CONSERVATION OF ANIMAL GENETIC RESOURCES: TECHNICAL AND SOCIO-CULTURAL ISSUES

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Abstract

The animal genetic resources (AnGR) that are and/or may be used for food and agriculture are an important asset. India being one of the mega biodiversity spot has its own role and responsibility to conserve and improve AnGR. Various scientific methods developed for the purpose like proper identification, characterization and data recording of animals and their performances, gene banks, cryopreservation of semen, oocytes, embryo, cells and nuclei, cloning, breeding programs etc have one or the other technical issue associated with them. Socio cultural diversity of India also possesses issues on use and disuse of various AnGR. All such issues must be entertained so that no stone remain unturned in the successful implementation of AnGR preservation and conservation programs in India.

Keyword: technical, socio-cultural, animal genetic resources, conservation, preservation

1.INTRODUCTION

The Animal genetic resources are breeder's raw material and most essential input of a farmer of any country. Luckily, India is bestowed with vast and varied forms of animal genetic resources that have played crucial role in its economic development. India is one of the mega-biodiversity centers. Among the domesticated livestock and birds, total 183 breeds- cattle (43), buffalo (15), goat (34), sheep (43), horses and ponies (7), camel (9), pig (8), donkey (2), yak (1), chicken (19), duck (1) and geese (1) are documented.[1]

India stands 1st in total livestock population. It is number 1 in milk, cara beef, goat milk production, 2nd in bristle (a pig industry by-product), fish production, 3rd in egg production, 5th in poultry meat production, 8th in duck production, 9th in wool production. Livestock sector contributes 4.11% of GDP and 25.6% of total Agriculture GDP. These astonishing figures demand for the conservation and continuous improvement of animal germplasm.

The conservation of Animal Genetic Resources is a multidimensional activity which encompasses not only preservation and maintenance of existing breeds but also their improvement and proper management. The overall aim is sustainable utilization, restoration and enhancement of resources so as to meet the needs of mankind at present and in future.

2.TECHNICAL ISSUES

Several modern techniques have been developed and used up to a great extent to conserve animal germplasm but still there are some loopholes in these techniques which are highlighted in this paper.

2.1. Proper identification, characterization and data recording

Identification and characterization of animals is pre-requisite for any conservation program. It is not an easy task as the number of highly skilled work force for proper recording is limited. There is hardly any breeding plan with proper data recording in field conditions and therefore, genetic improvement through selection is limited to organized herds only. The Committee on Agriculture has also recommended increased activity in documentation and preservation concurrently - particularly with regard to indigenous breeds in developing countries. This again requires more inputs and technical support. India lacks the basic infrastructures required for data collection and for developing a long-term preservation program. Proper training is very essential to learn data collection, recording and interpretation and it is one of the most

neglected area in our country. In most cases of in-situ conservation, farmers are not given much recognition and incentives for their role in conservation program.

2.2. Utilization of semen, oocyte, embryo, cells and nuclei in gene banks

Gene banks store semen, embryos etc. All the activities require inputs in terms of expertise, training and equipments. Documentation facilities including all relevant genetic information on the breed and donor animals including details of health control tests and on the processing of the samples are a must in Regional Animal Gene Banks. [2]

Semen is often easier to collect and is widely used for artificial insemination. However, some of the issues associated with it are- it is difficult with untrained animals in remote locations.

In India the availability of liquid nitrogen for freezing, transport, and storage of semen is also a big question sometimes. The difficulty in detecting heat in buffalo limits the use of AI. Even in sheep and goat AI is not so common because of failure to develop a simple, non surgical insemination procedure. [3] Research to improve the freezing and thawing properties of sheep semen is underway in the Republic of South Africa. Inability to successfully cryopreserve boar semen has hampered the use of AI in pigs.

Mature oocyte is recovered using surgery, laparatomy or slaughtering of donor animals and is a laborious process. [4] These procedures are not suitable for animals of endangered breeds.

