

Socio-Economic Characteristics of Girinka Beneficiaries and the Impact of Artificial Insemination in Some Sectors of Musanze and Nyabihu Districts, Rwanda

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Abstract: A survey was carried out in Nyabihu and Musanze Districts of Rwanda during 2014 to examine the socio-economic characteristics of Girinka beneficiaries; the acceptability of artificial insemination (A.I) and its impact in the progress of Girinka program (G.P). A total of two hundred eight two (282) persons of both sexes, between the age of 35 and 50 years were selected randomly from four sectors at the rate of 46% and 54% respectively. Girinka beneficiaries randomly selected from four sectors were surveyed to examine The sample of 282 persons interviewed composed by adult people were distributed in both males and females between 35 and 50 years at the rate of 46% and 54% respectively. The study revealed that traditional/ceremonial use of the animals, pests and disease problems and costs of production do not have significant effects on livestock production. However, availability of inputs and extension services were significant factors to be considered in the production of cattle distributed. The results of the study therefore show that there is need for the effective implementation of policies on adequate input supply to the farmers as well as improved extension services to enhance the production of cattle received from Girinka program.

Keywords: Girinka beneficiaries, Artificial Insemination, impact.

I. INTRODUCTION

The role of livestock in human development is enormous. Protein from livestock is needed for physical and intellectual development as well as for developing immunity against disease (Atinmo and Akinyele 1983). Livestock production is also an instrument to socio-economic change to improved income and quality of life. In Rwanda, livestock provides about 36.5% of total protein intake (NISER/CBN, 1991) but this still falls short of the minimum animal protein requirement recommended by FAO/WHO (1983). The agricultural sector is the backbone of Rwanda's economy, contributing to 47 % of gross domestic product (NISR, 2009) and livestock contributes 12 % of the GDP (RARDA, 2009). Even if the high mass of population practice agriculture and animal rearing, many people continue to suffer from hunger and malnutrition, especially the lack of proteins from animals and this is added to the poverty problem (ONAPO, 2002). As a matter of fact, animal husbandry will play an incomparable role in providing many necessities in daily socio - economic development in our society. Poverty in Rwanda is extensive over 60% of individuals and 57% of households live below the poverty line (MINAGRI, 2002). Moreover livestock keeping contributes to poverty alleviation, ensuring food security and generation of income for farmers (MINAGRI.2008). In line with this, the government of Rwanda has initiated a program called «GIRINKA» one cow per one family, the program aimed at enabling every poor household to own and

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manage an improved dairy cow which would help the family to better their livelihood through increased chiefly milk production, then meat and manure to improve soil fertility for crops production. The program was set up with the central aim of reducing child malnutrition rates and increasing household incomes of poor farmers. These goals are directly achieved through increased access to, and consumption of milk, by providing poor households with a heifer. The program is crucial to addressing the fundamental needs of those parts of the country that are critically food insecure (MINAGRI, 2015).

In order to strengthen this program, different strategies like A.I. have been implemented in order to shift to modern and improved breeds thinking that this could increase outcomes of both the family and the country.

In the light of the above, this paper determines the acceptability of artificial insemination and its impact in the progress of Girinka program in some sectors of Musanze and Nyabihu districts, Rwanda with an attempt to:

- Determine the socio-economic characteristics of respondents
- Examine the socio-economic constraints affecting cattle production among respondents.
- Identify the effects of pests and disease on livestock production within the zone and
- Determine the effects of extension services on the livestock production practices of the Girinka beneficiaries.

II. METHODOLOGY

The study covered selected sectors in Nyabihu and- Musanze districts of Rwanda. Mukamira and Bigogwe sectors was randomly chosen in Nyabihu district whereas Nkotsi and Muko sectors was randomly chosen in Musanze district (Kothari, 2004). 212 respondents were interviewed in Nyabihu district per sector giving a total of 106 respondents from each sector; Musanze, a total of 70 respondents were interviewed from each sector respectively: 24 from Nkotsi sector, 46 from Muko sector. A total of 282 respondents were used for the study.

III. DATA COLLECTION AND DATA ANALYSIS

Primary data were collected with the use of validated structured questionnaires administered by trained enumerators whereas documentation, reports, text books, journals and internet are sources of secondary data (Kothari, 2008). Ms Excel has been used to collect data from questionnaires and to produce tables and charts. Descriptive statistics such as frequency distribution and percentages were used to process the raw data while Statistic Package for Social Science (SPSS 17.0) was used for qualitative and quantitative analysis.

