

**ARTIFICIAL INSEMINATION
A CASE IN ANURADHAPURA DISTRICT, SRI LANKA.**

**A Research project Submitted to
Van Hall Larenstein University of Applied Sciences
In Partial Fulfilment of the Requirement for the Degree of
Master in Management of Agriculture Production Chains specialization in
Livestock Production Chains**

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ABSTRACT

The main theme of the study was to identify the ways to improve AI coverage in the Anuradhapura district, Sri Lanka.

For the study two areas of the district were identified as high AI coverage area and the low AI coverage area. Identification was based on the percentage of the AI coverage of cattle in terms of breedable population in the year 2007. Areas with more than 25% AI coverage was considered as the high AI coverage whereas the areas with less than 10% AI coverage was considered as the low coverage area. Five veterinary divisions from each area was selected for the survey.

Survey was carried out with the sixty five farmers and the twenty AI technicians in the selected area. Further the members of the two farmer organizations were interviewed. Whole survey was done during the period of 21 July to 15 August 2008.

Two surveys was analyzed separately. The key point to look was reason behind the low AI coverage in the district in both from farmers and technicians aspect.

Data collected from the survey with farmers was analysed quantitatively descriptive statistics to see number of cattle in the farm, type of breed, possible reason to not to do AI. Comparison was made between two groups of farmers to see whether there was significant difference in the reasons for not to do AI in their cattle herds. Two clusters again stratified according to farmers preference to AI and natural service, using AI regularly or occasionally and farmers not use AI at all. Results of the technicians was analysed with special emphasis towards the number of cattle and farms to be covered, communication with farmers, How to attend to AI call and how the service is provided during the holidays etc.

Significant level was tested by using Chi-square test and t test. SPSS version 16 was used.

Results of the two farmer organizations was used as qualitative and compared with two survey results. SWOT analysis was done on based on major findings.

There is no significant difference found between the two groups of farmers in preference to AI. There is significant difference found in method of communication used for the contacting technicians. All the farmers in two groups are aware about the AI service, provided in the district. There is no difference in the service supply during the holidays, But during the survey with technicians it was revealed that there is significant difference in providing the service during the holidays in high and low AI coverage area. There is significant difference between the number of animals kept by the AI and Natural service preferred farmers, being the less no of animals are kept by AI preferred farmers with higher percentage of cross bred animals. In the technicians side average herd size is higher in low coverage area compared to high coverage area.

Altogether in the district twenty five percent of the responded farmers engage in AI regularly to breed their cattle. Rest of the farmers either use AI occasionally or not use AI. Farmers who not use AI had higher number animals in their herds.

Main reasons of the farmers who not to use AI or use it occasionally is associated with No time and low success rate, Service delivery during the holidays and large herd size.

1.INTRODUCTION

Sri Lanka is an island in the Indian Ocean off the southeast tip of the India separated from peninsular India by the Falk Strait. It is located 6 and 10 degrees north of the equator. It is a tropical country and has the area of total extent 65610km² consisting of 62705km² land area and rest of the part is under inland water, Sri Lanka is divided into nine provinces and twenty five districts.

The main determinants of climate of Sri Lanka are rainfall and temperature. The mean temperature is 27.5°C while temperature in the mountain region varies from 13-16 °C. Monsoonal and convectional rains contribute mostly to the rain fall of country. There are two monsoonal periods. The Southwest (May-September) and Northeast (December-February) are responsible for major part of the annual precipitation. Sri Lanka has diverse agro-ecological conditions and is divided into three main rain fall zones namely Dry zone (DZ), Intermediate Zone (IZ) and Wet Zone (WZ). Again country is divided into three zones according to topography by considering the elevation from the sea level called Low country (LC), Mid Country (MC) and Up Country (UC). Taking into consideration of rain fall and elevation, seven major agro-ecological zones have been identified. (Annex 1)

1.1 Population

Population of Sri Lanka is 18.8 million (2001 census). The decline in infant mortality and increase in life expectancy (74 years) may also contribute the increase of population though at present reduced growth rate of 0.8%. Around 80 % of population is living in rural area. Around 30% of the employed work force are in the agriculture sector.

1.2 Agriculture

The agriculture sector continues to play an important role in the economy although the country is moving towards industrialization. The total land area of Sri Lanka is 6.44 million ha. However 39% of the total land area (2.5 million ha) is available for agricultural production and further settlement. Large extent of land is rain-fed is in the dry zone. Major land use sectors in Sri Lanka are agriculture, forestry, wild life and animal husbandry.

Livestock sector plays a vital role in agriculture. Cattle, Buffaloes, Goats, Pigs and Poultry are reared by the farmers. Nearly 60% of the total cattle population is found in dry zone.

1.3 Dairy sector in Sri Lanka.

Dairy husbandry is a major component of the livestock in Sri Lanka. Milk is produced in all the districts of country. Cow milk represents the 70-75% total milk production in the country. Rest of the milk is from buffaloes (Abeyrathne 2007). The type of production system, breeds and productivity vary greatly among the agro ecological zones in the country.

Sri Lanka has around 1.2 million cattle and 0.3 million buffaloes (Department of census and statistics in Sri Lanka.) Sri Lanka is not self sufficient in milk production and 80% of the consumer demand is met by importation mainly as milk powder (Abeyrathne, 2007). Low productivity of the local or indigenous breed of cattle has been identified as one of the contributing factors for low milk production in Sri Lanka. Therefore cross breeding of local cattle with temperate breeds like Jersey, Friesian, Ayrshire and zebu type breeds like Sahiwal is one of the strategies opted by Government to improve the milk production in the country. Are they doing better? Both natural service and Artificial Insemination (AI) is used

for cross breeding programme. In 2007, 23.6 million Sri Lankan rupees (LKR), 150.000 Euro, were allocated to AI programme.

Anuradhapura district is in the North Central Province (NCP) of Sri Lanka. It is the largest district in the country and many resources are available for dairy husbandry. An organized formal milk chain exists in the Anuradhapura district. Provincial Department of Animal Production Health (PDAPH) give the service to around 4500 dairy farmers in the district.(personal communication).Those farmers supply milk through either formal or informal milk chain. Extensive cattle management system is mainly practiced in the district. But now some farmers tend to semi intensive of management due to competition on land use for crop cultivation.

Animals are generally grazing on common land resources such as tank beds. Local indigenous type and non-descriptive zebu crosses are common in the district. Nearly 60% of the cattle are in large herds consisting of 25 -100 heads of cattle. Total cattle and buffalo population in the district is 155 000 (2006) and 35.100 (2006) respectively. Nearly 60.000 breedable cattle are in the district. (Department of Census and Statistics Sri Lanka)

There is high demand for the cross bred animals in the Anuradhapura district. Because more farmers like to join dairy husbandry. One way to fulfil this requirement is by providing the bull calves from the farms of National Livestock Board(NLDB). But limited availability of bull calves is a constraint.

PDAPH supply service to livestock farmers through twenty three Veterinary office In the district Main objectives of the department is summarized below

- To control and to eradicate animal diseases in the province,
- To provide and promote animal breeding services and to issue productive breeding animals,
- To develop efficient animal production systems through the dissemination of technology (extension service),
- To promote knowledge, skills and attitudes of the farmers and other target groups,
- To communicate a market centred information ,
- To execute animals acts and regulations within the province.

Artificial Insemination (AI) is used in the district to up grade the local cattle population to improve milk production in the district. The objective of the breeding policy is to produce dairy type/dairy dominated cattle through a cross breeding. PDAPH provides the AI service through field veterinary office. Central department of Animal production and Health (DAPH) provide inputs such as deep frozen semen, liquid nitrogen etc. Low AI coverage is one of the constraint encountered in the district to improve the local cattle in the district. Number of total AI done and percentage coverage of breedable population in the Anuradhapura district during the year 2004-2006 is given below.

Table1: No of AI done(2004-2006) and percentage coverage of breedable population in the Anuradhapura district.

Year	Number of AI (including repeat AI))	Total cattle population in the district	Breedable population	% AI coverage
2004	5493	144800	57920	9.4
2005	6353	149745	59900	10.6
2006	6391	155240	62100	10.3

Source: PDAPH and Department of census and statistics in Sri Lanka.

1.4 Problem statement.

Low AI coverage in the district is key issue that hinders the up grading of local cattle in the district. Less than 10% of the breedable cattle population is covered by the AI programme annually further this 10% coverage includes repeat AI as well.

Dairy development has been given priority by PDAPH, the organization the author is working for, Therefore it is needed to improve the AI coverage in the district to improve local cattle breeds in the district. This study will lead to find the reason to low AI coverage in the district and thus help to improve the AI coverage.