During MOET treatment in different breeds, the collection of embryos is uncertain due to the unknown hormonal responses of different breeds. In some species it is difficult or impossible to collect and successfully freeze embryos. The comparative cost of collecting and preserving embryos is much higher. To regain the ultimate population which possess the full diploid genetic variation of the original breed one need to collect larger numbers of embryos from many females. A review was done by Hare in 1985 [5] and Singh in 1988 [6] about diseases transmitted by semen and embryo. As compared to semen, intact embryo transfer greatly reduces the disease transmission between different populations. The offspring that develops from a transferred embryo may confer passive immunity from the surrogate mother (transplacental or via the colostrum). The unavailability of necessary facilities and infrastructure has hampered the process of producing several progeny from a female using embryo transfer despite its potential benefits. Even in developed countries, commercial embryo transfer is limited due to the cost involved in it. [7]

Each cell of an animal contains the entire genetic information. Theory opens up the possibility to preserve the genetic information of individual animals in the form of cells or cell nuclei however till now it has not been possible to reactivate an entire organism from the genetic information contained in a single somatic cell.

2.3. Cloning through somatic cell nuclear transfer (SCNT)

Cloning through somatic cell nuclear transfer has vast potential applications but attempts to apply this technology have not been successful due to very low offspring rate obtained with nuclear transferred (NT) embryos, (0.9% to 6% across different species) compared to that obtained with embryos produced through in vitro fertilization (>40%) [8]

2.4. Breeding programs

Successful breeding programs requires infrastructure for testing performance and for that large herd size is needed. In India, the herd sizes are normally small and variability between farms, farming systems and seasons are large; reproductive efficiency is low mainly due to poor nutrition and in such conditions implementation of systematic breeding and animal health programs is a bigger issue. Cross-breeding of indigenous animals with exotic animals has become a major threat to our local breeds. In buffaloes especially Murrah, degeneration and not extinction is the real issue. The high-producing genotypes in their first lactation are sold and moved to urban centres for milk production. After the end of lactation these are sold to slaughter houses and the superior genotypes are slaughtered and lost.

2.5. Relief and rehabilitation measures after disasters

India is very much prone to disasters which possess threat of losing precious animal germplasm. It is very hard to gather and compile quantitative data for disaster

hit animals. Thus effective policies for the relief and rehabilitation could not be formulated.

3.SOCIO-CULTURAL ISSUES

The history of domestication and conservation of livestock in the Indian subcontinent is more than 5OOO years old. Both negative and positive aspects of Social and cultural influences were always present as far as conservation of animals is considered.

3.1. Negatively associated issues

3.1.1. Harmful religious practices and social faiths

Number of practices/rituals/games performed in the name of religion and culture cause severe harm to the animals and birds involved in them. Some of the examples of such practices are - In Navratri, the Rajput of Rajasthan worship their weapons and horses and offer a sacrifice of a goat to a goddess Kuldevi. Every year during *Yatra/ Jatra* (festival), animals like goat and fowl are sacrificed before the *Kandhen Budhi* deity. In Kerala, blood is offered to Theyyam gods. Pigeon racing, or kabootarbaazi, a glorifying sport since Mughal time was popular in Agra and has recently been banned by Agra administration. Such rituals being related to the sentiments and believes of the society needs to be tackled wisely.

3.1.2. Inclination of society towards modernization

Modernization and globalization has lured the young generations and they are losing interest in animal husbandry and farming. Sometimes it is not easy to safeguard the traditional conditions, because people do not want to live in such a situation. This human dilemma is very difficult to overcome.

3.1.3. Alternatives of animal products are available in the market

The society is switching their choices to the alternatives of animal products available in the market. Specialized draught breeds are threatened by the expansion of mechanization in agriculture. Similarly, breeds developed for wool and fibre production are threatened by the availability of alternative materials. Availability of alternative sources of fertilizer or financial services also shifted the objectives of livestock keepers and has affected their choices regarding breeds.

3.1.4. Impact of globalization

The change in the consumer preference for leaner meat has led to the decline of pig breeds that have carcasses with a higher fat content [9]. Increased competition from imported products, fluctuations in the prices of imported inputs, and trade restrictions associated with zoo sanitary measures are also creating pressure. Strict laws related to product uniformity and food hygiene limit the range of marketable livestock products and are negatively affecting the traditional animal husbandry.

3.1.5. Government policies versus traditional pastoral livestock keeping

Use of land for crop production, wildlife parks, and mineral extraction being the priority in government policy decisions causes hindrance in traditional grazing strategies. Also the mobile nature of traditional pastoral livestock keeping does not make for easy relationships with the government because the focus of development has always been on promoting sedentary livelihoods.

