

**Terms of Reference**  
**For**  
**Establishing Facility for producing Sex sorted semen**  
**doses of Indigenous Cattle and Buffalo breeds in India**

**EOI No. AH/1530/2017 Dated 25.05.2017**

**Issued by**

Kerala Livestock Development Board,  
Pattom P.O., Trivandrum, 695 004  
KERALA STATE,  
INDIA

## Contents

1. Background .....	3
2. Objectives and expected results .....	4
3. Scope of the work .....	5
3.1. Scope of work for Service Provider .....	5
3.2 Requirements to be met by the semen station .....	5
4. Logistics and Timeline.....	6
5. Monitoring and Reporting .....	6
6. Documents to be submitted .....	6

## 1. Background

India is the largest milk producer in the world. Milk production was estimated at 155.5 million tons in 2015-16; about 49% contributed by buffaloes, 48% by cows and the remaining 3% by goats. The past long-term growth in milk production in India has been significant compared to the total world milk production. In the last one decade, the compounded annual growth rate in milk production in India has been about 4.8% against about 2% globally. The demand for milk in India is constantly growing. The demand for milk is expected to cross 200 MMT by 2021-22.

The country has a very large population of cattle and buffaloes; according to the Livestock Census 2012, the country had 76.69 million adult female cattle and 56.59 million adult female buffaloes. The country is bestowed with rich bio-diversity. There are uniquely identified 40 cattle breeds and 13 buffaloes breeds. Centuries of natural and human selection have resulted in genetically diverse breeds fitting into a wide range of environmental conditions and human needs each characterized by its unique adaptive and productive traits.

At present, some 110 thousand AI centres are in operation – 68 thousands are operated by the state governments, 21 thousands by the cooperatives, and another 21 thousands by NGOs/private. These centres together in 2015-16 carried out 67 million inseminations; 40.5 million by the state governments/ their agencies, 15.8 million by the dairy cooperatives and 10.7 million by NGOs and private. Through this huge network, however, about 30 percent of the breedable cattle and buffaloes are bred through AI at present and the remaining 70 percent are still bred through natural service. The overall conception rate of AI is assumed to be around 35% in the country. A massive drive has been initiated to cover the majority of breedable cattle and buffaloes under AI. There are 53 semen stations in the country producing about 100 million doses. Nine of these semen stations are with cooperatives, 37 with state and central governments, 4 with NDDB's sister organisations and 3 in private.

In Indian context use of sexed semen is very relevant. First, many states in India have banned cow slaughters, consequent to which many unwanted male calves survive limiting feed and fodder resources to productive cows. In many situations, male calves are just abandoned and their welfare is severely compromised. Applying sexed semen can solve this problem to a great extent. Second, the technology can help in increasing the supply of replacement heifers, leading to higher milk production. Increased production of heifers may also help in increasing the herd strength much faster at lesser cost and with no risk of introducing diseases compared to when one has to purchase animals from other farmers. Increased availability of heifers may also provide an additional opportunity to farmers to sell surplus heifers to other farmers. Third, the technology can speed up genetic improvement by enhancing the efficiency of both progeny testing and embryo transfer and IVF programmes. Fourth, dead, dying or

damaged sperm cells are eliminated in the sorting process ensuring only viable sperms. This helps the sexed semen more successful in low dosage. Fifth, by producing a female calves using sexed semen, there could be less difficult births compared to male calves (dystocia). This is particularly useful for maiden heifers. Sixth, higher productivity may also help in reducing methane gas production from animals mitigating impact of climate change and helping in reducing overall global warming.

Considering the relevance of the sexed semen technology in India, the State Government of Kerala, India, has decided to establish semen sexing facilities for indigenous breeds of specified standards at its semen station located at Mattupatti, Idukki District, Kerala, India.

## **2. Objectives and expected results**

The State Government of Kerala wishes to engage a identified service provider to create facilities to sort semen at its semen station located at Mattupatti from raw semen ejaculate harvested from indigenous bulls of cattle and buffaloes to produce semen doses having gender specified sperms (either X or Y bearing chromosomes). The specific objectives include:

1. To produce sex sorted semen doses from raw ejaculates harvested from bulls of indigenous breeds of cattle and buffaloes with the following specifications:
  - a. Purity of Primary gender : Not less than 90% (Should be supported by appropriate laboratory test)
  - b. Concentration: Not less than 2.1 M per dose
  - c. Packed in 0.25 ml straw
  - d. Post thaw motility : Progressive motility of minimum 50% at 0 hr and 30% at 3 hr post thaw
  - e. Intact Acrosomes : Greater than or equal to 50%
  - f. Field conception rates across herds not less than 92% of the conventional semen under similar conditions
2. To create sex sorted semen dose production facilities at Matupatti to produce a minimum of 200,000 gender specified sex sorted semen doses per year.
3. To promote the use of sex sorted semen doses in the country.