1.5 Objective

To identify the ways to improve the artificial insemination coverage in terms of number and quality to improve local cattle breeds in Anuradhapura district and thus contributing to increasing the milk production in the district.

1.6 Main Research questions

1. Why is the AI coverage low in the Anuradhapura district?

Sub questions

- a. What is the present breeding policy of the organization in the district on dairy?
- b. How is the AI service for dairy provided in the district?
- c. What are the reasons farmers which use AI do not use it all the time?
- d. What are the reasons that farmers who do not use AI at all, do not want to use it or cannot use it?
- e. What are the constraints encounter by technicians in providing AI service in the District?

2. What are the best ways to improve the AI coverage in the Anuradhapura district?

- a. What are the views and attitudes of the dairy farmer organization about AI service in the district?..
- b. What is needed fro good AI coverage in the district?
- c. What are the constraints for good AI coverage in the district?

3.METHODOLOGY

3.1 Study Area

The study was carried out in ten selected Veterinary divisions in Anuradhapura district which is one of the two districts in North Central Province of Sri Lanka. Anuradhapura district is the largest district in the country with the total land area 6664km². Population of the district is 0.79million (2006) with population density of 119 persons for square kilo meter. Anuradhapura is situated 200km from the capital city of the Colombo. Infrastructures like road systems are poor in the remote villages but the transport facilities are available to most of the distant places. (annex 3 shows the location of the district in the country)

In Agro-ecological point of view Anuradhapura district belongs to Low Country Dry zone. It has twenty three administrative divisions. There are around 4500 farmers are served by the PDAPH. According to the 2006 statistics 155,000 cattle are available in the district.

3.2 Selection criteria of two clusters

Anuradhapura district has twenty three veterinary divisions. Ten veterinary divisions were selected based on the AI coverage during the year of 2007. The reports in the PDAPH were used to establish two clusters a Low AI coverage area and High AI coverage area. For the selection, number of breedable cattle population was calculated in each division based on the cattle population data of the year 2005 (Annex 2) .For this study, over 25% AI coverage of total breedable cattle population was considered as High coverage area. AI coverage below the 10% of the total breedable population was considered as low coverage area. Buffaloes were not considered for the study. So the two clusters were formed from the 05? veterinary divisions each from high coverage and low coverage area. Divisions without AI technicians were excluded and veterinary divisions lie between10%-25% AI coverage also not included for the study. All the veterinary divisions in study lie between the 50km radius from the capital city of the district (Anuradhapura) where the head office of the PDAPH is situated.

AI coverage relative to low intermediate and high is given in the district map (figure1).

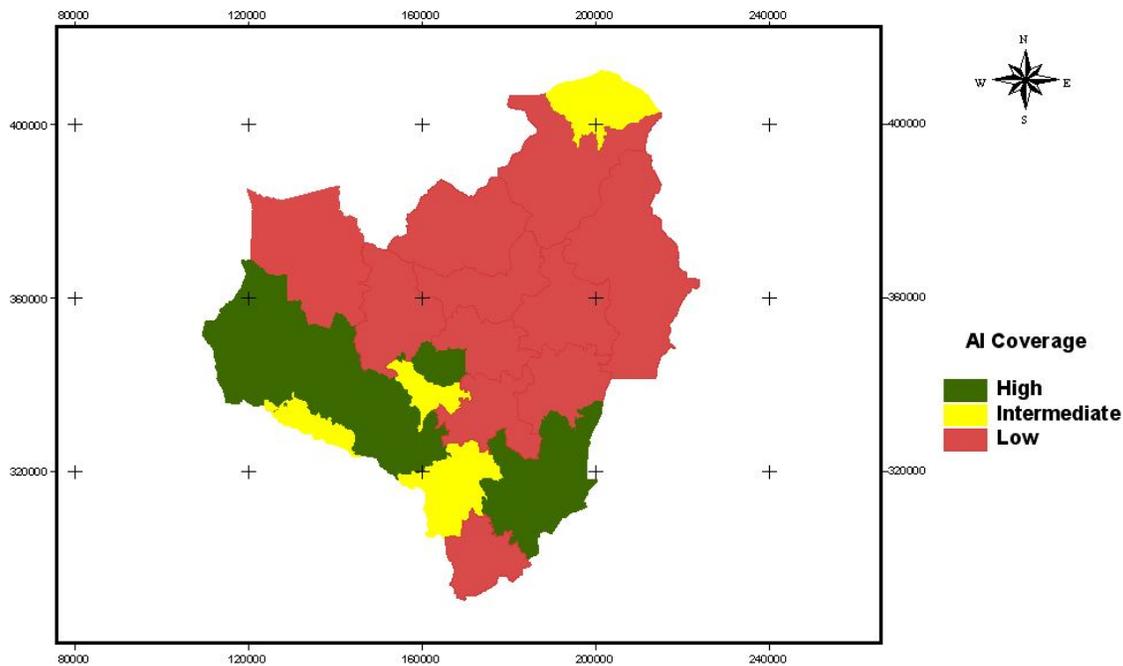


Figure 1 District map of Anuradhapura showing high, intermediate and low ai coverage areas

3.2 Data collection methods

Primary data

The primary data was collected through two surveys, conducted with dairy farmers and AI technicians in the selected divisions. Two case study was performed with the two farmer organization where the chairmen and the two other member farmers of the farmer organization were the respondents.

Survey 1

Thirty four dairy farmers from the high AI coverage area and thirty one dairy farmers from low AI coverage area were interviewed by using questionnaire. Farmers who use AI regularly and the farmers who not use AI or farmers who use AI occasionally were interviewed. This choice was made because it was essential to find out reasons why all the farmers were not using AI to breed their cattle. Questionnaires was focused on number of animals and breeds in farms, preference to AI / natural service, communication with AI technician, availability of AI technician on time, what they think should be done to improve the AI coverage in their farms, breeding season of animals. This related to sub questions b, c, d and 2b

The number of farmers involved in interviews from each divisions is given below.

Survey 2

The second survey was carried out with twenty AI technicians from two clusters of Low and High AI coverage area. There were 18 numbers of Government AI technicians and two private AI technicians among the respondents. Difference between two type of technicians were not evaluated during the study. Interviews with technicians was focused on number of animals and farms covered, communication with farmers ,attend to AI calls, providing AI calls during holidays, ability to improve AI coverage and suggestions to improve the AI coverage and monitoring of their activities. This relates to the research question b and e. Apart from the questionnaires information will be gathered in further interview with technicians.

Questionnaire for farmer interviews and the technician interviews is in the annex 4 and 5 respectively.

Table 5: No of farmers and No of technicians interviewed in difference divisions

Veterinary Division	Number of farmers		Number of technicians	
	High coverage	Low coverage	High coverage	Low coverage
1.Thalawa	8		3	
2. Central Nuwaragam Palatha		7		3
3. Mihintale		7		2
4.Thambutegama	7		1	
5.Eastern Nuwaragam Palatha	7		2	
6. Kekirawa	6		3	
7.Medawachchiya.		6		2
8.Thirappane		5		2
9. Galenbindunuwewa		6		1
10.Noichchiyagama	6		1	
Total	34	31	10	10

The study area map of the district is given in figure 2 below.

