STUDY ON PHENOTYPIC CHARACTERIZATION AND PRODUCTION OF GERMPLASM OF PUNGANUR CATTLE

Background :

Punganur is world's shortest humped cattle (Bos.*indicus*), originated in the surrounding areas of Punganur, Chittoor Dist, A.P. The productive and reproductive efficiencies are believed to be on par with the other dual purpose Indian breeds (Veerabramhaiah et al, 2001). At present, there are only 143 good Punganur cattle are available at Livestock Research Station, Palamaner, Chittoor Dist in the entire state / country. As per the FAO norms (Bodo, 1989) this small number indicates that the breed is in an alarming state of extinction. Therefore urgent efforts are needed for conservation of this precious indigenous germ plasm.

In an effort towards in-*situ* conservation, all the available Punganur cattle are being maintained at Livestock Research Station, Palamaner. Ex-*situ* cryopreservation of germ plasm plays an important role in support of in-situ conservation of the breed (Hensen, 1992). Ex-*situ* conservation involves storage of genetic resources by production fo elite germplasm such as semen, embryos etc. Cryopreservation is expected to preserve genetics of the breed for many centuries.

In view of the importance and threatened extinction, it is proposed to undertake ex-situ conservation of Punganur germ plasm with the following objectives.

Objectives

1. To conduct detailed survey on Punganur cattle population status in A.P
2. To establish an elite herd of breedable animals
3. To undertake phenotypic characterization of Punganur cattle breed
4. Production of frozen semen and embryos from true Punganur cattle
5. To supply the elite germplasm to the needy farmers for propagation in the field.

Practical relevance / utility of the project:

i) Selective breeding and ex-situ conservation minimizes the genetic drift and inbreeding in small populations and helps in faster multiplication of elite germplasm

ii) Endangered Punganur cattle germ plasm is conserved for the posterity.

iii) Further cryopreserved embryos would not be associated with loss of genes or alterations in the gene frequencies.

iv) It will provide much needed experience and expertise to undertake similar projects with other breeds and species of animals.

Technical Programme :

A. **For survey on Punganur cattle, an elite herd of breedable animals, phenotypic and genotypic characterization of Punganur cattle breed :**

- ✓ All breedable Punganur cows and heifers shall be bred to bulls available at this station, by avoiding close matings to the extent possible. Pedigree information will be recorded for all the animals involved in the breeding programme.
- ✓ Selection of animals based on phenotypic characters (height of the animal, coat pattern, length of the tail, body measurements etc) and dam's milk yield.
- ✓ The programme shall be continued till sizeable number of breedable herd strength with true type of Punganur traits is attained.

Traits to be measured

- ✓ Detailed field survey will be conducted to understand the status of Punganur cattle population in Andhra Pradesh as per the standard proforma given by the National Bureau of Animal Genetics Resources (NBAGR).

Recording of Physical or Morphological characteristics:

- o Coat colour, Horn pattern, Head profile, Eyes, eyelids, Ears, Forehead, Muzzle Colour, Hoof colour, thickness of the skin and Udder traits etc.

Growth traits:

- o Birth weight and Body weight at different ages i.e, 3, 6,9,12,18,24,30 months will be recorded .

Body measurements:

- o Height at withers, body length, Chest girth, Paunch girth, hip width, tail length, and colour of the tail switch are recorded.

Production traits:

- ✓ The production performance of the animals is estimated and expressed in terms of
  - i. Daily milk yield
  - ii. Total lactation milk yield
  - iii. Peak yield
  - iv. Persistency index
  - v. Lactation length
  - vi. Composition of milk

Reproductive traits:

- ✓ The reproductive performance of the animals is estimated and expressed in terms of
    - i. Age at Sexual maturity
    - ii. Age at first calving
    - iii. Gestation period
    - iv. Dry period
    - v. Service period
- vi. Calving interval
- vii. No. of services per conception
- viii. Reproductive disorders like dystocia, abortions, stillbirths etc

Adaptive Traits:

- ✓ Longivity of the animals
- ✓ Temperature-Humidity (THI) index is estimated to examine the degree of heat tolerance of the animals against adverse climatic conditions.

B. **Frozen semen and embryos from Punganur cattle and supply of germplasm to the needy farmers :**

1. Typical representatives of Punganur cattle available at Livestock Research Station, Palamaner shall be selected for this study.

i. **Frozen semen :**

1. Semen shall be collected from true Punganur bulls (at least from 6-10 bulls initially) twice in a week with the help of standard artificial vagina (AV).
2. Soon after collection, the semen collection tubes were labelled and transferred to a water bath at 34°C and immediately evaluated for macroscopic and microscopic evaluation.
3. All the samples with satisfactory results shall be used for preparation cryopreservation of semen @ 1000 semen straws per bull.

ii. **Embryos :**

1. True Punganur cows available shall be super ovulated during luteal phase of the estrous cycle with FSH / PMSG and PGF_{2} hormones and embryos shall be recovered non-surgically twice with a gap of 6-8 months non surgically from both the uterine horns with the help of Foley's catheter and using sophisticated embryo recovery media.
2. Good and fair quality embryos recovered shall be transferred to recipient and some (approx. 4-5 per cow) shall be cryopreserved in Liquid Nitrogen using a computerized automatic freezing system.
3. After some period some shall be thawed and cultured in vitro up to blastocyst stage in M-199, foetal calf serum, antibiotic, vitamins etc. to assess the quality of cryopreserved embryos.

iii. **Supply of germplasm :**

1. After production of semen and embryos elite germplasm shall be transferred to the needy farmers who are maintaining Punganur cattle for propagation in the field.

iv. **Data analysis :**

1. Appropriate experimental design and statistical analysis of the data shall be undertaken to obtain scientifically valid results and their interpretation.

Outcome :

At present, few Punganur cattle (175 only) are being maintained at Livestock Research Station, Palamaner. As per the FAO norms this population indicates that this breed is in an alarming state of extinction. These efforts shall increase the number of Punganur cattle so as to save this breed from the brink of extinction through *in-situ* conservation both at farm level and at farmer level.

Financial Outlay (Rs. in crores)

S. No.	**Name of the project**	**Budget**
1	Strengthening infrastructure for use of assisted reproductive techniology laboratory having facilities for AI and ET	**0.50**
2	Contingencies (Glassware, plastic ware chemicals, Media and maintenance of equipment, transport etc.) and operational expenses (SRF, Lab attendants etc.)	
	TOTAL	0.50

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