

Adoption of Recommended Breeding Practices on Small Holder Buffalo Rearing Systems of the Kole Lands of Thrissur District, Kerala

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Abstract

A descriptive analysis of buffalo rearing in the Thrissur kole was undertaken to assess structure of the buffalo units and the extent of adoption of scientific buffalo rearing practices. Snowball sampling was used to select 50 buffalo keepers each from North and South koles. Data were collected using a pretested interview schedule and direct observation with unstructured interviews. Meat based units of the North kole were larger with an average of seven total livestock units and the units on the South kole were the smallest with just over two total livestock units. More farmers of the North kole (53.57%) had adopted recommended breeding practices to a higher extent when compared to their counterparts in the South kole (45.46%). The mean age at puberty of buffalo heifers on the kole lands was 32.76 ± 1.02 months, while the average number of services per conception was 2.78 ± 0.43 and the mean inter-calving period observed was 628.13 ± 37.58 days.

Keywords: Adoption, Breeding Practices, Buffalo, Kole Lands



Introduction

The domestic water buffalo, technically referred to as *Bubalus bubalis* (Abd El-Salam and El-Shibiny, 2011) is an invaluable asset for millions of smallholder farmers all over the world. Its uniqueness stems from the multitude of functions and products that the buffalo provides on smallholder production systems. Buffalo rearing is a vocation in the *kole* lands in Thrissur district of Kerala. The Thrissur *kole* lands have also been referred to as wetlands and come under the purview of the Ramsar convention. These areas have been described as areas of marshes or water, both natural or artificial and can be permanent or temporary. The water in these areas is flowing or static, fresh, brackish or salty, including areas of marine water and the depth of the water at low tide does not exceed six metres. Wetlands are important in that they perform a variety of functions and services that are crucial to human life. Their main function centres on the replenishment and purification of ground water, production of food through the sustenance of livestock and fish and climate change mitigation. The importance of the water buffalo in this context is on account of its natural qualities that make it highly suitable for the *kole* farming system. The traditional landscapes of the *kole* land provide space for expression of the innate behaviour of the buffalo and also play an important role in minimizing thermal stress by ensuring natural wallowing areas which are important in ensuring thermoregulation, an important physiological process in buffaloes. Keeping in mind the necessity to promote sustainable vocations that are conducive to or that fit into the natural settings of the *kole* lands, it is of utmost importance that these systems be explored so that measures to optimize them can be taken. The *kole* lands are ecologically fragile areas with a delicately balanced system. Introduction of vocations that are detrimental to the balance of these systems must be viewed with caution. It is at this juncture that buffalo rearing assumes significance in that it fits into the natural landscape of the *kole* lands and provides valuable sources of income and employment to the community. Adoption of recommended farming practices is crucial to the economic viability of enterprises. So also, buffalo keepers may encounter many constraints which needs to be identified. Further, in the changing contexts of climate change and urbanisation, there may be certain factors that are detrimental or beneficial to the *kole* lands which need to be addressed. Literature search revealed that till date, there has not been any empirical attempt to study the buffalo rearing systems in *kole* lands with a view to strengthening them. With this background, a study was carried out to explore the structure of the buffalo holdings, breeding parameters and the adoption of recommended breeding practices by farmers.

Materials and Methods

Kerala, Thrissur and Malapuram districts are home to the wetlands, which are referred to as the '*kole*' lands. The geographical location of the *kole* lands is between 10°20' and 10°35'N latitude and 76°11' and 76°66'E longitude, extending over an area of approximately 13,632 hectares. The Thrissur *kole* lands have their origin at Velukkara towards the South of the district and pass through Mullasserry and the Tholur-Kaiparamb areas of Thrissur taluk (Johnkutty and Venugopal, 1993) and are geographically divided into two regions *viz.*, the North and South *kole* by the Karuvannur River. The North *kole* covers an expanse of 8,072 ha, while the South *kole* extends over 2,115 ha. The North *kole* consists of Peramangalam, Kechery, Chemmen, Puzhakkal, Naduthodu, Chiyaram, Kokkalai, Puthenthodu, Herbert Canal and Chirakkal basins, while the South *kole* comprises the Karalam fields, the Chemmanda and Muriyad *kayals* (Johnkutty and Venugopal, 1993). Buffalo rearing farm households in the *kole* area of Thrissur district comprised the universe for selecting the units of data collection. Key informant interview was conducted involving key informants identified in consultation with local veterinary surgeons to develop understanding about the perspectives of buffalo rearing in the study area. Snowball sampling was used to select 100 buffalo keepers, 50 each from the North and South *koles*. Data were collected on the respondent's farm using personal interviews and analysed using SPSS version 24.0. Structure of buffalo holdings was assessed in terms of size of holdings, herd composition and number of animals in milk on each unit. Size of holdings referred to the total number of livestock units owned by the respondent. Actual numbers of various age-wise categories of buffaloes on the buffalo holdings were recorded and converted into total livestock units. Conversion factor used for buffaloes was the tropical livestock unit as per Storck *et al.* (1991). Buffalo herd composition indicated the number of animals in various categories and animals in milk was operationalized as the total number of buffaloes in milk out of the total number of milch buffaloes on the buffalo holding at the time of interview. Breeding parameters included the age at puberty which was operationalized as the age in months at which the buffalo heifers first showed heat signs as reported by the buffalo keepers. This parameter was studied for 25 buffalo heifers of the Thrissur *kole* lands. Pregnancy rate referred to the number of services per conception of animals as reported by the respondent and was studied for 50 buffaloes. The third breeding parameter studied was inter-calving period which was operationalized as the number of days between the first and second calving as reported by the respondent. This variable was studied

for thirty animals.