3.2. Positively associated issues

Long before the word "conservation" was coined, tribal peoples were already having highly effective measures for maintaining the richness of their environment. They have their own sophisticated codes of conservation to avoid overhunting and thus preserve biodiversity. Tribal people have managed biodiversity for millennia. Conservation must accept the growing proof that tribal peoples are better at looking after their environment than anyone else. The huge sums spent on conservation must be given to the cheapest solution.

3.2.1. Role of different communities

Different Communities in different states all over India have significantly contributed in conservation and preservation of animal genetic resources. Some of which are listed in table 1.

Buffalo	**State**	**Communities Involved**
Banni	Gujarat: Kuchch District	Maldhari
Chilika	Orissa : Cuttack, Ganjam, Puri,	Chilika Promoters Society Orissa
Toda	Tamil Nadu: Niligiri	Toda tribes

Cattle	**State**	**Communities Involved**
Belahi	Haryana: Ambala, Panchkula, Yamuna Nagar & Chandigarh	Gujjars/Langarias
Dangi	Maharashtra: Thane, Ahmadnagar. Gujarat: The Dangs	Kanadi, Mahadeo, Koli, Konkane, Thakar , Maratha – Semi Nomadic
Bachur	Bihar: Madhubani, Darbhanga, Sitamarhi	Koir and Ahir
Gangatiri	Bihar: Bhojpur UP: Varanasi, Mirzapur, Ghazipur	Yadav, Bhumihar, Brahmin, Rajbhar, Kshatriya and Patel
Gaolao	Madhya Pradesh: Balaghat, Chhindwara, Seoni, Rajnandgaon, Wardha, Durg, & Nagpur	NandaGawali
Umbalacherry	Tamil Nadu: Thiruvur and Nagapattinam	Deshmukh, Sirdeshpande, Nawabs – farmers
Deoni	Karnataka: Bidar. Maharastra: Latur, Parbhani,Nanded & Osmanabad	Jahagirdars, Maktedars, Deshmukh, Sirdeshpande, Nawabs - farmers
Ongole	Andhra Pradesh: Guntur, Nellore, Kurnool & East Godavari	Sugalis ,Yadavas and farmer community
Gir	Gujarat: Amreli, Bhavnagar, Rajkot & Junagadh	Rabari, Bharvad, Aber and Mer. Farmers-Patel, Rajput etc
Rathi	Rajasthan: Jaisalmer, Ganganagar & Bikaner	Pastroal tribe (Raths)
Pulikulam	Tamil Nadu: Madurai, Virudhunagar & Sivaganda	Konar and Thevar
Malaimadu	Tamil Nadu: Virudhunagar, Theni & Tirunelveli	Konar, Thevar, Naicker, Moopar communities

Bargur	Bargur Forest zone- Tamil Nadu	Bargur Lingayat

The efforts of Prof. Sosamma Iype and a few of her students (later transformed as the Vechur Conservation Trust) conserved vechur who would have become extinct due to cross breeding. The small cow is now proving extremely attractive for people who are keen on zero-budget or low-input farming.

3.2.2. Breed Society

An officially recognized association of people with common interest in managing the breed is known as breed society. Its aims and objectives are breed improvement, maintenance of breed purity, supporting the breed as well as their keepers, arranging breed-shows to highlight importance/uniqueness and raising the breed relevance through its product utilization. [10]

3.2.3. Non-Government Organizations

Non-Government Organizations (NGOs) are individual registered organizations having a motto, objectives and action plans. e.g. ANTHRA, SEVA [Sustainable Agriculture and Environment Voluntary Action], SURE [Society for Upliftment of Rural Economy], SAHJEEVAN,TONA farms, TIMBAKTU COLLECTIVE, Jal Kranti Trust. NGOs engaged with livestock undertake improvement and conservation activities. They are more closely associated with the farmers and livestock keepers, hence understands the problems of farmers. NGOs along with breed societies can achieve the objectives of breed conservation and preservation.

4.CONCLUSION

Despite the fact that there are many technologies available for conservation and preservation of animal genetic resources, there is still some lacunae in the use of these tools on non-commercial and local breeds. The livestock genomic sector therefore needs to make effort to apply powerful tools for breed conservation and development. There are also various positive and negative socio-cultural issues associated with conservation and preservation. Only thing needed is to encourage the positive aspect to such an extent that the negative issues will be taken care of by themselves so that not only India remains rich in biodiversity but it also remains unique.

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