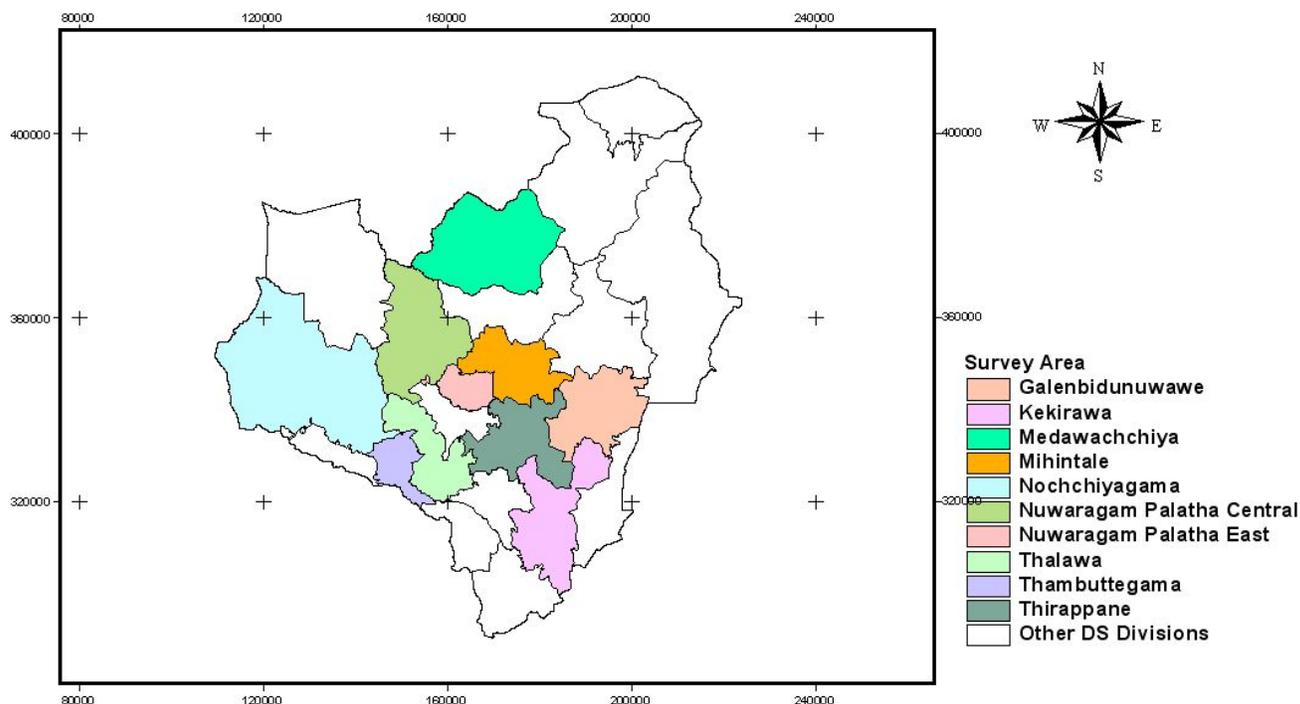


Figure 2 Ten divisions of the survey area in the Anuradhapura district

Case study with two dairy farmer organizations in the district

Two case studies were conducted with two dairy farmer organizations in the district. The chairmen of the organization and member farmers were interviewed. Interviews were focused on their attitudes and observed constraints over the present AI service in the district, how they can support to improve the AI coverage in district. This will relate to sub question 2a. Two farmer organizations belonged to high AI coverage area as no suitable farmer organization was found from low AI coverage area. (see definition below)

Secondary Data

The secondary data were collected from the provincial head office of the PDAPH. The information gathered was AI performance of the district in past years, and number of technician employed in divisions and cattle population of the relevant divisions

3.3 Data analysis

Two surveys were analyzed separately. The key point to look was reason behind the low AI coverage in the district in both from farmers and technicians aspect. Results were compared with relevant literature.

Data collected from the survey with farmers was analysed quantitatively descriptive statistics to see number of cattle in the farm, type of breed, possible reason to not to do AI. Comparison was made between two groups of farmers to see whether there was significant difference in the reasons for not to do AI in their cattle herds. Two clusters again stratified according to farmers preference to AI and natural service, using AI regularly /not regularly and farmers not use AI /occasional use of AI. Significant level was tested by using Chi-square test for the nominal variables. T- test was performed to compare the mean differences and to establish significant level and p value was estimated whenever possible. SPSS version 16 was used.

Case study with two farmer organization was used as qualitative data and was compared with the two survey results. SWOT analysis was done in respect to AI service improvement of the district to summarise the major finding of surveys and case study.

3.4 Study limitation

Author experienced in getting latest information like cattle population etc. Poor record keeping among the farmers and technician also the constraint to get information like exact number of AI done their farms specially repeat AI. Limited time and resource to undertake the research and documentation of the findings was also noted.

3.5 Definiton of terms

Breedable cattle population : In this report breedable population of cattle is expressed as 40% of the total cattle population

No of AI: All recorded AI was considered as first AI to calculate the percentage AI coverage to establish the high and low coverage area.

Local cattle: Non descript indigenous Sri Lankan cattle

Extensive system of management: Animal graze on poor quality grasses without any supplementary feeding of concentrates. Animals are paddocked in the open during the night. Animals are milked once a day or may not be milked specially during the cultivation season

Dairy farmer: farmers who sell the milk in formal or informal milk chain in the district.

Farmer organization: Group of farmers established by written constitution and who involve in milk collection in the district.

4. RESULTS

4.1 Background of the respondents

Sixty five dairy farmers and twenty technicians were interviewed during the study. Among the farmers, 52% were from the high AI coverage and rest of the farmers was from the low AI coverage area. All of them sell milk either to formal or informal milk chains. All of them stated that they are getting information regarding the AI service from the veterinary office and they were well aware about the AI service provided by the respective veterinary offices.

Among the 20 AI technicians, 18 were government technicians while other two were private technicians. Official designation of the government technicians is Livestock development instructors (LDI) and they have followed the two year diploma course in Sri Lanka school of Animal husbandry. Private technicians has undergone one month training given by the DAPH. Ten respondents each from high AI coverage and low AI coverage area were interviewed.

Also during the study members of the two farmer organization were interviewed.

4.2 Breeding policy of the district

Anuradhapura district belongs to dry zone area of the country. Two strategies are stated by the present breeding policy to upgrade the cattle in the dry zone.

- Grading up of existing cattle with temperate breeds.

This system is approved for the farms where intensive management system is practiced. Inheritance of temperate blood level is maintained up to 50%.

- Continuous grading up of existing cattle with zebu cattle

This system is approved for the farms where extensive management system is practiced

4.2.1 Type and number of animals

Comparison of the mean of the number of cattle reared by farmers in low coverage and high coverage area is given below.

Table 6: Comparison of the number of animals and type of breed between low and high AI coverage

Type	Mean number of animals		Significant level
	High coverage	Low coverage	
Total Cows and Heifers	15±13.9	15.2±13.6	Not significant
Local animals	17.3±15.3	12.9±19.8	Not significant
Local x Zebu	6.6±9.6	7.0±6.9	Not significant
Local x European	3.8±2.0	3.85±2.6	Not significant

No significant difference between the high AI coverage and Low AI coverage area in relation to the number of animals and type of cattle breeds reared($p>0.05$).

4.2.2 Preference of farmers,

Both AI and the natural service are used by the farmers. Preference of the farmers for AI and natural service is given in the following table.

Table 7: Preference of breeding method of farmers

Preferred method of breeding	High coverage		Low Coverage		Total	
AI	11	32%	16	52%	27	42%
Natural Service	23	68%	15	48%	38	58%
Total	34		31		65	

Statistically no significant difference ($p>0.05$) was found between farmers in high and low coverage area, 42% stated that they prefer to do AI and 58% said that they prefer natural service to breed their cattle. But comparatively higher number of farmers in the high coverage area prefers natural service.

4.2.3 Preference of breed type

Farmers preference to the breeds are varied and the table 8 compare the preference among the farmers in low and high AI coverage area.

Table 8: Comparison of the preferred breed type

Preferred type semen	AI coverage	
	High coverage	Low coverage
Jersey	14	12
Friesian	3	
AFS		2
Sahiwal	2	6
Other	1	
Total	20	20

Majority of farmers like Jersey type of semen to use their cattle herds. Farmers in the low AI coverage area second choice were Sahiwal.

4.2.4 Herd size and breeds

Table 9: Comparison of the herd size and the type of breeds according to the method of breeding

Breeding method	Herd size	Percentage of breeds		
		Local	Local x zebu	Local x European
AI n=27	7.4±4.2	20%	35%	45%
Natural service n=38	20.6±15.4	58%	30%	12%

There was significant difference ($p<0.05$) found in number of animals in the herd between the AI and natural service preferred farmers. AI preferred farmers kept less number of animals with higher percentage of with local x European crosses (Table 9).

4.3 Method of AI service delivery to dairy farmers.

AI service is provided to the farmers through the veterinary surgeons office in the area. Farmers either visits to the office or use telephone to contact the technician. Also other methods are used like send a massager or inform through the milk collecting centre etc. Communication between the farmers and the technicians are important factor in successful AI service. Also the availability of the technicians to AI call and service supply during the holidays were considered and results are given below.

Methods used to communicate the AI call are given in the table 10 below in the district.

4.3.1 Method of calling for AI

Farmers were asked about how they call the technician for AI and the result is given in the table 10.

Table 10: Cross tabulation method of contacting technician.

Method	AI coverage low and high		
	High coverage	Low Coverage	Total
Visiting vet office	08 (32%)	17 (68%)	25
Use telephone	16 (70%)	07 (30%)	23
Total	24	24	48

There was significant difference found between the two clusters ($P < 0.05$). Only 48 farmers responded because others not engage in AI service.

4.3.2 Availability of technicians to AI call and reasons to not attend AI call

Farmers were asked about the availability of technician to do the AI and 46 farmers have responded. No significant difference found between the two clusters and the results is presented in the table 11.

Availability of technicians were compared with the farmers aspect and the technicians aspect. In the technicians point of view, who attend to the more than 90% of the AI call considered as attend to all AI calls. No difference was found in farmers view. But significant difference ($p < 0.05$) was found in technicians view. Results are tabulated in the table 11 below.