IV. RESULTS AND DISCUSSION

Socio-economic characteristic of respondents:

Most of the Girinka beneficiaries were within the age range of 41 to 50 years (41.84%) and were males (70.00%), while 40.43% were between 20 and 40 years. The remaining 17.73% of the Girinka beneficiaries were above 50 years (Table 1). This implies that the female (30.00 %) ones were less involved in livestock production. This gender inequality is due to the fact that in Rwandan culture the men are chief of family and have big working forces in farm activities and are more active in animal husbandry, whereas the women shown are widower or divorced; So this will facilitate the taking care of the cow by male than female.

Table 1: Distribution of socio-economic characteristic of respondents

Gender	Frequency	Percentages
Male	197	70.00
Female	85	30.00
Educational Status		
Never attend school	66	23.40
Alphabetization center	29	10.30
Primary	158	56.00
Secondary	29	10.30

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Age		
20-40	114	40.43
41-50	118	41.84
> 50 years	50	17.73
Primary Occupation		
Farming(Agriculture& Livestock)	274	97.16
Public employee	0	0
Private employee	8	2.84

The study also showed that 97.16% of the respondents were involved in farming while 2.84% were involved in trading as primary occupation but took to farming as secondary occupation. Ninety-seven percent of those involved in farming as primary occupation claimed that they were involved in both crop and livestock production. This was in agreement with the findings of Charray *et al.* (1992), who reported majority of households in Africa to keep small groups of ruminants alongside cropping.

In the area studied the educational level of the respondents show that 23.40% of the Girinka beneficiaries had Never attend school while 10.30% had passed in the alphabetization center. Fifty-six percent (56.00%) of those who were formally educated attended the primary school and 10.30% attended secondary school. The low percentage of those with formal education may be due to limitations of educational facilities in the villages, which to a great extent could adversely influence adoption of advice and innovations of livestock experts in livestock production and handicap in general the AI practice.

Cow’s breed:

The cows of G.P. beneficiaries of the study area are mainly crossbreeds and few of them are local. Considering the conditions in which they are reared, they are expected to give high milk yield.

Table 2: Cow’s breed rate

Area Breeds	Nkotsi		Muko		Mukamira		Bigogwe		Total
	frequency	%	frequency	%	frequency	%	frequency	%	
Local	1	4.17	2	4.35	26	24.52	18	16.98	16.67
Cross	23	95.83	44	95.65	80	75.47	88	83.01	83.33
Pure Exotics	0	0	0	0	0	0	0	0	0
Total	24	100	46	100	106	100	106	100	100

Table 2 indicates that the cows distributed through Girinka program in both sectors of Musanze and Nyabihu districts are dominated mostly by cross breeds with 95.83% in Nkoti, 97.78% in Muko, 75.47% in Mukamira and 83.01% in Bigogwe sectors. The average rate is at 873.33%, % of cross breeds, while few of them are local with the average of 16.67% for both sectors. It is evident considering the conditions in which they are reared that G.P beneficiaries should get high milk production and calves which have high resistance to diseases when they apply A.I.

Methods used in cattle breeding:

The table 3 show the distribution of respondents from Girinka beneficiaries in both Nkotsi, Muko, Bigogwe and Mukamira sectors according to methods used in cattle breeding, either A.I. or natural mating.

Table 3:Method used to mate cow

Area Respond ent use A.I or not	Nkotsi		Muko		Mukamira		Bigogwe		Total
	frequency	%	Frequency	%	frequency	%	Frequency	%	
Yes	4	16.67	39	84.78	81	76.41	77	72.64	71.28
No	20	83.33	7	15.22	25	23.58	29	27.35	28.72
Total	24	100	46	100	106	100	106	100	100

The results of our study in the table 3 shows that in Nkotsi sector 20 farmers (83.33%) use natural service whereas 4 farmers (16.67%) use A.I comparing to Muko sector where 39 farmers (84.78%) are using A.I and 7 farmers (15.22%) use natural. The few number of famer using A.I. in Nkotsi sector is due to their negative mind set to it and sector localization, but in Muko sector is more improved.

