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NATIONAL DAIRY RESEARCH AND DEVELOPMENT CENTRE
DEPARTMENT OF LIVESTOCK
MINISTRY OF AGRICULTURE & FORESTS
YUSIPANG, THIMPHU

GUIDELINES FOR:
TRAINING & DEPLOYMENT OF COMMUNITY AI TECHNICIAN & ESTABLISHMENT, OPERATION OF NEW ARTIFICIAL INSEMINATION CENTRE

NDRDC YUSIPANG (2019): 14

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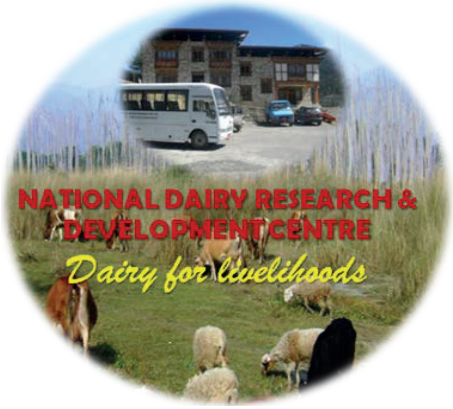

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SECTION I: GUIDELINES FOR TRAINING & DEPLOYMENT OF COMMUNITY ARTIFICIAL INSEMINATION TECHNICIAN

Scope:

The guidelines provide a framework for the selection of Community Artificial Insemination Technician (CAIT) for training and provision of Artificial Insemination (AI) services under public private partnership in cattle breeding encompassing rural employment opportunities, income generation and providing uninterrupted AI services to the public. The guideline shall facilitate to maintain uniformity across all Dzongkhags while implementing the CAIT concept.

1 CAIT candidate Selection criteria:

1.1 The CAIT candidate shall be selected by the community through meeting held at community level which includes all beneficiaries of the possible areas that are covered by the CAIT

1.2 Shall be member of a Dairy Farmers Group / Cooperative or residing near and willing to render AI service to the community and nearby settlements.

1.3 Shall have interest in the subject

1.4 Shall be above 18 years of age

1.5 Shall be able to read and write in Dzongkha and or English for maintenance of AI register and related records

1.6 Shall have basic knowledge and experience on livestock farming

1.7 Shall be mentally and physically capable to render services

1.8 Shall provide AI services to the community for a minimum of 3 years after successful completion of CAIT training

2 CAIT Training & Deployment

2.1 The duration of CAIT training shall be 28 days organized by Regional Livestock Development Centre (RLDC) and Dzongkhags with resource persons from National Dairy Research and Development Centre (NDRDC, Yusipang).

2.2 The training shall be imparted only upon fulfillment of the above guidelines.

2.3 The continuation of the CAIT training in the respective Geog will depend upon the evaluation of the existing CAIT and their performances.

3 Services after Training

3.1 Mobility for services

a) After successful completion of the training, the CAIT shall use his / her own mobility.

b) In event, the CAIT uses his/her own mobility; the mobility charges shall be decided through common consensus between beneficiaries and service provider.

3.2 Fixing of Service Charges:

Service charges shall be fixed based on common consensus between beneficiaries and service provider as below:

a) Number of Insemination (1st AI, 2nd AI, 3rd AI …)

b) Progeny born: Male / Female. However, in case, the AI progeny dies within one week after birth then certain deduction in rate / cancellation of progeny born allowance shall be determined.

c) In case, the inseminated animal is sold before calving rate may be determined accordingly.

d) While fixing the service charge the area of coverage, breedable female population, distance and other variables shall be considered.

3.3 Revision of service Charges

Any revision of service charges for CAIT shall be made in consultation with the concerned Dzongkhag Livestock Officer (DLO) and Geog Administration and in agreement with the community as and when required.

4 Drawing of Agreement

4.1 The selection of the candidate shall lead to signing of agreement for the services & charges between the beneficiaries and selected CAIT, countersigned by the Gup and DLO of concerned Dzongkhag.

4.2 A sample agreement form is attached (Annexure 1), which shall be modified/ adopted as per the circumstance and needs.

4.3 It is mandatory to have duly filled and signed Agreement before the CAIT renders AI service to the community.

4.4 The final selection and verification of the right candidate for CAIT shall be the responsibility of the concerned Geog Livestock Extension Officer and DLO.

5 Settlement of dispute:

5.1 Any dispute arising between the CAIT and the beneficiaries should be settled by the Gup / Geog administration and the community.

