

Disposal and replacement practices in Kenya's smallholder dairy herds

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Paper prepared for ORAL PRESENTATION at the 3rd All Africa Conference on Animal Agriculture. 6 – 9 November 2000.

Summary

The objectives of this study were to explore the possibilities for improving the breeding practices and developing policies in support of smallholder dairy producers in the central highlands of Kenya through analysing current disposal and replacement practices. Data were obtained from a cross-sectional characterization study. This began with a pilot survey in one district where 365 households were randomly sampled and then extended to another eight districts where 1390 households were randomly sampled. The pooled data from the nine districts comprised 987 dairy households with information on dairy cattle disposal and replacement practices during the previous year and the primary reasons for animal deaths and sales. Complementary information on the origins of cows was collected through targeted surveys of 50 sample households representative of the major dairy systems.

Based on farmer recall of events during the year preceding the surveys, almost a third of cow and heifer exits were driven by the households' needs for cash, and another third resulted from losses caused by diseases. Poor performance was less important, accounting for about 10% of cow exits and about 5% for heifers. More cows (>25% y⁻¹) left the herd in zero- and semi-zero grazing systems than from free-grazing herds (19% y⁻¹) and fewer heifers were available as replacements. As a result, the herds in the more intensive grazing systems would have to purchase replacements to maintain their herd size. By contrast, there were surplus heifer replacements in the free grazing systems. The majority of the breeding cows were born within the herd (68%) and few were purchased: 25% from smallholdings and 7% from large-scale farms. Of the purchased cows, 90% originated from smallholdings and 10% from large-scale farms while 96% of heifers were purchased from smallholdings and only 4% from large-scale farms. Purchases from smallholder farms were from within the locality. The implications of these results for smallholder dairy production in Kenya are discussed.

Key words: Smallholder dairying; disposal reasons; replacement rate

Introduction

Smallholder dairy herds produce over 75% of the total domestic milk supply in Kenya. The majority of these herds are concentrated in the central highlands (Reynolds *et al.*,

1996) where intensification of agricultural production has been a response to human population pressure on land. A major constraint on dairy production as smallholders shift to intensive systems is inadequate feed quantity and quality for dairy cattle genotypes (De Jong, 1996; Omore, *et al.*, 1996; Zemelink *et al.*, 1999). As a consequence, the realised growth rates in calves and heifer replacements are less than 0.25 kg day⁻¹, mortalities among calves, heifers and cows are in the range of 10 to 28%, age at first calving is delayed to 3 years and mean calving interval approaches 2 years (Gitau *et al.*, 1994; Odima *et al.*, 1994; De Jong, 1996; Omore, 1997).

These reproductive indices suggest that smallholder herds may not generate sufficient replacements to maintain herd sizes and that the herds may depend upon external sources for replacement stock. In the past, publicly and privately owned large-scale dairy farms provided the dairy foundation stock for smallholders (Conelly, 1998). These sources are now very limited, even if affordable, because the majority of the farms have collapsed or have been subdivided.

The objectives of this study were to explore the possibilities for improving the breeding practices and developing policies in support of smallholder dairy producers in the central highlands of Kenya through analysing current disposal and replacement practices.

Materials and methods

Data were obtained from a cross-sectional characterization study of smallholder dairy systems in the central highlands of Kenya. The study began with a pilot survey in Kiambu district during June-July 1996 (Staal *et al.*, 1998). A random sample of 365 households was interviewed using a pre-tested structured questionnaire. Respondents were asked about events in the past 12 months relating to cropping activities, livestock management and inventories (with emphasis on dairy production) and income sources. Subsequently the survey was extended to another eight districts during March-April 1998 when 1390 households were randomly sampled. The nine districts represented three levels of access to milk markets: high (HMA), medium (MMA) and low (LMA). The level was defined by: local demand, condition and density of roads, availability of milk marketing institutions, distance from and access to the Nairobi urban market. Three grazing systems were represented: free (FRGZ) or zero grazing (ZEGZ), and a combination of free and zero grazing, i.e. semi-zero (SMGZ). Dairy genotypes were classed as: crossbreds (50% or less *Bos taurus*), or high-grade dairy (more than 50% *Bos taurus*). The *Bos taurus* breeds were: Friesian, Ayrshire, Guernsey and Jersey.

The pooled data from the nine districts comprised 987 dairy households with 2156 cows (females after first calving), 1042 heifers (post-weaning females until first calving) and 601 heifer calves (pre-weaning females). The data included information on dairy cattle disposal and replacement practices and the primary reason for animal deaths and sales. In the pilot survey (Kiambu district), reasons for the sale of 49 cows and 34 heifers were not given.

Complementary information on the origins of cows (born in the herd; purchased from large- or small-scale farms) was collected through targeted surveys of 50 sample households (with 149 cows) representative of the major dairy systems.

Data processing

Disposal was defined as any exit of a female from the herd and included animals that died and/or were sold. Replacement was any entry into the breeding herd. There were eight broad categories of “Reasons for disposal”: diseases (death and sale); slaughter for meat; poisoning (death due to acaricide, snake bite, and bloat); injury (death and sales due to accidents); sales because of old age; sales because of poor performance; sales to meet needs for cash; and unspecified reasons (death and sales). Poor performance included low milk yield, low growth and infertility.

Statistical procedures

The frequencies of disposal categories were tested by Chi square procedures. The proportion of heifer calves and post-weaners that died or were sold was used to estimate the proportion that would reach the breeding herd.

