Artificial or natural insemination: The demand for breeding services by smallholders

Baltenweck, I.[a*], Ouma, R.[a], Anunda, F.[a,b], Mwai, O.[a,b] and Romney, D.[a]

[a]International Livestock Research Institute, P.O. Box 30709, Nairobi

[b]University of Nairobi, Department of Animal Production, P.O. Box 29053, Nairobi

* Corresponding author: email i.baltenweck@cgiar.org Tel: 4223000 Fax: 4223001

Abstract

Different types of breeding services are available to the Kenyan smallholder farmers. An important question is whether farmers choose the service, or they are constrained in their choice. Assessing the demand for breeding services is crucial for planning purposes since it will help in identifying the constraints faced by smallholders in the aftermath of agricultural liberalisation policies of the 1990's. Household and community surveys were conducted in March and April 2004 in three different farming systems of the Kenyan Highlands. The study of 300 smallholder cattle-keepers found that while 54% prefer artificial insemination (AI) to natural (bull) service, 81% actually use natural service, suggesting a sharp contrast between actual use and expressed preferences. Even in intensive dairy systems (represented by Ndia division in Kirinyaga district), the majority of smallholders use natural service. Farmers prefer AI service in view of its ability to maintain and/or upgrade their dairy herd but main constraints to use of AI services are low availability and perceived high costs. This study shows that the observed high use of natural service over AI recorded in previous studies may not reflect farmers' choice but the unavailability of the

alternative service types, cost considerations, information gaps and misinformation amongst farmers, historical reasons among other constraining factors. Some recommendations for breeding policy reform are made.

Introduction

Dairying is an important economic activity and source of livelihood for over 600,000 small-scale farmers in Kenya (SDP, 2004). The smallholders' dairy herd produces 56% of total milk production and 80% of the total marketed milk nationally (Staal et. al., 2002). Besides milk for home consumption and sale, cattle are kept for traction, manure for crops and fodder, and as a store of wealth. After years of government support to the dairy sector through the provision of subsidized services, including AI, the government started to withdraw its support at the beginning of the 1990s (Omiti and Muma, 2000). One of the services most affected by this policy change was the provision of AI. Whereas an initial increase in AI provision by private practitioners was observed, available data suggests a current negative trend although incomplete reporting may explain part of the sharp decline (Figure 1). Other studies have also suggested that a low proportion of farmers use AI (Karanja, 2003). A previous analysis has shown that farmers' use of AI services is partly explained by access to complementary services like extension and veterinary services and also market access, suggesting that use of AI services is influenced by farmers' ability to market their production (Njoroge et al., 2004). To better understand the observed low use of AI services despite years of extension services promoting this service among smallholders, a combination of household and community surveys was conducted to explicitly identify the constraints to AI uptake and identify the demand for this service.

Materials and methods

Data collection conducted in three divisions representing different dairy systems, namely Ndia in Kirinyaga district, Molo in Nakuru district and Oyugis in Rachuonyo district. The choice of the divisions was based on previous survey data (SDP characterisation data, 1998 and 2000). Ndia represents an area where AI use was historically high and dairy systems are fairly intensive. On the other hand, Molo division exhibits semi-intensive dairy production systems and a proportionately higher level of bull service. Finally Oyugis was chosen due to its almost exclusive use of bull service for breeding purposes and extensive feeding system. Three sub locations were selected randomly in each of the three divisions and 300 randomly selected cattle-keepers were surveyed (100 per district). The questionnaires collected information on household characteristics, land holdings, herd structure, feeding system, reasons for keeping breeds, breeding services used and reasons, animal health and management, and the nature of breeding records kept. Additional to the households' survey, participatory community surveys were also conducted to collect qualitative information on choices of breeds and breeding services, and inbreeding awareness. This involved groups of between 6 to 15 smallholder farmers drawn from village communities in the sampled sub-locations.

Results

Results from the household survey

Currently, the most commonly used mating method among the surveyed farmers is the use of bulls (natural service), both controlled and uncontrolled use; hired or for free, standing at approximately 81.44%. Of these 18.21% use uncontrolled natural mating,

that is, they do not determine the bull that will serve while 63.23% select the bulls. Only 18.56% of the farmers surveyed commonly use AI. When looking at the situation 10 years ago, interestingly, the most commonly used method was AI with 39.47% of the farmers using this service (Table 1).

Farmers within extensive systems of production (defined as feeding system being mainly or only grazing) more commonly use natural service, in contrast with the more intensified farmers (feeding system being mainly or only stall feeding) who use more AI, although natural mating is still used by the majority of these farmers (Table 2).

However, 54% of the respondents stated that they prefer AI over all other mating methods, although only 32% of those preferring AI actually use it. Farmers' reasons for preferring AI are listed in Table 3. Not surprisingly, the most important reasons relate to maintaining or upgrading breeding stock for optimal milk production. Reasons for not using AI are either the non-availability of the service (50%) or the perceived high cost of the service (48%).