5.2 In the event that the CAIT fails to render the service to the communities (minimum of 3 yrs) as specified in clause 1.8 above, he/she shall refund the CAIT training expenses as per the agreement signed.

6 Area of Coverage

6.1 The CAIT shall provide AI services in his/her community and nearby areas.

6.2 There shall be only one CAIT per Chiwog / area if it can be covered by one person

6.3 In areas where AI service can be provided by both AIT and CAIT, preference should be given to CAIT

6.4 The Government employed Artificial Insemination Technician (AIT) shall provide AI service in areas not coverable by CAIT in the Geog.

6.5 In event animals are bought to the AIC, the concerned AIT shall provide the required services.

7 Logistic arrangements of AI equipments and AI consumables

7.1 Basic facilities for the trained CAIT like LN2 containers (Semen bank, reserve tank, mobile cans), AI gun, thawing equipments and other essential items for performing AI shall be the provided by the concerned Dzongkhag / RLDC.

7.2 The NDRDC, Yusipang shall supply AI consumables viz. LN2, Frozen bovine semen, AI gloves, AI sheath free of cost to the RLDCs for further distribution to the CAITs in their region.

8 Progress recording and reporting:

8.1 Upon commencement of AI service delivery to the community, the CAIT shall maintain proper records in the AI register and submit AI progress report to the concerned RNREC /AI Centre In-charge on monthly basis.

8.2 The AIT and / or Livestock Extension Officer of the concerned Geog shall provide technical support, guidance and monitor performance of the CAIT in their jurisdiction.

SECTION II: GUIDELINES FOR ESTABLISHMENT, OPERATION OF NEW ARTIFICIAL INSEMINATION CENTRE

Scope

The guidelines shall facilitate establishment of new Artificial Insemination Centers (AIC) in feasible areas to promote dairy breed improvement program in the country. This guideline may also provide criteria for operation and management of AICs including relocation/closure of non-performing AICs.

9 Establishment of New AI Centre

9.1 The Gewog Yargye Tshogchung (GYT) shall submit proposal for establishment of new Artificial Insemination Centre (AIC) for the Gewog during the Dzongkhag Yargye Tshogchung (DYT).

9.2 The Dzongkhag Livestock Sector (DLS) shall rationalize the proposal and request the Regional Livestock Development Centre (RLDC) in their region to carry out detailed feasibility study.

9.3 The concerned RLDC shall carry out detail feasibility study in collaboration with DLS and submit the proposal to National Dairy research and Development Centre (NDRDC, Yusipang) for scrutiny and approval.

10 Perquisites for feasibility study for establishment of new AIC

10.1 The farmers of the locality show keen interest and commitment in AI services for breed improvement.

10.2 The interested farmers agree to bring animals in heat for AI at the proposed AIC.

10.3 There shall be only one AIC per Gewog unless otherwise recommended by the competent technical authority.

10.4 There shall be no Govt. supplied breeding bull within 5 km radius of the AIC and the community shall agree to sterilize all breedable bulls within the radius.

10.5 The DLS shall keep budget provision for the procurement of LN2 Containers (Semen tank / Bank, LN2 storage container, mobile AI Can), AI gun and other AI essential equipment for the new AIC.

10.6 The proposed AIC should be connected by motorable road for delivery of schedule AI input supply.

10.7 The villages should be located within the 5 km radius from the proposed AIC.

10.8 There should be a minimum of 120 breedable female cattle population to be inseminated annually.

10.9 In areas where the practice of seasonal animal migration is predominant, the establishment of AIC shall not be permitted.

10.10. There should be trained AI personnel (AIT/CAIT) or the Dzongkhag should commit to station trained AIT/CAIT prior to establishment of AI facilities.

10.11 AI Crates should be made available at the proposed AIC and other strategic locations for restraining of animals and safety of AI personnel.

10.12 The Dzongkhag shall create awareness to all beneficiaries on benefits and crucial requirements of AI services including heat detection, timing of AI etc prior to opening the new AIC.

11 Relocation or Closure of non-performing AICs

11.01 AICs not performing a minimum of 5 AIs per month or 60 AIs per annum continuously for three years shall be relocated to other feasible areas or closed.

11.02 Prior information on non-performance and advice on corrective measures shall be made by the second year to the concerned Dzongkhag administration and RLDC.

11.03 Failure to perform the required number of AIs during the third year will lead to non-supply of required AI inputs and the consequent relocation or closure of the AIC.