Results and Discussion

Structure of Buffalo Holdings

Profile of the buffalo holdings in terms of total livestock units indicated that generally, meat-based units of the North *kole* were larger with an average of 7.03 ± 1.98 (SE) total livestock units as against the meat units of the South *kole* which were the smaller with just 2.20 ± 0.31 (SE) total livestock units. The average size of buffalo holdings has been reported to range from 0.3 to 1.8 animals per holding (Landes *et al.*, 2017). Milch buffaloes dominated the milch units of both the North and South *koles*, whereas adult male buffaloes had a more visible presence on meat units of both *koles*. Hitihamu and Epasinghe (2015) reported that 37.8 and 28.2 per cent of buffaloes were milking cows and heifers respectively. In addition to buffaloes, cattle were also kept in over three-fourth of the milch buffalo rearing units in both the North (78.50 per cent) and South *koles* (76.10 per cent). It is also evident from Table 1 that goats had a more visible presence on nearly two-third of the meat rearing units of both *koles*.

Table 1: Structure of Buffalo holdings in the Thrissur *kole* lands

S. No.	North <i>kole</i>						South <i>kole</i>					
	Milch n=28			Meat n=22			Milch n=22			Meat n=28		
	Size	f	%	Size	f	%	Size	f	%	Size	f	%
1	Small up to 2	17	60.72	Small up to 2	10	45.45	Small up to 2	8	36.36	Small up to 1	3	10.71
2	Medium	9	32.14	Medium	7	31.82	Medium	10	45.46	Medium	19	67.86
	03-06			3-16			3			01-3		
3	Large	2	7.14	Large	5	22.73	Large	4	18.18	Large	6	21.43
	above 6			above 16			above 3			above 3		
	<i>Mean: 2.31</i>			<i>Mean: 7.03</i>			<i>Mean: 2.39</i>			<i>Mean: 2.20</i>		
	<i>SE: 0.49</i>			<i>SE: 1.98</i>			<i>SE: 0.26</i>			<i>SE: 0.31</i>		

Buffalo herd composition of holdings of Thrissur <i>kole</i>										
S. No.	Category		North <i>kole</i>				South <i>kole</i>			
			Milch n=100		Meat n=202		Milch n=80		Meat n=93	
			f	%	f	%	f	%	f	%
1	Calves up to 3 months	Male	5	5	0	0	5	6.25	1	1.08
		Female	1	1	0	0	5	6.25	0	0
2	Calves between 3 and 6 months	Male	5	5	0	0	0	0	0	0
		Female	3	3	0	0	5	6.25	1	1.08
3	Calves below one year	Male	7	7	11	5.45	5	6.25	4	4.3
		Female	11	11	2	0.99	5	6.25	2	2.15
4	Young bull up to 18 months		7	7	106	52.48	2	2.5	61	65.59
5	Heifer		14	14	4	1.98	13	16.25	5	5.38
6	Milch buffalo		37	37	1	0.49	26	32.5	0	0
7	Pregnant buffalo		6	6	1	0.49	8	10	1	1.08
8	Dry buffalo		4	4	2	0.99	5	6.25	0	0
9	Adult male buffalo		0	0	75	37.13	1	1.25	18	19.35

Herd composition of other livestock on buffalo holdings of Thrissur kole							
North kole				South kole			
Milch n=107		Meat n=145		Milch n=205		Meat n=92	
f	%	f	%	f	%	f	%
84	78.5	51	35.17	156	76.1	32	34.78
23	21.5	94	64.83	49	23.9	60	65.22

Animals in milk on buffalo holdings of Thrissur kole					
S. No.	Percentage of lactating animals in buffalo holding	North kole n=28		South kole n=22	
		f	%	f	%
1	0	8	28.57	3	13.64
2	50	4	14.29	8	36.36
3	66.67	0	0	3	13.64
4	75	0	0	1	4.54
5	88.89	1	3.57	0	0
6	100	15	53.57	7	31.82

Breeding parameters

Table 2 indicates that one-third of the respondents were able to achieve an inter-calving period of below 500 days (16.66 months), while in the case of 40 per cent of respondents it was between 23.33 to 40 months. This was much in line with data from government farms, where an inter calving period of 450 to 500 days was observed (GOI, 2011). The number of services required per conception was on an average 2.78 ± 0.43 (SE), which is much lower than the state average of four inseminations per calving reported for cattle (GOK, 2017). Better opportunities for wallowing and thermoregulation provided by the innate landscape of the *kole* lands could have contributed to better conception of buffaloes reared in *kole* lands.