Table 11 Comparison of availability technicians farmers view and technicians view

Farmers view			Technicians view	
Available for AI call	High coverage	Low coverage	High coverage	Low coverage
Yes	19 (76%)	13 (62%)	7 (70%)	1 (10%)
No	6 (24%)	8 (38%)	3 (30%)	9 (90%)
Total	25	21	10	10

Ninety percent of technicians in the low coverage area had problem to attend to all AI call and the reason for not attending all AI calls are given in the table 12

Table 12: Reasons not to attend all AI call by technicians

Reasons for not to attend the all AI call	AI coverage low and high		
	High coverage	Low Coverage	Total
Lack of mobility	1	3	4
Large area of operation	1	3	4
Other	1	3	4
Total	3	9	12

66% of the respondent told that they don't attend all AI call due to either lack of mobility or large area of operation.. Among them 50% of the technicians were from low coverage area.

4.3.3 Service providing during the holidays

Continuous supply of AI service is essential to get the farmers convince over the AI service. Both farmers and the technicians view collected and presented in the table 13 below.

Table 13: Cross tabulation Service supply during the weekends and the holidays.

Service supply during the weekends and holidays	AI coverage low and high		Total	% of total respondents
	High Coverage	Low Coverage		
Farmers view				
Technician Available	8 (32%)	7 (36%)	15	34
Contact Telephone number available	6 (24%)	4 (21%)	10	23
No service during the holidays	10 (40%)	8 (42%)	18	41
Other	1	0	01	2
Total	25	19	44	100
Technicians view				
Service provided and arrangement is made when technician not available	6 (60%)	1 (10%)	7	35
Service provided occasionally	2	3	5	25
Service not provided	2 (20%)	6 (60%)	8	40
Total	10	10	20	100

Forty four farmers responded and others not responded due to either they were not doing AI or had no experienced in contacting the technician during the weekends and holidays.34% (n=44) of the total respondents told that they can get AI service during the holidays and the weekends. No difference found in farmers view between the two clusters

Although statistically not proven, there is a trend can be seen in the technicians in the high coverage area in service supply during the holidays. Sixty percent of the technicians in the high coverage area supply the service during the holidays while sixty percent in the low coverage area not deliver the service.

ANOVA test was performed to see significant difference in number of AI done in the year in relation to service supply during the holidays between three groups of technicians (service suppliers occasionally suppliers and the not suppliers). No significance (P>0.05) found.

4.3.4 Heat detection by farmers

Heat detection plays important role in the AI service. Farmers ability to detect the heat signs of the cow and time of heat detection is important in this respect. Farmers awareness and usually how they detect heat (time) is given in the table 14 below. Comparison has been made between low and high coverage farmers and the between the AI preferred and Natural service preferred farmers.

Table 14: Heat detection compared with farmers High and low coverage area and according to breeding method.

Heat detection	AI coverage		Preferred method of breeding	
	High	Low	AI	Natural service
Do not know the method	01		01	
Milking time	05	02	02	05
During night paddocking with AI	01	01	01	01
Observed heat intentionally	04 (12%)	08 (25%)	12 (44%)	00
Heat observed or seen during day to day activity	15	10	11	14
Not necessary to do heat Detection	08 (24%)	10 (32%)	00	18 (47%)
Total	34	31	27	38
	65		65	

Statistically no significant difference was found between two clusters. Twelve percent of farmers of high AI coverage area observed heat intentionally while the twenty five percent of the low coverage area farmers are doing so.

All the farmers who did heat detection intentionally preferred AI (44%) and who not practicing heat detection preferred natural service (47%).

Altogether 30% of the farmers in the district observed the heat intentionally and 38% observed heat during the day to day activity.

4.3.5 Supervision of AI programme

Supervision of the AI programme is necessary in terms of identification of the repeat breeders, evaluate conception rate, Semen handling etc. response of the technicians is given in the table 15

Table 15: Supervision of AI service comparison of responses of technicians

Supervision of AI service	AI coverage low and high		
	High coverage	Low Coverage	Total
Pregnancy diagnosis (PD)	0	1	01
Attend repeat breeding cases (RBD)	1	2	03
Attend both PD and RBD	4	3	07
No adequate supervision	5	4	09
Total	10	10	20

45% of the total respondent told that they don't get adequate supervision. No difference found between two clusters. No variation between the two groups of technicians.

4.4 Constraint of technicians.

4.4.1 Number of Animals to cover

Technicians have been assigned an area to perform AI. Mostly the given area depends on the cattle population and the distance to travel. Number of farms and the cattle population was compared between high and low coverage area. No difference was found. But the average number of animals in the farms showed significant difference ($p < 0.05$) between two areas. Average animals per herd were higher in the low coverage area (Table 16).

Table 16: Mean comparison of Cattle population, number of farms and average number of animals in the farms covered by technicians.

Test variable	Mean number AI done		Significant level
	High coverage	Low coverage	
No of cattle per technician	1970±861.5	2920±1855.2	Not significant
No of farms per technician	306±170	303.7±300.2	Not significant
Average number of animals per farm	6.4±2.1	14.3±8.7	Significant

4.4.2 Expansion of AI coverage

Sixty percent of the technicians of both areas like to expand the AI coverage. But they mentioned the following reasons as constraint.

- Lack of mobility
- Large area of operation
- No method for the service supply during the holidays
- Formal system for collecting revenue from the farmers.

Lack of mobility and the large area of operation is the major constraint for low coverage area technicians.

4.5 Reasons to not regular use AI by farmers

Farmers from the two clusters were further screened as regular AI uses and farmers who either use AI occasionally or the not uses of AI. Results are given in the table 17 below.

Table 17: Comparison of the frequency of using AI

Frequency of using AI	AI coverage low and high			
	High Coverage	Low Coverage	Total	% of total respondents
AI used regularly	6 (18%)	10 (24%)	16	25
AI used occasionally	12 (36%)	09 (19%)	21	32
AI not used	16 (47%)	12 (57%)	28	43
Total	34	21	65	100

Among the total respondents of 25% told that they use AI to breed their cattle regularly. 75% of the total respondents told that they don't use AI on regular basis they either don't use AI to breed their cattle or AI is used occasionally to breed their cattle.

Eighteen percent farmers of the high coverage area and the twenty four percent farmers of the low coverage area were regular AI users. No significant difference found between the farmers in two clusters of high and low coverage area ($P>0.05$)

Reasons were tabulated according to the clusters of high coverage and low coverage, preference breeding method and the frequency of using AI by the farmers (AI not use or occasional use) .results is presented in table 18

Table 18: Reasons for not regularly use of AI.

Reasons for not regular use or not use AI	Number (%)	AI coverage		Preferred method of breeding		Frequency of using AI	
		High (%)	Low (%)	AI (%)	Natural (%)	Use occasionally (%)	Not use (%)
No success in AI	10 (15)	7 (10.5)	3 (4.5)	2 (3)	8 (12)	6 (9)	4 (6)
No time for AI	17 (25.5)	7 (10.5)	10 (15)	2 (3)	15 (22.5)	4 (6)	13 (19.5)
Difficult in heat detection	3 (4.5)	1 (1.5)	2 (3)		3 (4.5)		3 (4.5)
No service during weekends and holidays	4 (6)	2 (3)	2 (3)	2 (3)	2 (3)	4 (6)	
Large herd size	4 (6)	3 (4.5)	1 (1.5)		4 (6)		4 (6)
More male animals born	3 (4.5)	3 (4.5)			3 (4.5)	1 (1.5)	2 (3)
No AI route	1 (1.5)	1 (1.5)		1 (1.5)		1 (1.5)	
Calves born are weak	1 (1.5)	1 (1.5)			1 (1.5)	1 (1.5)	
Bulls available in the field interfere with the AI	5 (7.5)	2 (3)	3 (4.5)	3 (4.5)	2 (3)	4 (6)	1 (1.5)
Unawareness	1 (1.5)	1 (1.5)		1 (2)			1 (1.5)
Regular use AI	16 (24)	6 (9)	10 (15)	16 (24)			
Total	65	34 (52)	31 (48)	27 (42)	38 (58)	21 (32)	28 (43)
		65 (100)		65(100)		49 (75)	

Percentage of total respondents (65) is given within brackets.

25% of the farmers in the district not use AI to breed their cattle because of no time to do AI. Because of that 22% of the farmers prefer to do natural service and among them 20% not use AI to breed their cattle. It is the main reason of the farmers in low coverage area (15%) not do to AI on regular basis. Also 10% farmers of the high coverage area not use AI due to same reason.

15% of the farmers not use AI in the district as primary breeding method as it is no success or low success rate. Among them 10% farmers are in the high coverage area.

Because of no success in AI 12% of farmers use natural service as their primary breeding method among them 6% farmers not used AI due to this reason.