11.04 The equipment for AI services shall be relocated to other feasible areas within or outside the geog.

11.05 The Dzongkhag shall ensure appropriate placement of the AI personnel to other AICs.

Annexure 1: Agreement between CAIT and the beneficiaries

This agreement made on……..day of……month of……. Year between Mr/Ms ……., CAIT herein after referred to as AI service provider and the community herein after referred to as beneficiaries for AI services. The agreement has been drawn after due consultation with the AI service provider, beneficiaries, Gup/Geog Administration and …….. Chiwog Tshogpas of ……. Geog under …….. Dzongkhag facilitated by the Livestock Extension Officer (LEO).

The following terms and conditions are agreed between both the parties in accordance to guidelines of CAIT framed.

Terms and conditions

1. The beneficiaries have unanimously agreed to nominate Mr/Mrs. ……. bearing Citizenship Identity Card No: …… for the CAIT training as per his/her interest.
2. For AI services, the charge for the insemination (AI) is fixed at Nu…… per AI as agreed between the beneficiaries and the AI service provider.
   - 2.1 In the event of failure of 1st insemination, the subsequent (2nd and 3rd) AI services shall be charged Nu. …… / AI OR provided free of cost by the AI service provider to the beneficiaries as per agreement between the beneficiaries and the AI service provider.
   - 2.2 When the progeny is born, the beneficiary concerned shall pay Nu. …….. / Female calf and Nu: …….. / Male calf to AI service provider as progeny born allowance OR no charges as per agreement between the beneficiaries and the AI service provider.
   - 2.3 In event, the AI born progeny dies within one week after birth, progeny born allowance shall not be paid.
3. While providing services, the AI service provider shall comply with the following conditions;
   - 3.1 Shall provide AI services and ensure use of semen of a particular breed as prescribed under the "Guidelines for Use of Pedigree Selected and Imported Bovine Frozen Semen".
   - 3.2 Shall provide uninterrupted AI service to the community.
   - 3.3 Shall maintain proper records in the AI register which will be cross checked by LEO of concerned Geog, concerned Regional Livestock Development Centre (RLDC) & National Livestock

Research and Development Centre (NDRDC, Yusipang) from time to time.

3.4 Shall submit progress/ output of AI services on monthly basis to LEO for further submission to Dzongkhag and concerned RLDC.

3.5 Shall serve as AI service provider for minimum of three years after availing the training.

4. The service charge may be revised as and when required in consultation with the beneficiaries, and upon endorsement by the Geog Administration.
5. In the event the AI service provider fails to render services to the communities as specified in clause 3.5, he/she agrees to refund the individual CAIT training expenses to a minimum of Nu. 15,000 (Fifteen thousand only) to the Geog Administration.
6. The amount refunded by the AI service provider shall be collected by the Geog Administration and handed over to the Dzongkhag Livestock Officer (DLO) as per RGoB financial rules and regulations en vogue.
7. The DLO shall deposit the reimbursed amount in the RGR account as per RGoB financial rules and regulations en vogue.
8. Any disputes between AI Service provider and the Beneficiaries shall be resolved by Geog Administration.
9. This agreement shall be final and binding for any legal proceedings.

(Affix legal stamp)
Signature
Name…… …….

(Affix legal stamp)
Beneficiaries
Attached List with Names & Signatures

Witnesses:

Signature: ……...Signature of the RNRstaff……...……

Geog representative Name ……Name of the RNR staff……....

Verified by

DLOs Signature**.....**DLO Name…… …….

YOGURT MANUFACTURE

YOGURT

Yogurt is a dairy product produced by the fermentation of milk using selective bacterial cultures. The bacteria used for the production of yogurt is known as yogurt cultures that ferments lactose into lactic acid and acts upon the milk proteins to produce the characteristic yogurt flavor and texture.

