FARMERS' PERCEPTIONS REGARDING ARTIFICIAL INSEMINATION SERVICES IN PUNJAB, PAKISTAN

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A R T I C L E   I N F O

A B S T R A C T

A considerable number of livestock farmers are still practising natural matting for their animals instead of the Artificial Insemination (AI) technique. This study aimed to determine the various insemination procedures being used by farmers and the reasons for their rejection or acceptance in rural areas of Punjab. A cross-sectional dataset of 400 randomly selected livestock herders from two purposefully selected districts, Rahim Yar Khan and Muzaffargarh, was used. We used Statistical Package for Social Sciences (SPSS) to apply crosstab and t-test to the collected data. Findings infer that the AI technique was preferred by 60.5% of farmers particularly for cows whereas 75% of farmers preferred the natural matting process for buffalo (75.0%). The quality of AI service provided by public and private technicians was rated at an average level. For the natural matting process of their animals' farmers were heavily (73.8 %) dependent on fellow farmers for sourcing a bull. Farmers viewed both private and public sector technicians equally skilled in performing AI. However, the high cost of semen ($\bar{x}=4.07\pm1.17$) and unskilled technicians ($\bar{x}=4.05\pm1.17$) were the key obstacles in wake of the effectiveness of AI. Poor record of the bull ($\bar{x}=4.12\pm1.14$) and non-availability of bull ($\bar{x}=3.93\pm1.23$) were the prominent plights associated with natural matting. Statistically, a significant difference was found concerning the cost of insemination (t=16.058), breed type (t =20.403) and milk or meat production potential (t=24.480) while inseminating the cow or buffalo. This study concludes that it should be obligatory for the farmers to maintain a record of natural matting through the bull. For AI, semen quality should be ensured with the synergistic association among institutions. The concerned institutions must develop a strategy to eradicate unregistered and non-qualified quack technicians.

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INTRODUCTION

The livestock sector is perceived as an economic engine in Pakistan, and it is widely recognized as a primary source of income. It has outpaced the crop sector in recent years. The contribution of livestock in agriculture is 60.07% and 11.53% in the total gross domestic product (Govt. of Pakistan, 2020). The significance of this sector is evident from the reality that it is not just a source of foreign exchange earnings, contributing around 3.1% of total exports, but also a source of income of 35-40% for more than 8 million rural households and provide food security by increasing high valve protein

derived from animals. The buffalo cow, goat, sheep, horses, camels, mules, and asses are among Pakistan's livestock, which offers meat, milk, skins, and wool. They also offer a variety of additional by-products, but milk, meat, and skins are the most significant. Some animals are an important source of drought too (Govt. of Punjab, 2018).

Although the livestock sector in Pakistan is confronted with many challenges, a single factor, which is causing havoc at the base of this business, is poor Breading culture. This poor Breading does not only lead to poor animal performance but also deteriorate the quality of an animal, reduce its production and increase disease risks (Ashfaq *et al.*, 2014). Efforts have not been fruitful to improve the breeding practices of cows and buffaloes towards being more efficient milk-producing animals. Even the purity of local breeds is in danger through indiscriminate cross-breeding (Khan *et al.*, 2013). For natural breeding an excellent type of bull plays a key role in the success of the dairy farm, it is important to choose a bull that has all the records of the parents and family performance as it is genetically linked and responsible for 50% of traits in the next generation, but unfortunately, no attention is paid in Pakistan (Murage and Ilatsia, 2010; Hossain *et al.*, 2012). There are very fewer studies that address breeding problems in the livestock sector and equip decision-makers at the provincial and national levels with baseline information and strategic assessment on the livestock sector. This study was deadly needed in our country where the literature on the breeding problems associated with livestock was very much scanty, scattered or silent. Therefore, the current study was planned to make a scientific effort to probe out the roots of these problems regarding livestock in Punjab Pakistan.