Table 2: Breeding parameters of buffaloes of the Thrissur kole

Distribution of animals based on age at puberty of heifers on milch buffalo holdings of Thrissur kole (n=25)			
S. No.	Age at puberty (months)	f	%
1	Low (below 28)	3	12
2	Medium (28 – 34)	12	48
3	High (34 – 43)	10	40
<i>Mean: 32.76 SE: 1.02</i>			

Pregnancy rate of buffaloes on milch buffalo holdings of Thrissur kole (n=50)			
S. No.	Pregnancy rate	f	%
1	Up to 2	20	40
2	3 and 4	21	42
3	Above 4	9	18
<i>Mean: 2.78 SE: 0.43</i>			

Inter-calving period of buffaloes on the milch units of Thrissur kole (n=30)			
S. No.	Inter-calving period (days)	f	%
1	Below 500	10	33.33
2	500 – 700	8	26.67
3	Above 700 – 1200	12	40
<i>Mean: 628.13 SE: 37.58</i>			

Extent of Adoption of Practices on Breeding of Buffaloes

It is evident from Table 3 that more farmers (53.57 per cent) of the North *kole* had adopted recommended breeding practices to a higher extent when compared to their counterparts in the South *kole* (45.46 per cent).

Table 3: Distribution of milch buffalo keepers of Thrissur *kole* based on extent of adoption of practices in breeding of buffaloes

S. No.	North <i>kole</i> n = 28			South <i>kole</i> n = 22		
	Category	f	%	Category	f	%
1	Low (0-11)	3	10.71	Low (0-13)	8	36.36
2	Medium (11-17)	10	35.72	Medium (13-17)	4	18.18
3	High (17-23)	15	53.57	High (17-23)	10	45.46

Mean: 15.46 SE: 0.83; Mean: 14.82 SE: 0.77; $t=0.557NS$; $p > 0.05$

Item-wise Analysis of Extent of Adoption of Practices on Breeding

Proper record keeping with regard to the dates of inseminations and calving were adopted by 78.57 and 86.36 per cent of farmers in the North and South *koles* respectively. The practices that were least adopted in this category were artificial insemination (AI) of animal between 12 and 14 hours from the onset of heat and proceeding for a detailed gynaecological examination of the animal in case of prolonged inter-calving interval. Regarding various practices under breeding management of buffaloes, nearly eighty per cent continued to adopt proper recording of artificial insemination and calving dates and this was in consonance with the finding of Manivannan and Mathialagan (2016). The breeding practice that had a lower extent of adoption with more than 45 per cent non-adoption in both the North and South *koles* was seeking veterinary service for gynaecological examinations of animals with prolonged inter-calving periods. Manivannan and Mathialagan (2016) also reported that 45 per cent of buffalo keepers had partially adopted this practice.

Table 4: Distribution of milch buffalo keepers of Thrissur *kole* based on the extent of adoption of practices on breeding

S. No.	Items	North <i>kole</i>					South <i>kole</i>				
		CA (%)	DA (%)	NA (%)	MS	Rank	CA (%)	DA (%)	NA (%)	MS (%)	Rank
1	Veterinary check-up, if no heat signs up to 30-36 months	57.14	0	42.86	2.14	IV	63.64	0	36.36	2.27	II
2	AI between 12 and 14 h from outset of heat	39.29	0	60.71	1.79	VI	36.36	0	63.64	1.45	VII
3	Recording AI and calving dates	78.57	3.57	17.86	2.61	I	86.36	0	13.64	2.73	I
4	Pregnancy diagnosis 2-3 months after AI	75	0	25	2.5	II	59.09	4.55	36.36	2.23	III
5	Veterinary help in delayed parturition	60.71	0	39.29	2.21	III	31.82	0	68.18	1.64	VI
6	Veterinary check-up, if no calving within 15-18 months after last calving	53.57	0	46.43	2.07	V	50	4.55	45.45	2.05	V
7	Veterinary check-up, if heats are irregular	57.14	0	42.86	2.14	IV	59.09	0	40.91	2.18	IV

CA – Continued adoption; DA – Discontinued after adoption; NA – Not adopted; MS – Mean Score

Conclusion

The results of this study indicate that the extent of adoption of recommended buffalo breeding practices by the buffalo farmers of the *kole* lands of Thrissur was generally towards the optimal side and was reflected in the indicators of reproductive efficiency of their animals. However, these farmers were not in receipt of any specific assistance for buffalo rearing. Special packages to ensure both economically and ecologically viable livelihood ventures on the *kole* lands are essential to maintain the balance of nature and to protect these systems while ensuring that the interests of the local community are also met.

Conflict of Interests

There is no conflict of interest.

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