In Nyabihu District, 81 farmers (76.41 %) from Mukamira sector and 77 farmers (72.64 %) from Bigogwe sector practice A.I. The major advantage of artificial insemination (A.I.) is the control of spreading of venereal diseases, by avoiding the direct contact between males and females. With the A.I, the selection rate is increased, this was the principal reason for the introduction of A.I. in most countries about 50 years ago (VEEPRO, 1998). Consequently, the A.I. contributes on credit revolving scheme and on Girinka program in general.

Our results shows that the A.I. technique is progressively accepted by Girinka beneficiaries as a tool of cattle improvement, at 71.20 % respondents respectively in both Musanze and Nyabihu districts.

Main purpose of cattle rearing:

Table 4: Target of rearing animal and advantages of using A.I.

Area Purpose of rearing	Nkotsi		Muko		Mukamira		Bigogwe		Total
	frequency	%	Frequency	%	frequency	%	frequency	%	%
Milk production	17	70.83	30	65.22	82	77.36	84	79.25	79.25
Direct sell of the animals	3	12.50	4	8.70	20	18.87	19	17.92	17.92
Manure production	4	16.67	12	26.08	4	3.77	3	2.83	2.83
Total	24	100	46	100	106	100	106	100	100

Table 4 above show that in average 73.12% of respondents for both sectors confirmed that most of Girinka beneficiaries' purpose of rearing cattle using A.I. is milk production. Therefore after self sufficiency in milk consumption there will be a sale for the surplus of milk. Unlike the most of respondents who main purpose is milk productions, there are also Girinka beneficiaries who take first advantages in selling the animal (14.50%), and this will allow cash generation through saving money that could be paid to hospitals, others needs. Indeed taking into account the importance of milk either for consumption or sale for income generation, it would be confirmed that the Girinka program is meeting its objectives at some extent. Our results differ from those of HAKIZIMANA (2013) who found that 72.04% of respondents practice A.I. and INGABIRE(2009) who found that 70% Of respondents practice A.I. This difference relies on the fact that from 2009 there have been sensitization on A.I. and people now appreciate this technique more than it was in previous years.

Quantity of milk production:

The milk production is an important point to consider while accessing the performance of cattle in dairy industry, and the milk production depends on cattle breeds and conditions in which they are reared.

The respondents of study area whose cows calved reported the daily production of milk in liters:

Quantity of milk production:

Table 5(a): Milk production

Area Quantity of milk	Nkotsi		Muko		Mukamira		Bigogwe		Total
	frequency	%	frequency	%	Frequency	%	Frequency	%	%
0-2	0	0	0	0	11	14.66	8	10	
2-4	15	62.50	25	54.35	25	33.33	28	35	
4-6	2	8.33	5	10.87	29	38.66	35	43.75	
6-8	1	4.17	6	13.04	9	12	6	7.5	
8-10	6	25.00	10	21.74	1	1.33	2	2.5	
10-over	0	0	0	0	0	0	0	0	
Total	24	100	46	100	75	100	80	100	

The results from our study in table 5 shows that most respondents from Girinka beneficiaries stated that their cows give milk ranged from 2 to 6 l in Nkotsi, Muko, Mukamira and Bigogwe sectors equals to 70.80%, 65.22%, 71.99 % and 78.75 % respectively. The mean milk production is evaluated at 4.4 l and 4.8 l per cow per day in Mukamira and Bigogwe sectors respectively. According to our results there is a low milk production in cows given through Girinka program in both sectors because some beneficiaries own local breed, others own cross breeds of first generation thus affect the reproduction potentials. However the poor management of cattle including unbalanced diet, cattle health in general is also a great cause of low milk production. The mean quantity of milk produced per day per cow was calculated as follow:

Interval means:

$$(0+2)/2=1, (2+4)/2=3, (4+6)/2=5, (6+8)/2=7, (8+10)/2=9$$

a) Nkotsi

$$\text{Mean: } [(1*0)+(3*15)+(5*2)+(7*1)+(9*6)]/24=4.83$$

b) Muko

$$\text{Mean: } [(1*0)+(3*25)+(5*5)+(7*6)+(9*10)]/46=5.04$$

c) Mukamira

$$\text{Mean: } [(1*11)+(3*25)+(5*29)+(7*9)+(9*1)]/75=4.04$$

d) Bigogwe

$$\text{Mean equal: } [(1*8)+(3*28)+(5*35)+(7*6)+(9*2)]/80=4.09$$

The mean quantity of milk produced per cow per day are 4.83, 5.04, 4.04 and 4.09 liters in both Nkotsi, Muko, Mukamira and Bigogwe sectors respectively.