METHODOLOGY
This study was conducted in the Punjab province of Pakistan. The population comprises of all those livestock farmers having cattle and buffalo in district Muzaffargarh and Rahim Yar Khan. The reason why only cattle and buffalo were selected for this study was due to their leading role in the livestock sector in the province. From Rahim Yar Khan District, Liaquatpur (25 Union Councils) and Sadiq Abad (29 Union Councils) tehsils and from Muzaffargarh, Alipur (20 Union Councils) and Kot Addu (28 Union Councils) tehsils were selected randomly. At the next stage of sampling, five union

councils (only rural) were selected randomly (total 20 UCs). At the fourth stage, two villages from each selected union council were selected resulting in a total of 40 villages (see figure 1 and figure 2). Different villages selected from the four selected tehsils are illustrated on the map developed with the help of Arc Gis 10.3.1 software. After that two villages from each union council were selected (a total of 40 villages). A benchmark survey was conducted in these 40 villages and a list of 3808 livestock farmers was prepared. From each selected village 10 farmers were selected in the sample. Thus, a total of 400 respondents were interviewed in this study. A pretested and validated interview schedule was used for face-to-face interviews. The average value of internal consistency emerged was 0.751. Crosstab and t-test were the key techniques along with frequency, percentage, mean, standard deviation and ranking.

RESULTS AND DISCUSSION
Type of insemination performed at a livestock farm
It is critical to inseminate animals with the greatest choice to begin the afresh calving cycle and produce healthier offspring at the farm. Blind insemination not only degrades the animal's quality but also reduces its output and increases illness risks. Natural or artificial insemination is possible. Figure 3 shows the information on the method of insemination used by livestock farmers in the research region for their animals.

Figure 3 indicates that 60.5% of farmers favoured artificial insemination procedures for their cows. Insemination by natural means was almost identical to artificial insemination. The buffalo's findings were considerably different from the cows, as exactly three-quarters (75.0%) of the buffalos were still inseminated through the natural mating process. At the same farm, 13.3 percent of the buffalos were artificially inseminated and 11.8 percent were inseminated both naturally and artificially.

Overall results depict that natural breeding was the dominant practice even in this advanced era of livestock insemination. Farmers were more conservative concerning buffalo breeding as a huge majority was dependent on natural breeding. The findings were remarkably similar to those of (Ashfaq *et al.*, 2014), who found that the majority of farmers employ natural breeding sources for their animals, resulting in genetic degradation. (Hasnain and R. Usmani., 2006), on the other hand, found that just 2.5 percent of animals had

access to AI services. Simultaneously, the findings contradicted those of Idrees *et al.* (2007), who stated that a large majority of respondents employ natural insemination to get a calf. The findings appeared to

agree with that of Abebe (2012), who found that natural breeding was the most prevalent technique for animal breeding in the Ethiopian.
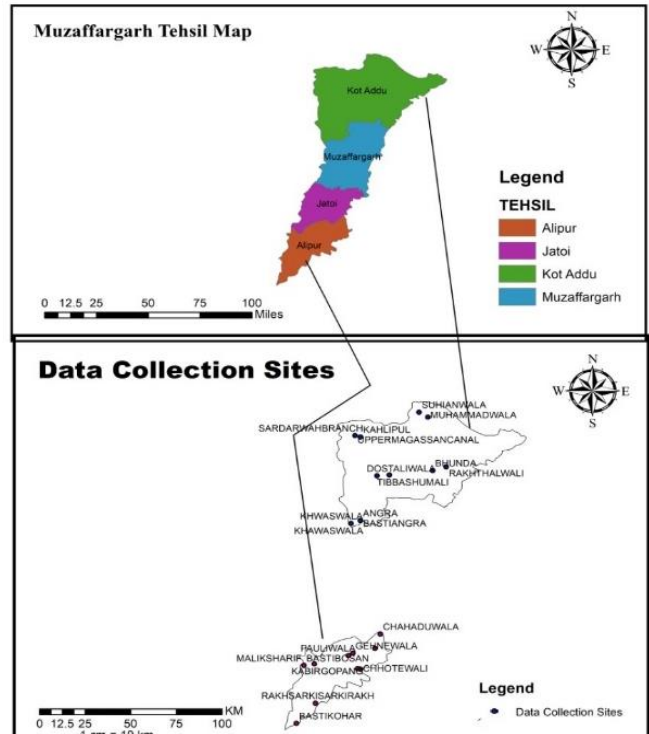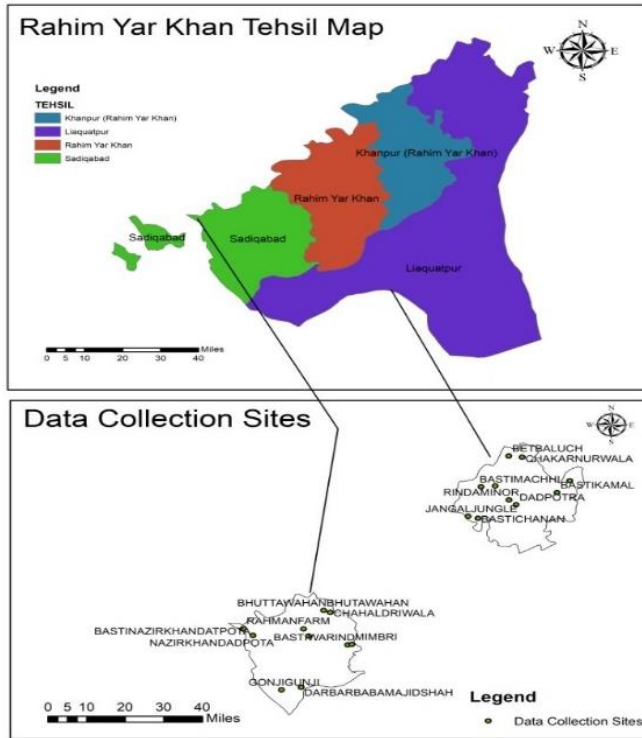