Turning to the availability of the different services by district, Table 4 shows that following liberalisation of breeding services, the availability of private AI has increased. In Kirinyaga District where government AI is almost non-existent, availability of private AI has increased from 14% 10 years ago to the present 59%. Availability of cooperative AI has also more than doubled in 10 years. The availability of private AI in Nakuru has also increased from 37% 10 years ago to 64% today. This is matched by an increase in availability of own, hired and neighbours bulls over the same period. In Rachuonyo there are no successful private AI services.

The availability of hired bulls and neighbours bulls used for breeding purposes has increased in all three areas. In Kirinyaga (where hired and neighbours bulls availability rose to 20% and 68% respectively), most farmers do not keep own bulls but a single neighbour or hired bull was found to serve a very wide area. The level of bull commercialisation was highest in Nakuru with 41% but overall availability of bulls was greatest in Rachuonyo where the systems are most extensive. Over half of the farmers in Rachuonyo own a bull (56%) while almost all the farmers have access to a neighbour's bull (94%). The herd structures (Table 5) did not have a significant influence on bull availability as both Nakuru and Kirinyaga which had only 2% bulls in the herd structures (Table 5) still showed high levels of breeding bull availability.

Of the farmers using the respective services, farmers consider that the main constraint when using private AI is the cost and the long distance to inseminator. The same constraints are mentioned by government AI-users but the order is reverse (Table 6).

Results from the community surveys

In all the 10 sites where community surveys were conducted, farmers stated that they prefer AI as a mating method over bull service while actual use in all the 10 areas was predominantly use of natural methods (either hired, own or neighbour's bull). AI was preferred mostly because it was seen as a way of upgrading to better quality animals and because it reduced the threat of venereal disease.

Discussion

Availability of AI services does not translate directly into use. In Kirinyaga for example, despite the fact that 59% of the surveyed farmers have access to private AI, only 35% use AI (private and cooperative) today as opposed to 94% (mostly

government AI) 10 years ago. It therefore appears that availability, though important, does not guarantee use of AI services. Many farmers have not adjusted to the private delivery of the service (mainly on call), which is different from government delivery system (daily run system). This 'forced' use of natural service may lead to a mismatch between the farmers' optimal herd and the one actually kept, resulting in a likely decreased production and competitiveness. While availability of private AI has increased significantly over the past 10 years, it is still very low. In Nakuru where highest availability was recorded, only 64% of the surveyed farmers have access to private AI. From the community surveys, other factors leading to using bull services over AI include:

- Ease of service transaction: farmers find it easier to conduct bull service than AI. In all cases the cow is driven to the bull owners premises upon detection of heat signs and without any prior appointment. AI on the other hand requires that the farmer reports the heat incidence and records his/her exact location and name with the inseminator's office.
- Cost: farmers prefer AI but use bulls because they are cheaper and the bull owner can provide credit facilities. The cost of AI escalates when repeats are factored in. Also, bulls are more effective and where pregnancy is not achieved, repeats are usually free.
- Choice of bull and breed: farmers do not choose the bull when using AI. Although farmers choose the breed, it is the AI practitioner who decides what bull to use.
- Information: farmers generally gather information on the qualities/reliability of particular bulls using informal network ("through the grape vine") unlike for AI services as the farmers do not usually conceptualize the AI as a 'bull'. In extensive

systems such as Rachuonyo some farmers and extension agents do not think AI can be used with zebu or other local breeds.

- Information gap: farmers perceive AI as expensive as the potential benefits through improved herd are not taken into account.

Conclusion and recommendations

Both government and survey data show that smallholders' use of AI services has significantly declined over time. On the other hand, the majority of farmers are aware of the benefits of using this method over natural mating as seen in the higher number of farmers preferring AI compared to those using it. Other barriers than awareness seem therefore be the main constraints to the wider uptake of the AI technology among Kenyan smallholders, including low availability, relative high costs compared to bull service especially in view of the fact that in the past AI services were cheaper due to government subsidies. There is need to provide farmers with relevant information on the real costs of AI as the perceptions of high cost are misplaced. Further analysis needs to be pursued to better quantify and understand the relationships between choice of breeding services on one hand, and cost, proximity, range of breed choice and mode of operation among other breeding service characteristics.

Acknowledgment

The help of numerous colleagues in the Kenya Ministries of Agriculture, Livestock and Fisheries is gratefully acknowledged. This project is funded by DFID (through Smallholder Dairy (R&D) Project) and by USAID (through the Kenya Dairy

Development Program). The views expressed are not necessarily those of the DFID and USAID.

References

Karanja, A. 2003. The dairy industry in Kenya: the post-liberalisation agenda. Tegemeo Institute/Egerton University Research paper. Nairobi, Kenya.

Njoroge, L., Baltenweck, I. Ouma, R.., Staal, S. and Romney, D. 2004. Breeding services in Kenya: an examination of trends and factors predisposing adoption of artificial insemination technology. Paper presented at the East Africa Regional Animal Production Society Conference, KARI headquarters, 15-18 March 2004, Nairobi, Kenya.

