samples of semen doses may also be checked by drawing samples from the AI centres on a regular basis for bacterial load, motility, etc.

6.2.5. Control of the bulls used for natural service

It can be seen from the latest census (1996) figures that the number of bulls used for breeding has increased by 38% during the period from 1987 to 1996. The number of bulls used for breeding in the State is 17000 according to the 1996 livestock census. It is need less to mention that these unselected bulls will be creating great damage to the genetic improvement programmes carried out in the State over and above the spreading of sexually transmitted diseases. The committee proposes to take urgent and intensive measures to sterilise the unselected breeding bulls used for natural services in all areas where AI facilities are provided by invoking the provisions of the Livestock Improvement Act 1961.

6.2.6. Pedigree details of the bulls

All the AI centres should have the pedigree details of the bulls whose semen is available for AI. The present system of supplying the pedigree details of bulls should be strengthened to ensure that all centres are provided with the pedigree details so that the AI technician can explain the details to the farmers. The details of the bulls may also be supplied to the farmers by redesigning the present AI receipt form incorporating these details as well.

6.3. Management improvement

6.3.1. Farmers education and extension

Many studies have indicated that there is a large scope in increasing the productivity of the sector through improvement in the management practices, farmers' education and extension programmes will go a long way in this regard. The present farmers training programmes may be strengthened and expanded for providing easy to adopt management packages that will benefit the farmers. The publication of information through mass media systems shall also be strengthened. Stress should be given for educating the farmers on the proper feeding and reproductive management.

6.3.2. Feeding

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Unlike in other parts of the country dairying is highly concentrate based in Kerala. There is ample evidence to show that the quality of the compounded cattle feed is not satisfactory. As such farmers are mixing concentrates like cakes into the compounded cattle feed. More than escalating the cost of the feed, this system also upsets the protein to energy balance. In order to make the feeding cost effective and meaningful there is an urgent need to make necessary regulations for the quality control of the compounded cattle feed.

The roughage feeding in the State is becoming increasingly expensive on account of the prohibitive price of the paddy straw. Fodder production programme needs a thorough restructuring with the involvement of the grama panchayats so that good quality fodder is made available to the cattle.

6.3.3. Care of the growing stock

The female calves are to be managed and looked after scientifically till returns are received from them. However majority of the farmers are yet to practice a scientific calf rearing scheme. The efforts of the Government under the special livestock breeding programme have clearly indicated that there is considerable reduction in the age at first calving by adopting scientific calf rearing practices. The cows brought up under the special livestock breeding programme also yield 35 to 40% more milk than that of the average crossbred cows. As such it is recommended that the special livestock breeding programme be expanded to cover at least 15% of the female calves born in the State annually.

6.3.4. Reproductive management

Substantial increase in the State's milk production could be achieved by reducing the age at first calving and calving interval of the crossbred cows. Both these parameters are at present far from satisfactory. Farmers education, providing AI service at the door of the farmer improvement in the quality of AI services, regular pregnancy diagnosis, are all actions required in this direction. Animals that are not settling even after two inseminations should be subjected to detailed examination and treatment. A massive programme to achieve 'zero sterility' should be launched for improving the reproductive efficiency of the cattle

6.4. Management of information and establishment of Pasuhhavan

There are many information gaps in the livestock sector. Information helps in assessing the impact of the programme, to make corrective measures and for the planning process. Genetic selection and animal breeding schemes greatly depend on individual data for taking appropriate decisions.

With the above objectives, it is proposed to establish 'Pasubhavans' in selected areas to be expanded in a phased manner. To start with 3 panchayats in each district may be selected on a random basis. In these Pasubhavans the number of all animals, status of their breeding, reproduction, feeding, production, health, etc., should be recorded and made available for planning. The information thus collected will enable the planners, administrators and farmers to take steps for improvement and remedial measures. These Panchayats will be model for others to replicate..

As is followed for recognised breeds all over the world there should be a breeders association for the Sunandini breed. The Pasubhavans shall take a lead role in organising and instituting breeders association which in turn will be responsible for the welfare the Sunandini cows and their owners.