Figure 1. Rahim Yar Khan selected tehsils and different villages sites.

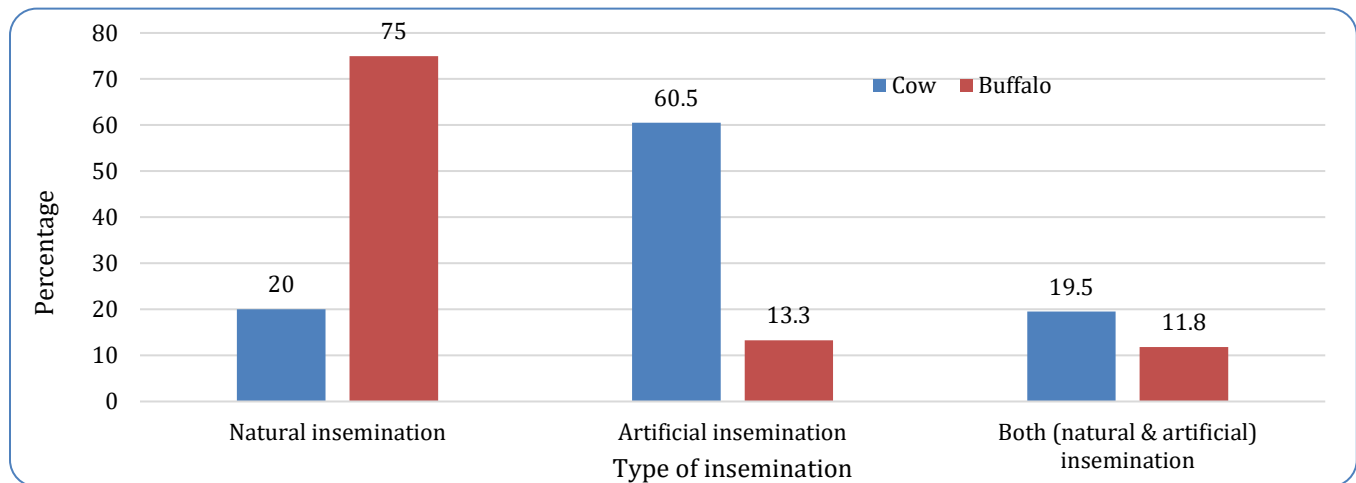Figure 2. Muzaffargarh selected tehsils and different villages sites.

Figure 3. Type of insemination.

Service providers for artificial insemination and perceived effectiveness of the services

In Punjab, Pakistan, both the public and private sectors provide artificial insemination services for cattle. It was

imperative to know the rates of the various service providers as well as the farmers' reactions to their efficacy. Table 1 reveals that a total of 276 farmers were getting artificial insemination services for their animals

from private technicians. Out of these 276 farmers, over half (54.3 %) of them rated it as an average service while more than one third (38.8 %) rated it as a good service. A meagre percentage of the farmers ratted it as not good service. Only 43 farmers were getting artificial insemination services from the Government technician and out of these 43 farmers less than half (44.0 %) rated it as an average service followed by good. 33 farmers were getting insemination services from both public and private technicians and they ratted it nearly as same as above. It looks like farmers were equally satisfied with both, public and private technicians.