Omiti, J. and Muma, M. 2000. Policy and institutional strategies to commercialise the dairy sector in Kenya. Institute of Policy Analysis and Research, Occasional Paper No 006/2000. Nairobi, Kenya

SDP (Smallholder Dairy Project). 2004. Employment Generation in the Kenya Dairy Industry. Policy Brief 2. SDP, Nairobi, Kenya

Staal, S. J., Baltenweck, I., Waithaka, M., de Wolff, T. and Njoroge, L. 2002. Location and uptake: integrated household and GIS analysis of technology adoption and land use, with application to smallholder dairy farms in Kenya. *Agricultural Economics* 27 (3): 295-315.

Table 1: Most common mating method, currently and 10 years ago (% of farmers)

	Currently	10 years ago
AI	18.56	39.47
Bull controlled	63.23	34.21
Bull uncontrolled	18.21	26.32
Total	100	100

tests for equality show that percentages differ at 0.01 level of significance over time

Table 2: Most common mating method, by feeding system (number and % of farmers)

	Extensive		Intensive	
	Freq.	Percent	Freq.	Percent
AI	10	6.6	41	34.5
Bull controlled	90	59.2	78	65.6
Bull uncontrolled	52	34.2	0	0.0
Total	152	100	119	100

tests for equality show that percentages differ at 0.01 level of significance between feeding systems except for "bull controlled"

Table 3: Main reason for preferring AI (number and percent of farmers)

	Freq.	Percent
Maintain pure breeding	46	32.6
Upgrade local zebu to dairy	42	29.8
Produce superior offspring	33	23.4
Most available method	7	5.0
Convenient method to get crosses	5	3.6
Other	8	5.7
Total	141	100

Table 4: % of farmers for which service is/was available now and 10 years ago

	Kirinyaga, Ndia		Rachuonyo, Oyugis		Nakuru, Molo	
	Now	10 yrs ago	Now	10 yrs ago	Now	10 yrs ago
private AI	59	14	1	1	64	37
government AI	2	17	3	3	10	12
cooperative AI	44	19	2	2	2	2
own bull	1	1	56	49	14	7
neighbour bull	68	37	94	88	52	48
hired bull	20	5	19	16	41	36
other bull	0	0	2	1	0	0

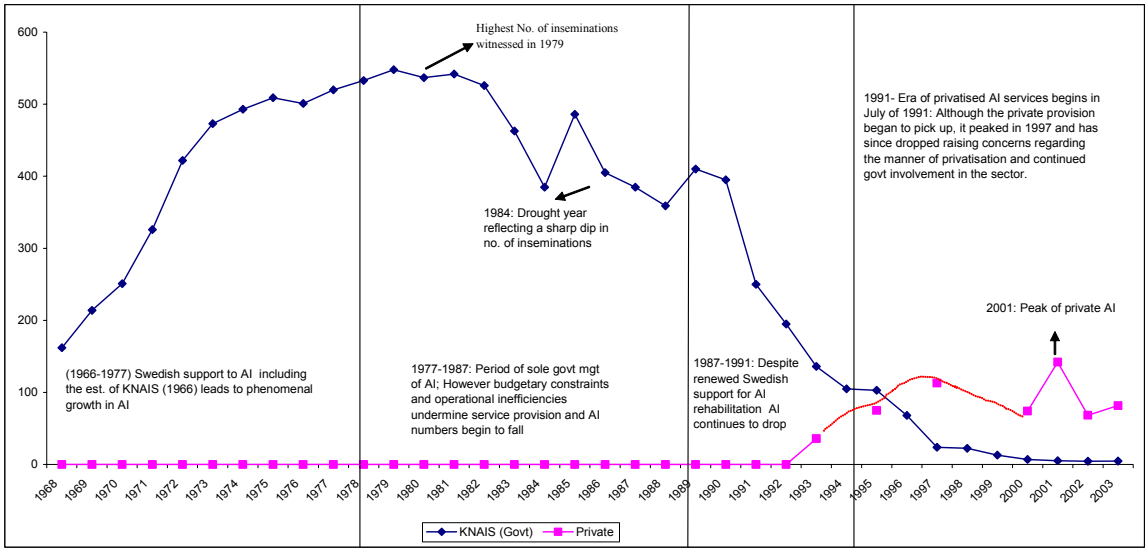
Table 5: Herd Structure: Percentages (%) of numbers by animal type

Animal type	Kirinyaga	Nakuru	Rachuonyo
Cows calved at least once	50	50	29
Female calves	11	5	9
Mature Bulls > 3years	2	2	21
Castrated adult males	0	3	0
Immature males	5	6	11
Heifers (post weaning, pre-calving)	26	30	22
Male calves	6	5	7

Table 6: Farmers' stated problems with private and government AI (number and % of farmers)

	Problem with private AI		Problem with gov. AI	
	Freq.	Percent	Freq.	Percent
Too expensive	58	71.6	6	20.0
Long distance to inseminator	12	14.8	13	43.3
Too many repeats	6	7.4	5	16.7
Other	5	6.2	6	20.0
Total	81	100	30	100

Figure 1: AI over the years



Source: Central AI Station annual reports, 1966 - 2003