Six percent of the farmers not use AI regularly due to the no service supply during the holidays. Also another 6% not use AI at all as their primary breeding tool due to large herd size.

8% of the farmers not use AI regularly because they get disturbance of the scrub bulls available in the area. In both high coverage and the low coverage farmers have same problem in breeding their cattle with AI.

4.6 farmer organization view about the AI service

Members of the two farmer organizations were interviewed. Main objective was to get their views and observation regarding the AI service supply in the district. Initially it was thought select one organization from two areas. But it was not found functioning such organization in the low AI coverage area according to mention in methodology. Therefore both farmer organizations interviewed was from the high AI coverage area. In both cases one of the senior office barer and two or three member farmers participated to the interviews.

Farmer organization 1

Total membership of this organization is 58 and the it operates since the 2001. Their main observation is most of the farmers are withdrawing from the AI due to high charges for the AI. Therefore farmers willing to go for the natural service. Further questioning it was realized this trend is associated with the low success rate of AI, Farmers don't like to pay for the repeat AI. They further described it not feasible to keep dairy cattle as the milk price is not adjusted according to the expenses for inputs.

Farmer organization 2

This is a cooperative with the membership of 700 farmers. They produce 2000-2500liters of milk per day. Farmers use AI as main breeding tool.

Both government and the private technicians are available for service. But farmers preferred to do AI through government technicians. They have more convinced of government technicians. It also associated with the charge of the AI because they pay less for the government technicians.

Now it has become the problem of feeding the animals due to the more land are used for the cultivation. So farmers tend to keep less number of animals with high production. It may be the reason AI is get rooted on this area. Still the some farmers not using the AI. Therefore it is needed to arrange farmer awareness programme. Also scrub bulls in the area interfere with the AI programme.

It is needed to employ more technicians in the area. There is possibilities to train the farmers and employ to do AI in the member farmers. But they like to get service through the government technicians.

5 Discussion

5.1 Breeding policy of the district

Breeding policy of the district is based on the guide lines of National breeding committee of the country. In formulation of the policy guidelines, consideration was given to agro climatic zones. Socio economic conditions of the farmer and the management system. The breeding policy guide lines for each zone ,is therefore ,designed to assist the farmer to obtain genetically improved animal that he is able to manage with normal inputs available at his disposal.

Anuradhapura district is in the dry zone of the country and extensive type of cattle management system is predominated. Also the some farms semi intensive management system practiced, but exact number of farms under each system of management was not found. Grading up of existing cattle with temperate breeds up to 50% inheritance of temperate breed is recommended for the intensive type of management while continuous grading up of existing cattle with zebu cattle is recommended for the extensive management system in the district.

Both AI and the natural service practiced in the district. Improvement of the milk production has been given priority in the district. Though it was not the only solution AI has been selected as the tool to improve local animals and in turn to increase milk production.

5.1.1 Type of animals in the district.

Local cattle are dominated in the district. Main reason for introduce AI in the district is to improve the local cattle with zebu or temperate breeds. According to the results, it does not show considerable impact of AI on the district in keeping the cross bred animals in numbers among the farmers in high coverage area.

During the study it was revealed that most of the farmers do not practice AI on their local or indigenous type animals. Because farmers believe that local cows may have encounter difficulty in the parturition, if they are inseminated. It may associate with lack of transferring the correct information about the AI to farmer level. More often farmers tend to buy cross bred cows with a calf to improve his cattle herd. As mentioned by Abeygunawardena et al (1999), though AI service is in operation throughout country, service is established itself as primary breeding technique only in few provinces.

5.1.2 Preference breeding method

During the study it has not been shown special preference for AI among the farmers even in the high AI coverage area. It gives an indication that AI has not been rooted as the primary breeding tool even in the high coverage area. It is shown that less number of animals are kept by the AI preferred farmers compared to the natural service preferred farmers (Table 9). Also the AI preferred farmers have higher number temperate cross animals. It is interesting to note here that the farmers who keep less number of animals are more prefer to do AI and as effect of that they keep higher number of cross animals with their herds.

Also farmers tend to buy cross bred animals within the district and adjacent districts where the AI coverage is high. It could be the reason why the natural service preferred farmers also keep some percentage of European crosses in their cattle herds. It is an indication that farmers need more cross breed animals irrespective of their breeding method. Farmers more preference for the Jersey breed is associated with size of the animal and also easy to handle. But according to breeding policy Jersey breed is approved for the intensive management system, but farmers who is practicing the semi intensive management keep the

Jersey animals. Less preference to Sahiwal breed is due to the large body size and the less milk production. Philipsson, (1999) has mentioned that Sahiwal animals today are characterized by rather few milk let down problems and good beef characteristics.

Farmers have various reasons to do natural service in their cattle herds. Those reasons are mostly associated with the reason to not use AI regularly and will be discussed in the later part of this chapter.

5.2 AI Service delivery in the district.

Communication with the farmers, availability of the technician, heat detection, providing the service during the holidays and supervision of AI programme are important in AI programme.

5.2.1 Communication between the farmers and the technicians.

Communication between the farmers and the technician is an important thing to get the AI done at correct time for correctly observed heat signs. In the distinct farmers use both telephone and visiting to the office. Some send messenger to the office and some inform to the milk collecting point. But during the survey it was realized that quite few farmers use later options.

During the study it was realized that significant difference between the two farmers of AI high coverage and low coverage area in the method of communication (Table 10). During the study it was realized that both farmers and technicians had good reason to choose telephone because it is easy and save the time. The most important reason what they realized is through the telephone conversation the technician may decide to which time to attend to AI to be done. Because technician may ask question regarding the time of observing heat and signs of heat observed etc. Also the farmer came to know when the technician available to do the AI in his or her farm. Accordingly there may be some trust building occur between the farmer and the technicians. This is an advantage when compared to the visiting to office because it will take time to go to office and even the farmer visit to the office, some time technicians may not be met. Most of the farmers realized that there is a less chance to meet the technicians in the office as technicians used to go field duties in the morning. In such an instances all the information may not be recorded in the office to see the technician when he or she back. The significant difference between the two clusters can be explained as difference between attitudes of the farmers in high and low AI coverage area. Also the attitudes and motivation of the technicians in high coverage area may also contribute to that difference.

Taking into the account that there is no socio-economic difference among the two areas of study such as infra-structure facilities, particularly communication this shows some development in recent years. According to Chupin and Schuh (1993) communication between the farmers and the technician is constraint in implementing AI in field level. But here the farmers of the both areas have no such difficulties but the telephone uses have more advantages.

5.2.2 Availability of technicians for AI call

It has been shown that technicians in the low coverage area has some constraint or problems in attend to the All AI calls (Table11). Also as a overall results 30% of the farmers are not satisfied with the availability of technician for AI call. It is needed to put more emphasis on this issue as technician not available there will be no AI service. Lack of mobility and large area of operation is the main constraint for the technicians. Systemic planning of AI programme may help to correct this situation. It is needed to keep the proper records of AI and accordingly monitor the farmers. But additional cost for the programme should be provided.

All the AI technicians including the private technicians are not full time technicians in the district. Government technicians also engage in other activities like animal health activities such as vaccination campaign etc. Particularly during the period of vaccination campaigns there is more possibility not attend to AI calls. Non availability of the technicians may influence the trust building among the farmers about the AI service. According to the Bane and Hultnas (1977) once AI service is introduced it should be available at all times.

5.2.3 Service supply during the weekends and holidays

There is no formal arrangement to service supply during the weekends and holidays in the district.

During the study it was realized that farmers are not convinced about the service during the weekends and holidays. No difference between the two areas. Less people responded as some farmers may have not experience to get service during the holidays. To some farmers it is the main reason to not use AI in regular basis. Veterinary office has six working days, Saturday is half day. It means technician available for six days. Then the problem with Sundays and other public holidays. This burden of providing service during the holidays can be relived by the arranging roster system to deliver the service during the Sundays and other holidays. Also another alternative is to introduce farmer technician system.

But during the survey it was realized that some of the well motivated technicians attend to the AI calls in off days as well. Though in the farmer's aspect no difference was found, in the technician's aspect there is a significant difference found between the two areas in connection with supply AI service during the holidays. It may be due to the farmer's reluctance to criticize the technician or service which associate with socio-cultural factors and they think it may affect the future service. The impact of the service supply during the holiday were checked with the number of AI performed by the technicians. As mention in the results (paragraph 4.3.3) it was not significant (may be due the less sample size) but it is shown that there is significant difference in mean number of AI between the service providers and the non service providers.

Difference between the technicians in two areas may be associated with the motivation of them but it has to be further investigated.