Major causes of not practicing A.I.

Considering the importance of A.I. we could expect that it should really be practiced by all farmers. But this is not always the case due to different reasons. The table 5 below illustrates the main causes of some farmers for not practicing the A.I. Based on survey conducted in both sectors, we may say that there is a misapprehension of beneficiaries on about A.I. because among reasons given to answer why some beneficiaries do not apply it; main responses are in the statement of being out of information using trivial sensitization or slight campaign.

Table 5 (b): Main purpose of not practice the A.I.

Area Reasons Of not use A.I	Nkotsi		Muko		Mukamira		Bigogwe		Total
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
Low fertility	16	66.67	35	76.09	68	64.15	77	72.64	69.89
Calving problems	2	8.33	3	6.52	17	16.04	7	6.60	9.37
Hi cost	6	25.00	8	17.39	21	19.81	22	20.75	20.74
Total	24	100	46	100	106	100	106	100	100

The results of our study from the table 5 above show that, 69.89 % of Girinka beneficiaries in both Nkotsi, Muko, Mukamira and Bigogwe sectors do not practice A.I. because of low fertility. It can be agreed that the low fertility is major handicap of A.I. practice in both sectors that leads some Girinka beneficiaries to prefer natural mating rather than A.I, this tendency of practice natural mating affect negatively milk production because the bulls used are not genetically tested for milk production, the high cost of A.I. also is another constraint to some other farmers.

Artificial insemination progression:

Artificial insemination in Nkotsi and Muko sectors

Our results in figure 1 and 2 shows that there is a progression of conception rate in both sectors with A.I. of 71% from 17 calves in Nkotsi sector against 85% from 42 calves in Muko sector. Our results are in close agreement to the finding of HAKIZIMANA(2012) who found that there was a progression of conception rate from 2008 to 2011 with A.I. from 65.51 to 81.18% in Bigogwe sector against 63.88 % to 83.88% in Mukamira sector. If we compare our results to those of CNIA (2006) that stated that the conception rate in cows at national level between 60 to 65 %, we can conclude that the conception rate in study area is good. This is justified by the efforts done by RAB, through the training and equipping inseminators, experience is increasingly acquired through years.

The results of our study in figure 1 revealed that most of respondents' cows got pregnant after the practice of one A.I. and the success rate is evaluated at 67% in Nkotsi and 67% in Muko sector. According to DELALANDE (1989), if the fertility at fist A.I. ranges between 60 to 70% and cows undergo three A.I. are less that 15% the fertility is good. It is clear that the results found in this study are in close agreement to the findings of COORDONNIER (1986) who recommended that the success rate must be affirmed good when the cows require one A.I. practice for successful pregnancy are superior to 60 % whereas cows require three or more A.I. practice are less than 15%. This allows us to conclude that the fertility in study area is good.

Times for mating until pregnancy

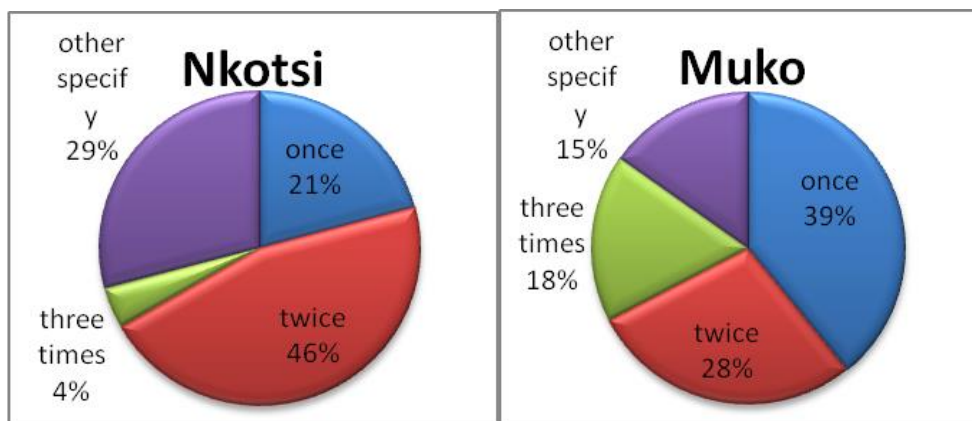


Figure.1 Times for mating until pregnancy

The results of our study show that high percentage for using more than 3 times to mate until pregnancy 29% and 21% for once;15% and 39% for once they affect the accessibility of A.I in both sector respectively.