6.5. Buffaloes and goats

The population of buffaloes are constantly on the decline in Kerala. At present frozen semen from selected Murrah bulls are made available in all the AI centres as per demand. This programme should be continued using superior Murrah bulls.

Though there was a decline in the goat population from 1982 to 1987, it has shown considerable increase during 1987 to 1996. The breeding programme for goats needs improvement. The Malabari breed of goats, a famous dual purpose breed, can be improved with regard to its economic characters. Supply of superior and selected breeding stock to farmers should be expanded with a view to provide bucks for breeding in needy areas. It is learnt that deep frozen semen AI is being experimented in goats in selected centres. The AI programme may be expanded to more AI centres after perfecting the system. It is also recommended that crossbreeding programme with world's best milk producing goat breeds, such as Sannen and Alpine may be implemented in the non-Malabari tracts in a pilot scale.

6.6. Research & Development

6.6.1. Constitution of a coordination committee

For the smooth functioning of the breeding operations in the State it is necessary to have coordinated efforts of all the agencies engaged in cattle development. This is all the more important in the changing scenario where many of the cattle breeding operations are carried out with the involvement of the local bodies.

The Committee proposes to constitute a coordination committee with following members

- Secretary (AH & Dairying) Government of Kerala Chairman
- Director of Animal Husbandry, Kerala.
- Dean, College of Veterinary & Animal Sciences, Mannuthy
- Managing Director, KCMMF
- Managing Director, KLDB
- A reputed scientist specialised in animal breeding.

This coordination committee will oversee the progress of the breeding operations periodically and provide necessary guidance.

This committee shall also recommend the areas of research and development programmes that need thrust from time to time in the livestock sector.

6.6.2. Karyotyping

The karyotyping of bulls used in the breeding programme should be carried out on a regular basis for which facilities at the Kerala Agricultural University shall be strengthened.

6.6.3. Parentage control

The parentage control programme started on experimental basis at the Kerala Agricultural University shall be scrutinised with a view to subject all breeding bulls, and random number daughters of test bulls.

6.6.4. Quality standards for milk

Farmers are often complaining that they are penalised for supplying milk having sub-standard fat percentage. It is necessary to undertake a field study and to recommend to Government for making suitable amendments in the PIA Act.

6.6.5. Germ plasm conservation

It may be desirable that herds of local cattle of Kerala be maintained in Government and University farms. Since the University farms are basically for research and teaching such programmes will be desirable.

6.6.6. Economics of milk production

Studies are recommended to know the impact of the breeding operation and the economy of milk production in the State.

Annexure I. District wise details of AI and AI centres							
District	Breedable females '000 (1966)				No. of AI centres	No. of AI done	Breedable females per centre
	Crossbred	Indigenous	Buffaloes	T'otal			
Thiruvananthapuram	117.56	32.56	7.70	157.82	222	165844	711
Kollam	112.30	41.21	3.63	157.14	211	158759	745
Pathanamthitta	78.56	28.86	0.77	108.19	161	109605	672
Alapuxha	75.17	20.15	1.57	96.89	136	134344	712
Kottayam	104.39	21.71	1.99	128.09	175	115007	732
klukki	96.91	38.00	7.01	141.92	163	50170	871
Ernakulam	116.13	41.58	3.78	161.49	196	108211	824
Thrissur	92.96	39.83	7.57	140.36	169	155249	831

Palakkad	111.05	69.81	9.85	190.71	166	102179	1149	
Malappuram	83.40	45.98	8.15	137.53	158	57073	870	
Kozhikode	63.48	65.71	0.43	129.62	154	83944	842	5
Wayanad	60.28	17.29	1.81	79.38	107	39431	742	3
Kannur	82.34	47.00	1.45	130.79	181	84071	723	4
Kasargode	31.82	59.84	2.45	94.11	93	25744	1012	2
TOTAL	1226.36	569.53	58.16	1854.05	2293	1389661	809	0