Table 1. Livestock farmers perceptions regarding the quality of service provided by public and private technicians.

Service provider		Ratting			Total
		Not good	Average	Good	
Private technician	Frequency	19	150	107	276
	Percentage	6.9%	54.3%	38.8%	100.0%
Government technician	Frequency	6	19	18	43
	Percentage	14.0%	44.2%	41.9%	100.0%
Both	Frequency	4	18	11	33
	Percentage	12.1%	54.5%	33.3%	100.0%
Total	Frequency	29	187	136	352
	Percentage	8.2%	53.1%	38.6%	100.0%

Scale: Not good, 2= Average, 3= Good.

Natural insemination

An excellent type of bull plays a key role in the success of the dairy farm, it is important to choose a bull that has all the records of the parents and family performance as it is genetically linked and responsible for 50% of traits in the next generation, but unfortunately, no attention is paid in Pakistan (Hossain *et al.*, 2012). Having a breeding bull on the farm is not an easy job for small livestock farmers. Therefore, farmers were asked to explore their source of natural insemination as given in Figure 4.
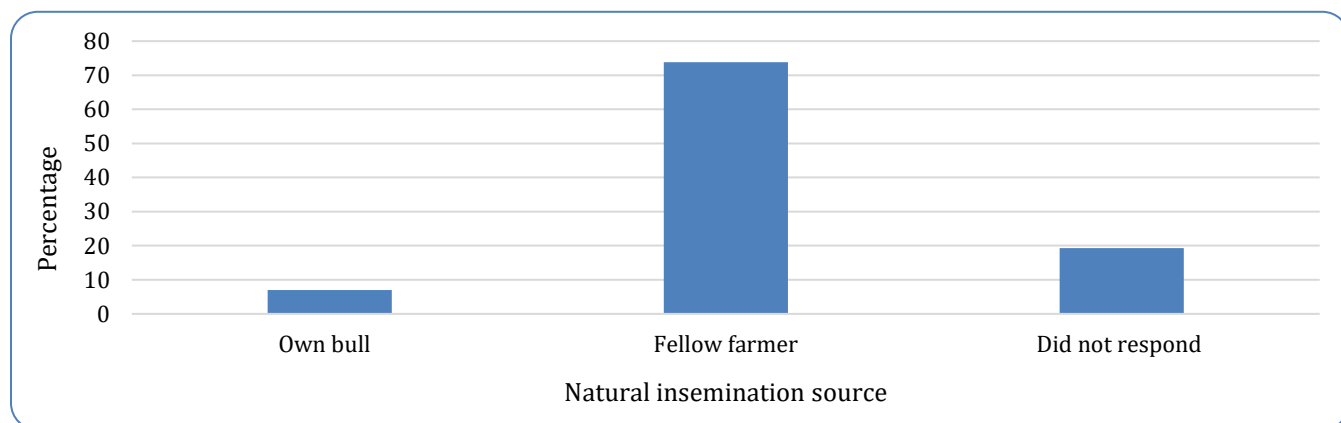

Figure 4. Natural insemination source as perceived by respondents.

Respondents were asked about the source of natural insemination they have. It can be indicated that just a meagre (7.0 %) of the farmers has their bull for cow or buffalo insemination while slightly less than three fourth (73.8%) of the respondents depend on fellow farmers. Depending on the fellow farmer for breeding can lead to destroying the breed quality as farmers are not in the position to control the bull quality. Mostly it is blind insemination and the farmer hardly cares about the history of the bull mother and the health status of the present source. The rest (19.3 %) of the farmers did not respond in either way. In the study area, the majority of the farmers were small livestock farmers and have 3, 4 animals. They couldn't have their bull for their stock. Results were somewhat in line with that of (Munyai, 2012), who also reported that very few people (6%) had

their bull for animal insemination. He also explored that the majority (76%) of the farmers use any bull available in the community. This is the biggest risk in the breed quality of the herd.

Associated problems
While getting the animals insemination either natural or artificial, livestock farmers tend to face multiple problems. These problems are highlighted in Table 2.

Table 2. Farmers' perceptions about the problems associated with cow/buffalo insemination.