Also farmers described their experiences like that there is more animal show heat during full moon days and because of that they missed the AI done for their cattle. This is an interesting to see as the full moon day is holiday for the whole country. According to the literature there is an influence of the lunar cycle on the oestrous cycle cattle (Roy and et al, 1980). Relationship between effect of full moon and animals to come heat is an interesting area to further investigation.

5.2.4 Heat detection

Heat detection plays an important role in successful implementation of AI in field. Though much variation is not seen the between the high and low coverage, there is a trend among the AI preferred farmers to detect heat intentionally. Those farmers keep the recording of their animals and they have an idea when the animals come to heat. Natural service preferred farmers has more trend towards the not observing the heat, it means they more rely on the bulls available in the communal grazing lands.

During the study it was realized that 70% of the farmers has no difficulty in the heat detection. But this does not give exact picture of the heat detection ability among the farmers. Because the main aim of the asking that question was to get the idea about the farmer's general knowledge about the heat detection. Majority of farmers replied that they know how to identify the heat signs. But it was not further investigated during the study.

Time is also problem for the farmer to detect heat. For the heat detection farmers need to spend more time. Van Vliet and van Eerdenburg (1996) showed that time of the day and length of the observation are very important in heat detection. They reported maximum rate of heat detection of 85% by observing the heat from 6.00 am until 10 pm in four hour interval spending 30mintues for the each observation. Time limitation for heat detection is associated with management system adapted by the farmers. Most of the farmers in the district, practice extensive cattle management system. Farmers send their animals to common grazing land after milking and they again bring the animals in afternoon. Therefore there is more chance to miss the heat detected by the farmers, if they don't observe the heat signs intentionally in their cattle herds. Also heat detection is connected to the motivation of the farmer.

Some farmers described that animals showing the heat signs in the afternoon or during the night as a constraint. Therefore they missed the heat detection. Orihuela et al.(1983) and Galina and Arthur,(1990) reported that oestrous behaviour of zebu type of animal are likely to occur either during the darkness or early morning hours. Also zebu animals exhibit weak heat signs as well. It may be the problem to the farmers as most of the farms have either local or local x zebu cross animals in the district.

5.2.5. Supervision of the AI programme

Veterinary Surgeon (VS) of the respective divisions responsible for the monitoring an follow up work. Pregnancy diagnosis, attending to repeat breeder cases and infertility case are among the duties of VS. Also they are responsible for the giving advice to the technicians in semen handling and also the routine checking of semen motility etc. obviously those are very important in successful functioning of AI programme. Because just drop the semen to cow is not a AI programme. During the study it was revealed that supervision is not adequate. By considering the fact that 15% of the farmers are not doing AI due to low success rate, one must realized how important of the supervision of AI programme.

During this study it was not possible to get VSS views. So it is important to consider their opinions and views as well.

5.3 Constraint of the technicians.

5.3.1 Farm size

Technicians Service area of technicians are demarcated according to cattle population and the number of villages. Herd size of the high AI coverage area is low compared to the low coverage area. It was shown that less animals are kept by the AI preferred farmers. So there may be more AI calls received by the AI technicians in the high coverage area and vice versa. It is needed to select the area to work based on number of animals in the herds.

5.3.2 Expansion of AI coverage.

Majority of technicians like to expand the AI coverage. But it is needed to improve the success rate as well. Because some of the farmers drop-out AI service due to low success

rate. Lack of mobility is long run problem to district. Usually technicians use their own motor bicycle to visit farms and they have to recover the fuel expenses and depletion of bicycle from the farmer.

It was observed that, large area of operation and lack of mobility are the major constraint of technicians in the low coverage area. Usually in the district AI service is supplied according to farmers call. It means no plan with technician to go farms on regular basis. If they plan to visit by keeping proper records and plan on it ,then it will help to get rid of burden of large area to cover.

Farmer's preparedness also essential to expand the AI coverage. Some farmers not like to keep AI born animals because of feeding problem. Since more lands are used during the cultivation season. But it can be used as opportunity to expand the AI. Scrub bulls also interfere with the AI service , Castration programme will help to solve this problem. But farmers support is necessary and also it is needed to ensure continuous supply of AI service after castrate the animals.

5.3.3 Payment for AI

In some countries AI service is highly subsidized (Chupin and Schuh 1993). Even in the Sri Lanka the dose of the semen is only be charged but the expenditure for the liquid nitrogen and other expenditures are not recovered from the farmer. It means it is subsidized

Technicians recover his expenses from the farmer. During the study it was found that technicians in high coverage area, are getting higher payment compare to the low coverage area. It is associated with the high demand for AI in certain area.

Farmers are expected to pay sum of 26 Sri Lankan Rupees (LKR) for the one semen dose used (equivalent to 0.15 euro cents). Therefore farmers have to pay charge for the semen dose plus technicians expenses. According to farmers they have to pay more money if the service is provided by the private AI technician. It is the one reason realized by author that farmers more like to get the service done by government technicians.

In other hand technicians are given limited subsistence for their day to day activity, but they complain, it is not sufficient to cover-up the expenses (fuel and depletion of motor bicycle). This could be the one reason that some of the technicians not available for the all the AI call. This may create some biasness among the technicians as they may select and visit to the farmers who pay more for AI.

During the survey farmers don't mention about the payment for the AI as problem. But further questioning it was realized most of the farmers like to pay first AI only as now they pay repeat AI as well. Members of the one farmer organization interviewed, strongly condemned the higher charges for AI. And because of that, they realized that farmers willing to go for natural service. One of the reason that farmers keep behind with the AI is that they have to pay repeat AI without success.

Government has not announced that technicians should be paid by the farmers. Therefore as a public officer they have problem in collecting money from the farmers, according to some technicians it is a kind of bribery. It is need to be further discuss with higher officials who have decision making power.

5.4 Reasons for not regular use of AI

Higher percentage of farmers not engage in AI service in the district due to no time available to spend on it (Table 18). As the AI service is connected with activities like heat detection, calling the technician and restraining the animal etc. But this is mostly associated with the type of farming system. Though most farmers do milk their animals and sell the milk, their core activity is not the dairy husbandry. In the district it is hardly found the farmers who engage in only in dairy farming. Farmers practice the crop based livestock production system and during the cultivation season farmers more attention is given to the crop cultivation. Therefore most of the farmers have the problem with detection of heat and calling for the technician as they send their animals to the field in the morning and then usually bring the animal back in the afternoon. But how we can change this situation. It is hardly to change the farmers practices unless they convince the alternative given. Farmers use less inputs their farms on present farming system. But in the district there is a tendency to reduce herd size by farmers due to competition for the lands for cultivation purposes and other development works. So it should be taken as an opportunity to take those farmers to main stream of AI regular users.

Farmers difficulty of heat detection is associated with the time. However Due to this reason some farmers like to get AI service during the morning reflecting their unawareness about the importance of timing of AI. Orihuela et al.(1983) pointed out that heat detection is influenced by the frequency, duration and timing of the observation period. As heat detection play an important role in AI programme it is hardly to take those farmers to AI programme because their reason also associated with the time.

Considerable percentage (15%)of farmers not practicing AI due to Low success rate of AI. During the study, it was realized that most of the farmers tend to perceived in their mind that all the AI should be successful at the first instance. They believe that it is highly scientific technology, therefore it should be success at all the time. This type of beliefs need to be corrected by through farmer awareness programme.

There are many factors associated with low success rate of AI, Abeygunawardena et, al (1999) has reported that first service to conception rate in the small holder dairy in the mid country wet zone in the Sri Lanka is 45%. In the dry zone this number may be more low, as they have mentioned that in the dry zone calving rate from AI is around 11%. Shamsudden et al (1999) also mentioned that,nutrition condition of cow ,duration and frequency of suckling, use of cows for draught purpose, heat detection accuracy are important determinant for the success rate of AI. According to above authors heat detection, timing of insemination nutrition state of the cow, Body condition score at insemination, handling of semen and also the donor bull, transport of semen are main contributory factors to low success in AI. In present study it was not possible to trace the exact reasons for the low success rate in the district but one in interest may look for those aspects as well.

Inadequate supervision of AI in the district should be taken in to consideration. By doing proper supervision it is easy to identify the problem breeders and also the defects during the semen handling and the insemination. It is needed good communication between the technician and the veterinary surgeon to arrange the good monitoring system. According to authors experience, number of AI is increased during the period of May to August in the year. It means there may be tendency in more animals come to oestrous during this period. Also this period is not the main cultivation season of the year, so most of the farmers may spend more time to heat detection as well. Authors view is this opportunity must be used to improve the supervision, as more farmers engage in AI during this period.