Results and discussion

The type of grazing management influenced the proportions of cows (Table 1) leaving the herd during the previous year and of heifers (Table 2) that survived to reach the breeding herd. On an annual basis, on average more cows (>25%) left the herd in intensive (zero and semi-zero) systems than from free-grazing herds (19%) and fewer heifers were available as replacements. As a result, unless they purchased replacements, the herds in the more intensive grazing systems were unable to maintain their herd size. By contrast, relative to the requirements for maintaining herd size, on average there were surplus heifer replacements in the free grazing herds, in part due to its superior calving rate, possibly resulting from better nutrition. In the intensive systems, feed shortages and under-nutrition are common (Zemmelink *et al.*, 1999). This may also explain why in the zero-grazing herds, sale accounted for over 40% of the heifer exits, twice the rate from the free grazing herds (Table 2). Sales of heifers would reduce herd sizes and increase the proportion of feed resources available to the productive animals in the dairy herd, the lactating cows.

Table 1. Proportion (%) of cows leaving the herd by type of grazing systems in smallholder dairy herds in the central Kenya highlands during the year prior to the survey

	Grazing systems		
	Free	Semi-zero	Zero
Cow population, n	709	796	651
Total disposal/exits (%)	19.2	27.0	25.2
Died	11.0	15.0	12.1
Sold	8.2	12.0	13.1

Table 2. Proportion (%) of heifers that survive to reach the breeding herd by type of grazing systems in smallholder dairy herds in the central Kenya highlands

	Grazing systems		
	Free	Semi-zero	Zero
Calving rate (%)	68.0	50.0	49.0
Heifers surviving after:			
Pre-weaning mortality	28.6	21.0	21.3
Pre-weaning sales	28.3	20.4	20.9
Post-weaning mortality	26.3	17.7	19.2
Post-weaning sales	24.7	15.9	16.1
Heifers reaching the breeding herd (per cow)	24.7	15.9	16.1
Distribution of losses			
Deaths, %	79.9	73.5	58.1
Sales, %	20.1	26.5	41.9

Of the cows kept by the households sampled in the targeted survey, 68% were born within the herd, 25% were purchased from other smallholders and only 7% were purchased from large-scale farms. Consequently, the great majority of smallholder dairy cattle were either reared in the herd in which they were producing or were purchased from another smallholding. In the pooled survey data, 102 purchased cows were reported, of which 90% originated from other smallholdings and 10% from large-scale farms. For heifers, a total of 78 were reportedly purchased with 96% originating from smallholdings and only 4% from large-scale farms. Combining the total number of females (102 cows and 78 heifers) purchased, 57% were cows and 43% were heifers, suggesting that smallholders prefer purchasing cows rather than heifers, or that cows were more readily available. Purchases from smallholder farms were from within the locality, which the targeted surveys showed enabled the purchaser to verify with more confidence, the performance (fertility and milk yield) of the cow being purchased.

Of the reported cow exits, diseases accounted for a third and cash needs more than a quarter (Table 3). Nearly 40% of the heifer exits resulted from diseases, while a third were caused by needs for cash. In total therefore nearly a third of cow and heifer exits were driven by the household's needs for cash, and another third resulted from losses caused by diseases. Poor performance was less important, accounting for about 10% in cows and about 5% in heifers. Disposals attributed to diseases or cash needs were three to five times greater than those attributed to poor performance. The most important diseases affecting dairy cattle in the central Kenya highlands are East Coast fever and anaplasmosis (Gitau et al., 1999). More effective control strategies for these tick borne diseases in smallholder dairy production systems are needed in order to reduce the losses that they cause.

Clearly dairy cattle performed a very important function as capital savings for these smallholder households. Generally, the female cattle sold to generate cash did not leave

the community, but served as breeding stock for those smallholder households in need of replacements. During the interviews conducted as part of the targeted survey, farmers stated that a cow sold to meet pressing cash needs might be re-purchased. This practice allows the recycling of fertile cows within the community and serves therefore to support smallholder dairy production in the short-term. However, sustainability in the long-term is doubtful because it was shown in this study that the more intensive dairy systems (based on zero- and semi-zero which reflect small land sizes) require external sources of replacements to maintain the herd sizes. It can be expected that with increasing human population pressure on land, more of the current free grazed herds will shift to more intensive systems. This trend further casts doubt on the long-term sustainability of smallholder dairy production unless improved feeding strategies (including increased dependence on external feed resources; Utiger *et al.*, 2000), and reproductive and disease control management practises can increase reproductive rates and reduce reproductive wastage.

Table 3. Frequency (%) of reasons for disposal of cows and heifers in smallholder dairy herds in the central Kenya highlands

Reason for disposal	Cows	Heifers
Diseases	36.3	37.7
Cash needs	27.2	32.7
Poor performance	9.9	5.0
Unspecified reasons	9.2	13.2
Injury	6.7	8.8
Old age	6.5	0.0
Poisoning	2.6	1.9
Slaughter for meat	1.7	0.7
Total disposals, n	434	167

Acknowledgements

We gratefully acknowledge the support of the Smallholder Dairy (R&D) Project (SDP) of the Kenya Ministry of Agriculture and Rural Development, the Kenya Agricultural Research Institute (KARI) and the International Livestock Research Institute (ILRI). SDP is funded by the UK Department for International Development (DFID). The first author was supported by a research grant from The Netherlands Foundation for the Advancement of Tropical Research-WOTRO. The views expressed are those of the authors and not necessarily those of DFID, SDP or WOTRO.

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