	Associated problems	Mean± Std. Deviation	Ranking
Artificial Insemination	High cost of the semen	4.07±1.17	1
	Unskilled technician	4.05±1.17	2
	Fraud in semen quality	3.65±1.40	3
	Dishonest technician	3.30±1.46	4
	Unavailability of a technician on time	2.34±1.22	5
	Time-consuming	2.20±1.00	6
Natural Insemination	Zero/ poor record of the bull	4.12±1.14	1
	Unavailability of the bull	3.93±1.23	2
	High chances of animal injury	3.21±1.35	3
	Time-consuming	3.08±1.52	4
	Poor health of the bull	2.92±1.38	5
	High chances of disease transfer through the bull	2.44±1.34	6
	High cost per service	2.14±1.16	7

1=Strongly Disagree, 2=Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree

Table 2 illustrates the associated problem with artificial insemination as encountered by farmers in the field. The farming community was agreed that high cost of the semen ($\bar{x}$=4.07±1.17) and unskilled technician (($\bar{x}$=4.05±1.17) was the prominent problem. Herding in Pakistan is still operating in a traditional way where manual methods are being less expensive than mechanized ones (Rehman *et al.*, 2017). It was comprehensively argued by the ranchers, good quality imported semen was too costly for a farmer. In addition to those unskilled, unregistered and non-qualified quick technicians failed to perform the insemination process properly (The News, 2020).

Because sperm is biochemically fragile, it requires highly specialized, most modern management and well-trained manpower during transportation, storage and inseminating processes. When a technician takes too long to inseminate an animal, it not only deteriorates the sperm quality but also damages the animal reproductive track (Anzar *et al.*, 2003). All these problems result in animal repetition. It not only wastes time but also the resources farmers spend in the form of technician fees, semen cost and animal feeding.

Fraud in semen quality and dishonest technicians were ranked third and fourth in artificial insemination problems having 3.65±1.40 and 3.30±1.46, mean values.

Overall, these issues were rated between neutral to agree on the Likert scale. Inferior, unapproved and substandard quality of the semen is a huge obstacle in the production growth of the livestock sector (Govt. of Punjab, 2016; The News, 2020). Farmers had gone through the experiences of worse calf breed quality against the expected one. Sometimes technician deliberately uses different tactics to repeat animals and earn more. Respondents did not agree that the unavailability of a technician on time was an issue or it was time-consuming as their means were 2.34±1.22 and 2.20±1.00 respectively.

Similarly, natural insemination also had different types of limitations. The topmost important problem is the absence of a bull record ($\bar{x}$=4.12, SD=1.14) followed by the unavailability of the bull. Small farmers don't afford to have their bull and depend on their fellow farmers bull ($\bar{x}$=3.93. SD=1.23). Farmers don't keep animal records for a variety of reasons, including illiteracy, a lack of time, motivation, and awareness (Yadeta *et al.*, 2020). They don't have any means of confirming the bull's previous performances because farm records aren't available. Is it disease-free, physically or sexually healthy enough to inseminate the animal (Dissanayake *et al.*, 2019), and most importantly what type of breed it is? It is just like blind insemination of the animal.

High chances of animal injury and time-consuming were rated between neutral to agree having mean values of 3.21±1.35 and 3.08±1.52 respectively. Farmers who wanted natural insemination had to move their animals to another farmer's herd. Transferring from one herd to another may be stressful and even dangerous. LeBoeuf and Mesnick. (1991) reported that hairless patches at female animals point out potentially lethal injuries during mating. Valergakis *et al.* (2007) described that animal accidental injuries can be controlled by applying artificial insemination. At the same time, it also takes a bit more time as compared to artificial insemination. Poor health of the bull was also a matter of concern as it was on the fifth tier with a mean value of 2.92±1.38. Farms rely on fellow farmers for natural insemination

and have no other alternative for getting the necessary healthy bull. Farmers were unconcerned about the risk of disease transmission through the bull or the high cost per service because their means were falling back on the disagree with a mean value of 2.44±1.34 and 2.14±1.16 respectively. Infect farmers argued that they don't have to pay for natural insemination.

Consideration while inseminating the Cow/Buffalo
Before selecting for natural or artificial insemination, a livestock farmer considers a variety of factors. Different criteria were used to determine whether they preferred artificial or natural insemination. Table 3 shows statistics on whether farmers choose natural or artificial insemination.