Number of calves from A.I

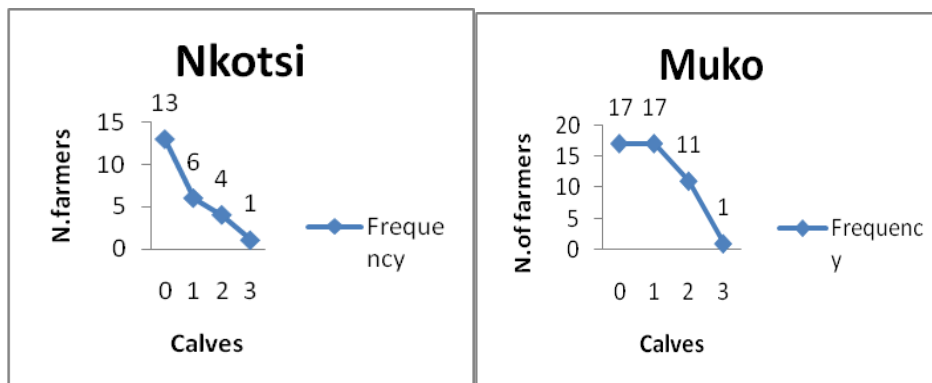


Figure.2 Number of calves obtained

The results of our study show that the number of farmers and their calves gotten respectively 13, 6, 4, 1 to 0,1,2,3 which means that 17 calves are obtained from A.I. in Nkotsi sector while 17, 17, 11, 1 to 0,1,2,3 which means that 42 calves are obtained from A.I. in Muko sector. Same cows of respondents from Girinka beneficiaries concerned by this study have not calved due to the limitations and factors affecting success of A.I in these two areas.

Artificial Insemination in Mukamira and Bigogwe sectors:

Our results in tables 6 and 7 shown that there is a progression of conception rate from 2008 to 2011 in both sectors with A.I. from 65.51% to 81.18% in Bigogwe sector against 63.88% to 83.88% in Mukamira sector. If we compare our results to those of CNIA (2006) that stated that the conception rate in cows at national level between 60 to 65 %, we can conclude that the conception rate in study area is good. This is justified by the efforts done by RAB, through the training and equipping inseminators, experience is increasingly acquired through years.

Situation of A.I. in study area from 2008 to 2011:

Normally the A.I. practice was being used in cattle even before distributing the cows through Girinka program and helped in improving local cattle. However in 2007 they distributed already inseminated heifers and insemination went on annually with A.I. campaigns initiated by RARDA and cover Mukamira and Bigogwe sectors as well as other parts of the country.

In addition, the livestock officers of sectors are trained in A.I. and well equipped to perform the work while needed. There were also private inseminators across the country.

A.I. situation in Mukamira from 2008-2011:

The cows inseminated in Mukamira are in two groups, one is composed by cows inseminated on induced heat through the annually A.I. campaigns, another group is composed by cows inseminated on natural heat; the farmers themselves observe cows in heat and call inseminator on time.

Table.6 Inseminated cows, pregnancies diagnosed and births recorded in Mukamira

Observation Year	Inseminated cows	Pregnancy diagnosed	Berth observed
2008	36	23	20
2009	42	31	29
2010	43	32	32
2011	63	53	51

According to our results illustrated in the table 6 above, there is an increase in cows inseminated from 36 in 2008 to 63 in 2011. The fact is that the A.I. campaigns take place in Mukamira sector every year as well as in other areas of the country leads to the increase of cows inseminated each year as a consequence of resulted heifers from A.I. are payed back. The conception rate also increase from 63.88% in 2008 to 83.88% in 2011

A.I. situation in Bigogwe sector from 2008-2011

The inseminated cows in Bigogwe are cows that are inseminated time to time on natural heat as well as cows inseminated in mass through the campaigns of A.I. conducted annually.