More male animals born due to AI is the most common reason that farmers complain to not doing AI. Even in this study also 5% of the farmers had a experience in more of male animal born due to AI. So they have given up AI. Though it is a personal experiences, it is necessary

to investigate it. Because those farmers engaged in AI programme previously. According to the calving return received by the DAPH, there is no variation in male female ratio in the calves born due to AI (personal communication). Roelfs (2008) investigated that whether time of insemination can alter the sex ratio and concluded that up to now it has not proved the time of insemination to influence the sex ratio.

Bulls available in the field may interfere with the AI programme. During the survey it was found that 8% of the farmers can't do AI in regular basis due to the scrub bulls. In the district it is not common intensive management system even the farmers with the lesser number of animals tend to send their animals to nearby abandoned lands or the tank beds, If they don't look for the heat signs intentionally it is difficult to detect the heat and more chance to animal get served by the scrub bulls. According to regulations imposed by the Animal act (Animal act No 29,1958) farmers are asked to castrate unnecessary bull calves but in the present situation, it is not practiced. There is no planned castration programme is carried out in the district. But one must realize that if castration programme is launched, it should be coincide with the proper breeding programme either with AI or natural service.

Farmers with large herds not much involve in the AI. During the study it was found those farmers have 35-55 number of animals in their herds. This also associated with the management system adapted by the farmers. Definitely those farmers practicing extensive management system and they don't observe the animals throughout the day, so no heat detection and the no involve in the AI programme. Also the purpose of animal rearing should be taken into account. Though farmers keep those animals for milking purpose they earn lot by selling the excess animals to the butcher. Therefore they not motivated to do AI.

As discussed in the earlier part of the chapter frames not convince about the regular deliver of AI in the district. It is also a contributing for not involve in the regular basis in the AI. Number of missed heat during the holidays was not estimated as farmer had no exact figures.

5.3 SWOT analysis

Swot analysis is based on the farmer and technicians survey and authors experiences. SWOT analysis is done on organization level (PDAPH).

Strengths <ul style="list-style-type: none">• Continuous government support for AI• Willingness of the Technicians to expand the AI	Weaknesses <ul style="list-style-type: none">• No formal method of supply AI service during the holidays• Farmers are not convinced whether they receive the AI service continuously.• Low success rate of the AI• No uniformity in charging for AI• Less supervision on AI programme
Opportunities <ul style="list-style-type: none">• More land is used for the cultivation, hence and farmers tend to keep less number of animals. So more farmers will attract to the AI service,• Organized milk chain is existing in the district so more farmers joined to the dairy sector.	Threats <ul style="list-style-type: none">• More farmers main choice is natural service• Farmers have less time to spend on the AI• Scrub bulls interfere with the AI programme.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

During the study it was not found the significant impact of AI on high AI coverage area in terms of cross bred animals in the farms. Main objective of the breeding programme in the district is to produce dairy dominated dual purpose animal. Cross breeding of the existing cattle with improved zebu animals or temperate breed is the strategy used in the district. During the study it was realized that there is less tendency to breed the local animals with AI by the farmers, which associated with some mis-conception among the farmers.

The preference for the AI in both in high coverage and low coverage area is same. Even Among the AI prefer farmers AI is not used not as main tool of breeding their cow. It was observed that AI prefers farmers keep less number of animals compare to farmers who prefer natural service. Survey with the farmers clearly indicates that they fully aware of the AI service. They know that there would be increased milk production if they use the tool. On the other hand, increased herd size influences the AI service.

Farmers have general knowledge about the heat detection. But some have constraints mainly time for the heat detection.

Communication with farmer and technicians are in satisfactory level. Motivation among the farmers as well as technicians may have influence on the method they used. There are some advantage of using telephone was observed during the study.

Both farmers and technicians did not complain about availability of the basic requirement for the AI service in the district such as semen, liquid nitrogen etc But technicians have problem with mobility. Specially in the low coverage area, mobility and large area of operation is the constraint.

Service supply during the holidays has effect on the AI coverage. In the high coverage area service supply during holidays is seen as one of the reasons for reporting high number of AI. However, the service offered on holidays may convince the farmers specially who observe the heat intentionally.

There are some implications regarding the payments for AI. Farmers are frustrating to pay for repeat AI.

It is necessary to make sure adequate attention is given to supervision of AI programme. It will be used as a media to capture more farmers to AI.

There is no marked participation of dairy organization in the district in AI programme. They prefer to get service from government.

No time for the AI, low success rate, Scrub bulls , Large herd size and no assurance about the service supply during the holidays are identified as the key reason for not doing AI regularly by the farmers. Lack of mobility, large area of operation and herd size of the farms are contributed to AI performance of technicians. Those factors need to be further analysed when planning to improve AI coverage in the district.

6.2 Recommendations.

Based on the findings following recommendations are given to improve the AI coverage in the district.

- It is needed to identify the farmers needs before introduce the AI in the field. It needs to concentrate on the areas where the small herds are kept. Service supply should be coincide with the farmers demand.
- Steps should be taken to get farmers who used AI occasionally to the maim stream of AI users . Need to keep proper recording and good follow up work to assess the successful rate of AI. Introduce the incentive programme based on success rate of AI to the technicians.
- Farmer awareness programme is needed as still the farmer have some misbelieves and conception regarding the AI.
- Steps should be taken to control scrub bulls by castration programme where the AI service is used to be feasible.
- Service supply during the holidays important. It is needed to the farmers to be convinced by make an arrangement to service supply during the holidays.
- Change the policy to charge a levy for the first AI only. The second and any other repeats can be made free of charge.
- It is not feasible to introduce the AI service in the areas where the large herds are kept. Natural service need to be promoted in those areas by distributing stud bulls and monitoring them.

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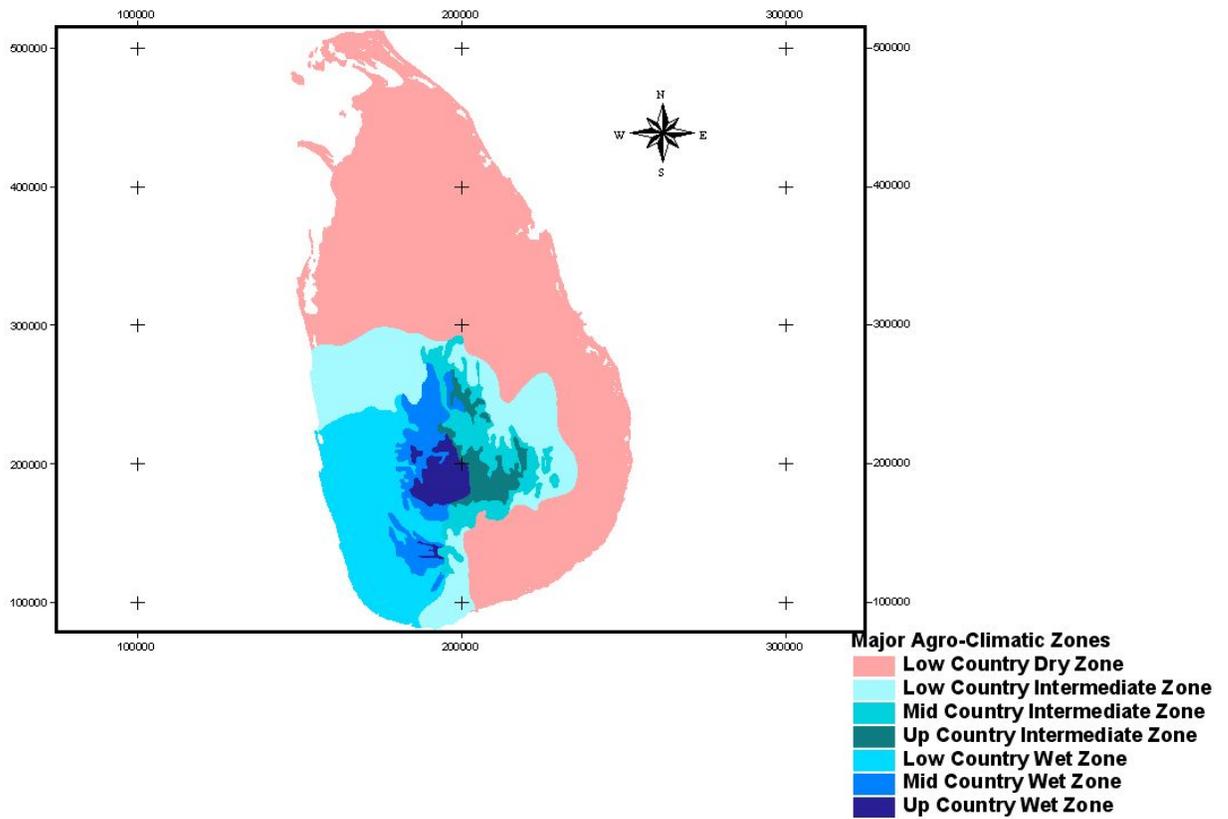
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ANNEXES