Table 3. Consideration while inseminating the Cow/Buffalo

Consideration	Natural Insemination	Artificial Insemination	t-value	Sig*
	Mean ± Std. Deviation	Mean ± Std. Deviation		
Cost of insemination	2.54±1.611	4.15±1.172	16.058	.000**
Breed type	4.62±0.732	3.02±1.422	20.403	.000**
Breed colour choice	2.31±1.155	2.51±1.317	2.354	.019*
Breed physic	2.50±1.074	2.89±1.292	4.822	.000**
Milk or meat production potential	3.16±1.451	4.97±0.178	24.480	.000**
Adaptability in the environment	2.20±1.037	1.89±0.993	-4.643	.000**
As suggested by others	2.51±1.328	3.43±1.416	10.372	.000**
Don't care any thing	3.32±1.419	2.65±1.335	-6.529	.000**

Scale: 1= Never, 2= Seldom, 3= Sometime, 4= Often, 5= Always

Table 3 displays that there was a significant difference for breed colour choice (t-value=2.354) while inseminating the cow/buffalo. The colour choice was comparatively getting a bit more attention of the farmer while he opts for artificial insemination (x̄=2.51±1.317) against natural insemination (x̄ =2.31±1.155). The unavailability of matting bull at the farm leaves a faint choice for the farmer to consider. Any available bull at the neighbour farm is considered for matting. In artificial insemination farmers had choices and sometimes a good marketable colure is preferred before inseminating the animal. The choice of sacrificial animals on Eid-ul-Azha is considerably affected by their body colour shades and physical look. Apart from breed colour choice all the other considerations had strong significant difference like cost of insemination (t-value= 16.058), breed type (t-value= 20.403), breed physic (t-value= 4.822), milk or meat production potential (t-value= 24.480),

adaptability in the environment (t-value= -4.643), as suggested by others (t-value= 10.372) and don't care anything (t-value= -6.529). Mean values claim the consideration of farmers related to the cost of insemination was much higher in the artificial method (x̄=4.15±1.172) against the natural matting (x̄=2.54±1.611). Farmers get free natural insemination services at their fellow farmers' farm or they had to pay just Rs. 50-100 while on the other hand, artificial insemination was as costly as they can afford. Cost always affects the farmers' semen choice at the farm. Breed type remind always a matter of concern in artificial insemination (x̄=4.62±0.732) as compared to natural insemination (x̄=3.02±1.42). The mean value of artificial insemination was spotted between often to always but slanting towards always on a likert scale. Mean value difference for milk or meat production potential was a prominent factor to be considered in

artificial insemination (x̄=3.16±1.451) as compared to the natural one (x̄ =4.97±.178). It was a tough ask for a farmer to inquire about the potential performance of the serving bulls offspring. But on the other hand, farmers try to ask each and everything especially milk or meat production potential before semen selection. Mean comparison of adaptability of the calf in the environment was an ignored part in artificial insemination (x̄=1.89±.993) as compared to natural insemination (x̄=2.20±1.037). It was one of the momentous problems which hinder the specific (exotic) breed to perform in local (southern Punjab) conditions. Farmer failed to provide the required physical condition which ultimately results in poor performance. Mean comparison of suggestions about different breeds given by the other people vastly influence farmers decisions in artificial insemination (x̄=3.43±1.416) against natural insemination (x̄=2.51±1.328). Third-party involved in this decision-making process was mostly the technician. Not caring for anything while inseminating the animal was mostly observed in natural insemination (x̄=3.32±1.419) as compared to artificial insemination (x̄=2.65±1.335). In natural insemination, a farmer finds the bull anywhere available and gets the inseminating procedure done. This type of attitude regarding insemination leads to the deterioration of breed quality which eventually results in poor production.

CONCLUSION AND RECOMMENDATION

Conservativeness was observed in the case of buffalo insemination as a huge majority still opted for natural insemination. It was explored that bulls used for natural insemination were not specifically prepared for insemination but raised for either meat production or sacrificial occasion. The bull raised for meat production had extra body fat and low sperm quality result in a failed pregnancy. Bull raised for meat purposes should be discouraged in insemination. It should be raised based on the requirement of the matting bull. In artificial insemination, the quality of semen, cost per semen and skill level of the technician was a matter of concern for the farmers. Somehow record of the inseminating bull should be mandatory. For artificial insemination, semen quality should be under strong observation. Unregistered and non-qualified quack technicians should not only be banned but heavy fines should be imposed on practising.

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