### **3. Scope of the work**

The service provider will carry out sorting of semen to produce desired sex sorted semen doses of Indigenous cattle and buffalo breeds, whereas the Matupatti semen station located at Idukki district, Kerala, India will provide raw ejaculates of specified specifications to the service provider. The details on the activities to be carried out by the service provider and the semen station are given below:

#### **3.1. Scope of work for Service Provider**

The Service Provider will:

1. Set up and maintain a sexed semen sorting laboratory with the necessary equipment at its own cost;
2. Hire, train and compensate the appropriate personnel necessary for the purpose of processing of sorted semen;
3. Put in place an appropriate information system to evaluate the semen sorting process objectively; and
4. Make available sex sorted semen doses of required specifications and number as mentioned under objectives and expected results.

#### **3.2. Requirements to be met by the semen station**

The Matupatti semen station will:

1. Provide adequate lab space as per the specification provided by the Service Provider to accommodate their equipment and be responsible for:
  - o Initial set up of the lab including laboratory work benches
  - o Liquid nitrogen requirements for the lab on cost basis
  - o All maintenance and upkeep of the laboratory, including liquid and solid waste disposal
2. Make available to the laboratory uninterrupted supply of water, electricity, internet, telephone connection, general air conditioning, and temperature controlled storage room for consumables. However the recurring cost thereon will be met by the Service Provider periodically.
3. Provide raw ejaculates of bulls meeting the following specifications:
  - Semen is diluted for motility analysis via microscopic inspection
    - o Minimum motility of 70%
  - Microscopic evaluation for Abnormalities (maximum allowed):
    - o Primary Abnormalities (head deformities) : 15%

- Secondary Abnormalities (mid piece and tails) : 15%
  - Total Abnormalities - not to exceed : 25%
  - Concentration of sperm will be determined via nucleo-counter:
    - Concentration should be approximately :1 Billion ( $1.0 \times 10^9$ ) sperm/ml, with a minimum of 3 Billion sperm per sample
  - Nonviable count : Not to exceed 20%
4. Buy the specified number of primary gendered straws that meet the agreed quality specifications given under objectives and expected results at an agreed price during each contract year

#### **4. Logistics and Timeline**

The Project will be implemented in two stages: Stage-I: Setting up semen sorting facilities to produce 200000 sex sorted semen doses at each semen station, and Stage II: Production of sex sorted semen doses of indigenous breeds of cattle and buffaloes;

The first stage is to be completed in three months. Having satisfied with the results, production of sex sorted semen of Indigenous cattle and buffalo breeds to commence and 200000 (two lakhs) sex sorted semen doses to be produced in first year.

#### **5. Monitoring and Reporting**

The Service Provider will provide the following to the concerned End Implementing Agency (i.e. semen station):

- Monthly progress report on technical and financial matters
- Problems and constraints encountered
- Planned activities for the ensuing month.
- The progress will be reviewed every quarter by a Project Review Team and the observation there on to be complied by the service provider.

#### **6. Documents to be submitted**

The Service Provider will have to furnish their particulars including, name of contact person, address for communication, e-mail address, telephone numbers, information indicating that they are qualified and interested to perform the services as mentioned above.

In this context, the following documents/information needs to be submitted along with EOI:

1. Details of similar assignments (already completed/ongoing)

2. Copies of Certification & accreditation credentials
3. Reference (including email and telephone numbers) of at least three major customers.
4. Availability of required machinery/technology/manpower.
5. Financial credentials
6. Indicate tentative schedule for completion of the job specified above.

In addition, applicants must provide two clearly labelled electronic/softcopies of the prequalification documents.

Failure to provide any of the listed documents or information shall negatively affect the qualification to participate in the tendering process. Notwithstanding the submission of this documentation, Kerala Livestock Development Board is neither committed nor obliged to include any agency on the tender list or award any form of contract to any agency and/or associated agencies.

Please note that this is not an invitation to tender. Full tender document will be provided only to agencies who have been successfully pre-qualified through this EOI and suitable to provide this service/ execute the project.

Interested agencies having relevant experience and expertise as required for the above job and willing to provide services/execute the job, are invited to submit their EOI at our e-mail id: [kldboard8@gmail.com](mailto:kldboard8@gmail.com) within **2.00 PM on 30.06.2017**, followed by hard copies and two clearly labeled electronic/soft copies of the same through courier/post superscribing "Expression of Interest No.AH/1530/2017 dated 25.05.2017 "TO PROVIDE FACILITY FOR SEX SORTED SEMEN" at the following address:

**The Managing Director,  
Kerala Livestock Development Board,  
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Kerala Livestock Development Board reserves the right to (a) accept or reject any/all EOIs submitted by parties (b) cancel the process at any time without any liability and assigning any reason thereof.



MANAGING DIRECTOR