Table.7 Inseminated cows, pregnancies diagnosed and birth recorded in Bigogwe and Mukamira sectors

Obsevation Year	Bigogwe sector			Mukamira sector		
	Inseminated cows	Pregnancy diagnosed	Birth observed	Inseminated cows	Pregnancy diagnosed	Birth observed
2008	29	19	21	36	23	20
2009	36	29	29	42	31	29
2010	35	27	25	43	32	32
2011	54	44	48	63	53	51

Results from table 7 shows that, there is an increase in number of Girinka beneficiaries who practiced A.I. from 29 inseminated cows in 2008 to 54 in 2011. The conception rate also is increased through years, from 65.51% in 2008 to 81.18% in 2011.

V. CONCLUSION AND RECOMMENDATIONS

In Rwanda, agriculture is the major household income earner but livestock is an integral part of the bio-physical and economic importance of cropping providing inputs in terms of manure and consuming outputs mainly milk (MINAGRI, 2006). Therefore, the high population growth has led to demand for livestock products that are higher than domestic production, thereby forcing the country to invest its small financial resources in the massive import of milk and meat with objective of contributing to food self-sufficiency and poverty alleviation (MINECOFIN, 2009).

The Girinka program was established in Rwanda in 2006 in response to chronic cases of malnutrition that plagued half of Rwanda's population. Food insecurity was a constant feature in

Rwanda's economic climate and the plan was to create a system that can reduce malnutrition and lead Rwanda on the path to food security. Food security is said to be in existence when "all people, at all times, have physical and economic access to sufficient, safe and nutritious food for a healthy and active life" (FAO, 1996). When Girinka was established 2006, child malnutrition stood at an average of 43% (the average was drawn from across the country, where the level of childhood malnutrition ranged from 23% to 50%). And when children are malnourished, they experience stunted growth, looking much thinner than other children their age and they are susceptible to various illnesses and usually perform very poorly in their academics (Rwanda Governance Board, 2013). It also increases the earnings of beneficiaries from milk, milk products, meat and manure. In fact, even if the Rwandan livestock policy is taking advantages in improvement of local cows by using the artificial insemination, this technique is not accepted and practiced by all Girinka beneficiaries. Some of them prefer the use of natural mating. This reason motivated us to conduct a study on the artificial insemination acceptability and its impact in the progress of Girinka program" to reveal the Socio-economic characteristics of Girinka beneficiaries and the impact of Artificial Insemination in some sectors of Musanze and Nyabihu districts, Rwanda. This concern the case study of Nkotsi and Muko sectors in Musanze; Mukamira and Bigogwe sectors in Nyabihu district in order to verify this worry.

At starting, we objected that the artificial insemination has a success to Girinka program progress and AI is more practiced than natural mating in *Girinka* beneficiaries of the study area.

The results of our study show that the herd of Girinka beneficiaries is dominated by cross breeds with 96 %, 95.6 %, 75.47 % and 83.01 % respectively in Nkotsi, Muko, Mukamira and Bigogwe sectors. Therefore, our results shows that the A.I. technique is progressively accepted by Girinka beneficiaries as a tool of cattle improvement, at 71.20 % of respondents respectively in both Musanze and Nyabihu districts. However, low fertility and mindset are the major handicap of A.I. practice that leads to the use of natural mating as another alternative by few beneficiaries.

Considering the A.I. success, our results state that there was a progress in conception rate of cows inseminated from 2008 to 2011 which is evaluated from 57.14% to 70%.

Regarding the contribution of A.I. on credit revolving scheme, the fact is that a large number of paid back heifers are from the practice of A.I. equivalent to 64.58% and 68.62% respectively in Mukamira and Bigogwe sectors.

Making reference to our results, we can conclude that the A.I. is more practiced in Bigogwe and Mukamira sectors than natural mating, so it contributes to the progress of Girinka program by providing improved heifers in the process of credit revolving scheme in which reproduction potentials are higher than that of local cattle.

Based on our results here mentioned occurrence, following recommendations are addressed to stakeholders, farmers and the public services linked with livestock:

Regarding that major handicap, the hard work has to be done in order to raise the rate of G.P beneficiaries who participate in the use of A.I and rate of paid back heifers from A.I will be increased; therefore we want to recommend all concerns and relatives of G.P such as beneficiaries, to keep daily records on individual cattle rearing and respect the advice given by skilled person in farming system. Livestock officers should train farmers in animal breeding techniques especially on how to detect the heat and follow up if beneficiaries are following the advices whereas the Rwanda Agriculture Board should train more inseminators and provide more skilled inseminators in A.I. nearby cattle keepers in the sectors.

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