ANNEX 1:

MAJOR AGRO ECOLOGICAL ZONES OF SRI LANKA



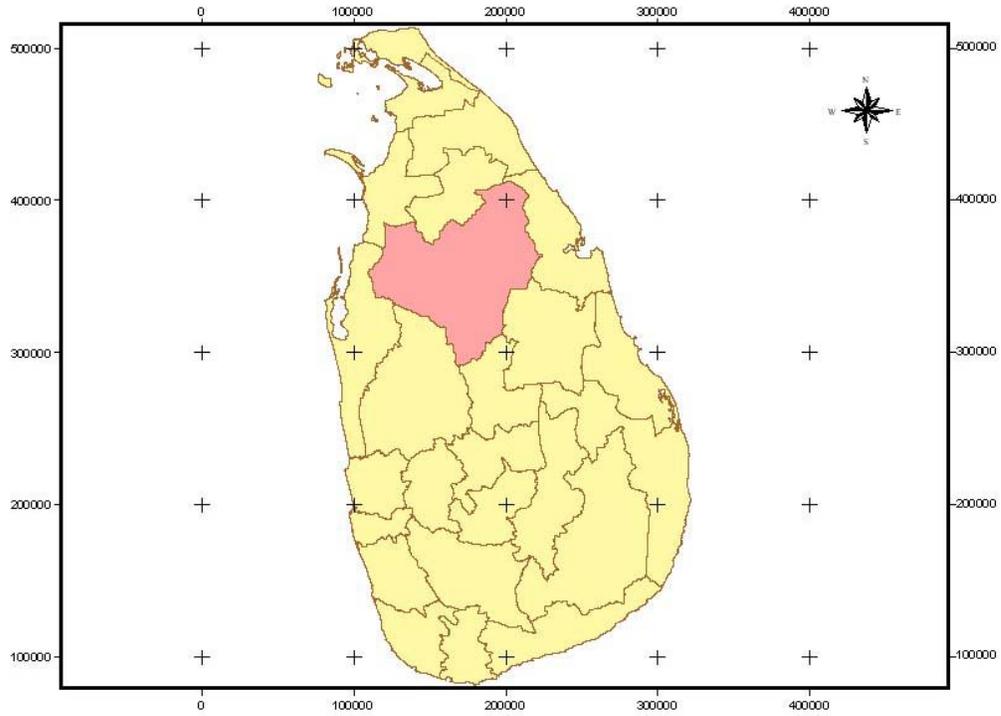
ANNEX:2 AI COVERAGE IN THE DISTRICT 2007

Range	Breedable population	Total AI In 2007year	Coverage
1. ENP	1200	660	55.0%
2. Eppawala	1640	1130	68.9%
3. Keirawa	3000	817	27.2%
4. Nochchiyagama	3000	824	27.5%
5. Palugaswewa	720	184	25.6%
6. Thambutegama	1520	396	26.1%
7. Ipalogama	1800	407	22.6%
8. Rajanganaya	1200	239	19.9%
9. Galnewa	2200	429	19.5%
10. Nachchaduwa	1080	199	18.4%
11. Padaviya	3800	651	17.1%
12. Galenbindunuwewa	4600	401	8.7%
13. Palagala	2720	197	7.2%
14. CNP	3000	132	4.4%
15. Thirappane	2200	78	3.5%
16. Medawachchiya	4000	95	2.4%
17. Mihntale	3000	53	1.8%
18. Kahatagasdigiliya	4200	72	1.7%
19. Rambawewa	3720	57	1.5%
20. Wilachcchiya	3320	5	0.2%
21. Horouwpotahana	5800	0	0.0%
22. Kebihtigollawa	2200	0	0.0%

N. B. All the reported AI has been counted as first AI

ANNEX 3:

MAP OF THE SRI LANKA SHOWING THE LOCATION OF THE DISTRICT ANURADHAPURA



ANNEX: 4 FARMER QUESTIONNAIRE

Questionnaire for farmers

Name of Veterinary range _____

1. Category

High AI coverage		0
Low AI coverage		1

2.a. How many animals do you have on your farm?

	Cattle
Cows	
Heifers	

b. If possible please specify the breed

	Cattle
Local	
Local x Zebu	
Localx European	
Other	

3. Do you have a stud bull

Yes		0
No		1

If yes Breed _____

4. Which method do you prefer to breed your cattle?

AI		0
Natural service		1

4. a.. If natural service why do prefer it

a. No heat detection problems		0
b. No time for AI + heat detection		1
c. Do not know when to call		2
d. Do not know who to call		3
e. Technicians does not come in time after calling		4
f. No success with AI		5
g. Other		6

4.b. Why do you prefer AI?

No need to keep stud bull		0
Easy access to AI service		1
Reduce disease spreading		2
Milk production increased		3
Low cost		4
Other (specify)		5

5. How do you get information on AI service in your place?

Veterinary office		0
Milk cooperative		1
From other farmers		2
Other (specify)		3

6. How do you detect heat (method and frequency)

Do not know method and how to detect		0
Milking time		1
During night paddock		2
Observed heat intentionally		3
Not observed intentionally but seen during work		4
Other		5

7. What are the difficulties you experienced in detecting heat signs?

a. No time		0
b. size of the cattle herd		1
c. Animals show heat signs for short period		2
d. Animals show heat signs at night		3
e. No difficulties		4
f. Other		5

8. How do you call the technician for AI ? (tick most appropriate box)

a. Visiting to vet office		0
b. Through messenger		1
c. Inform via milk collection centre		2
d. Service available at the farm gate.		3
e. Phone		4
f. Other (specify)		5

9.a. Does the technician readily attend on your call?

Yes		0
No		1

9.b. If no what would be the reason/s

Do not pay adequate attention		0
Lack mobility		1
Busy with other work		2
Semen not available		3
Other (Specify)		4

10. How do you get AI service during weekends and public holidays?

Technician is available		0
Contact telephone number is available		1
Do not get service during the weekends and holidays		2
Other (specify)		3

11. How many animals in your herd were inseminated last year?

	First AI	Second AI	Total
Cattle			

12. What breed type do you prefer to inseminate your cattle?

Jersey	Friesian	AFS	Sahiwal	Other
0	1	2	3	4

13. Specific period of time cattle show heat signs according to your experience

January –March		0
April – June		1
July- September		2
October -Decembet		3

14. How much money do you pay for a AI ? _____Rs

<50Rs , 50-100Rs , 100-150Rs 150-200 >200Rs

15. a. Are you doing AI regularly?

Not doing AI regularly or not used AI		0
Used AI regularly		1

15. b. If you not use AI regularly, have you give up doing AI or not use AI at all?

Used AI occasionally		
AI not used		

15.c. Reasons for not use AI or not doing AI regularly

Difficult to call technician		0
Distance to veterinary office		1
No successes in AI		2
No available preferred semen available		3
Difficult in heat detection		4
Calves born are weak		5
No difference in milk production compare to other animals		6
Charges for AI high		7
Regularly engage in AI		8
Other		9

Farmers other views will be analysed in separate table

16. Any comments to improve the AI service in your farm and village?

1.
2.
3.
4
5
6.

ANNEX: 5 TECHNICIAN QUESTIONNAIRES

Questionnaire for AI technicians

Name of veterinary range _____

1. Category

High AI coverage		0
Low AI coverage		1

2. Number of farms covered by you for AI and cattle population?

2.a No of farms	2.b Cattle population	2.c. Average No of animal per farm

3 Number of technicians engaged in AI activity

4. a. Do you attend all the AI calls ?

Yes		0
No		1

b. If no, why you cannot attend all the AI calls?

Lack of mobility		0
Large area of operation		1
High cost of operation		2
Cost not compensated		3
No time/ High work load		4
Other (specify)		5

Rank as 1,2.....

5. What is the arrangement to deliver service during the weekends and holidays?

Service is provided arrangement is made in the absence		0
Service provided occasionally		1
Service not provided		2

6. No of AI done by you last year.(AI register or AI receipts in the office may also be used)

	First AI	Repeat AI
Cattle		

23. Who decide s the type of semen used for AI?

a. Farmer decides		0
b. Farmer organisation decides		1
c. Decided by technician		2

8. Are there specific breed of semen requested by farmers?

Jersey		0
Jersey and Frisian		1
Jersey AFS		2
Sahiwal		3

9. Are the type of semen requested always available with you?

Yes		0
No		1

10. a. Can you expand the AI service coverage ?

Yes		0
No		1

b. If yes what are the extra facilities necessary to support you or what to be done?
If No why?

11. What support you get from your supervisor

Pregnancy diagnosis		0
Handle repeat breeders		1
Pregnancy diagnosis and repeat breeding		2
Check semen handling		3
No adequate supervision		4