RAW MATERIALS REQUIRED

- **Milk of very good quality (low acidity and low microbial count)**
- **Yogurt Cultures** *(Streptococcus thermophilus and Lactobacillus delbrueckii subsp. bulgaricus)*
- **Skim milk powder or Whey protein powder**


Yogurt Cultures


Skim milk powder


Yogurt Vat

EQUIPMENTS REQUIRED


Cream separator

- **Yogurt Vat (heating up to 90 - 95°C)**
- **Cream separator**
- **Incubation chamber**
- **Cold storage**
- **Yogurt cups and lids**

CONSTRAINIS FOR PRODUCTION

- **Poor quality raw milk (high numbers of microbes)**
- **Contamination with bacteriophage**
- **Poor hygiene of production personnel**
- **Lack of Good Manufacturing Practices**
- **Milk with antibiotic/antibiotic residues**
- **Poor hygiene in plant**
- **Post production contamination of product**
- **Poor HACCP control in plant**

DETAILED MANUFCTURING PROCESS

Selection of Raw Materials

The raw milk selected for the product must support good growth of the culture and should be fresh, have normal milk composition, be free from mastitis and other diseases, be free from antibiotics and other inhibitors, be free from off-flavours and have low bacterial count. It is important to conduct all necessary platform tests on the milk supplied and to reject milk that fails the platform tests.

Standardization and pre-treatments

Standardization of milk to meet requirements for fat and SNF (Solids-not-fat) will have to be carried out by the manufacturer. Ideally, good quality set yoghurt is obtained from milk having 13-15% total solids. Milk fat contributes to flavour and richness of the product. About 3% fat is sufficient to have good quality product, while SNF can be increased to 10-12% by supplementation with skim milk powder.

It is important to select ingredients of the highest quality to avoid contamination of milkand ensure a good end product.

Homogenization

Homogenization of the milk at 100 Kg/cm2 at 60-70 °C can be carried out as an optional step and is useful to provide uniform mixing of all raw materials, reduce the problem of fat separation in curd and improve gel stability.

However, the homogenizer and the interconnecting pipes can be an additional source of contamination if it is not properly cleaned it may add to the total micro flora of the milk.


Homogenizer

Heat treatment

The heat treatment destroys pathogenic microbes and makes the milk safe for human consumption and is considered as the critical control point (CCP) in HACCP program for yoghurt. It is therefore important to ensure that after heat treatment, the milk should not get contaminated by extraneous microorganism. Milk for yogurt manufacture must be heated to and held at one of the following time temperature combinations: 80°C for 30 minutes or 85°C for 20 minutes or 90°C for 10 minutes or 95°C for 5 minutes

This high heat treatment is also useful for supporting good growth of the culture as it destroys other competing micro flora giving free ground for the starters to proliferate. It also inactivates natural inhibitory substances in milk, produces some growth stimulating agents for starters and denatures whey proteins to improve gel stability

Inoculation

After heating, the milk is cooled to the incubation temperature of 42-45°C for addition of starter culture. Inoculation of starter culture should be carried out as fast as possible to prevent the growth of unwanted microbes. The inoculated milk should be uniformly mixed prior to filling in containers.

The milk is inoculated with active yoghurt cultures comprised of *Streptococcus thermophilus and Lactobacilus delbrueckii subsp. bulgaricus* at the rate of 2% (v/v) of milk. Usually both the cultures are added in equal proportion (1% each).

Filling in retail packs

The inoculated milk is filled in retail containers before incubation. The packing material must efficiently be treated, sanitized to minimize contamination as risk of mould and bacterial spores decreases shelf-life.

Incubation

Incubation temperature should be kept 42 - 45°C. The period of incubation varies between 3 - 6 hours depending upon the rate of acid production by the culture in the milk. However, the best end point to stop fermentation is just after the milk sets. Setting takes place at about 0.6% acidity and the remaining acidity required in the product can develop while cooling. During incubation, the milk is very sensitive to mechanical disturbances and other changes. Hence, it should not be disturbed.

Cooling

As soon as the curd sets or desired acidity in the product is achieved, it must be cooled. Cooling is done to reduce the rate of multiplication of starter cultures and stop their growth at the end of cooling. This is essential to avoid over acidification in the product.

The rate of cooling affects the quality characteristics of the product and should be decided according to the per cent lactic acid expected in the final product. Rapid cooling may lead to more contraction of gel and separate more whey, while too slow cooling may sour the product. In yoghurt, two stage cooling is preferred, i.e. in first stage cooling from 42°C to 20°C and in the second stage from 20°C to 5°C in cold store.

Storage

The yoghurt must be stored at less than 5°C to ensure growth inhibition of starters and non-starter microorganism. Temperature fluctuations or temperature increases during storage will promote the growth of culture as well other microorganisms and will make the product sour or produce other defects. Hence, maintenance of temperature during storage is very important. The distribution of the finished product should always be through cold-chain facilities.

A good quality yoghurt has shelf-life of 2-3 weeks at 5°C.

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