DAIRY SYSTEMS CHARACTERISATION OF THE GREATER NAIROBI MILK SHED

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SDP Research Report

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Background

An important first step in addressing the research and development needs of smallholder dairy farmers in Kenya is to accurately diagnose the existing and future constraints and opportunities facing them. These may occur at a number of levels: the dairy animals themselves, agro-ecology of the area, farm practices, household resources, level and type of services available, infrastructure, and other policy or macro-environment factors. To carry out this broad and multi-level diagnosis, a stratified random survey of households was conducted in what may be termed the Greater Nairobi milk shed, the target area for the Smallholder Dairy (R&D) Project's first phase. This study falls within the characterisation phase of the conceptual framework for dairy system research developed by ILRI (Rey et al, 1993).

The broad goals of the survey were to a) describe the current structure of dairy production and practices of dairy farmers in Central Kenya, b) assess current and future constraints and opportunities facing them, and c) identify those types of dairy producers that should be targeted by the SDP project, given the focus on assisting the most resource poor.

The conceptual framework used for stratifying the survey was based on the principle that the main determinants of dairy system development lie along two independent axes: a) agro-climatic potential and b) market access. Using existing maps of agro-ecological zones and road infrastructure, the Central Kenya area was differentiated into regions of high, medium and low market access, and high and medium agro-climatic potential. Eight districts were then selected that represented the diversity in potential for dairy development.

An SDP team comprised of collaborators from MoA, KARI, and ILRI conducted the survey in March-April 1998 among 1390 households chosen in a stratified random sample from the eight districts. Household were selected randomly without regard to whether they were farms or kept cattle. This systematic characterisation survey followed the form developed during the pilot characterisation survey in Kiambu District in 1996 (Staal et al 1997). It also applies to the Kenya setting some of the new methods available through linking GIS- (Geographical Information System) and farm-based analysis. To accomplish this, all surveyed household were geo-referenced using GPS (Global Positioning System) units.

Survey results

Of the 1,390 households that were randomly surveyed, 1,015 (74%) owned agricultural land and of these, 73% had dairy cattle. This underlines the fact that dairy is a prevalent enterprise among rural households over a wide area of central Kenya. The mean age of the household head was 47 years and the majority (70-85%) had primary or secondary level education. The average household size was 5.7 persons, including usually 2 adults in the age group 23 to 65 years.

There was great variation in types of cash crops grown from one district to another and even within districts, reflecting mainly differences in agro-climatic potential. Dairy farming is nevertheless a consistent feature across the area suggesting that it can be integrated with a variety of other crops and farming systems. Napier grass has been widely adopted as a fodder crop across and it is only in Narok district that napier growing was not practised. This is clearly associated with the greater land availability in that area and the consequent lower demand for intensive technologies such as planted fodder.

The results also emphasise the important role of dairying in generating employment in rural areas. In total, 60% of the households keeping dairy animals employed some type of casual or long-term labour. Within the household, analysis of labour allocation suggests that adult family males contribute 36% of the labour required by dairy activities, followed by 24% contributed by family females. This appears to contradict results from other studies that showed that females contributed the largest proportion of labour to dairy.

Cattle genotype differed according to the system of keeping dairy cattle in the manner expected, with more exotic genotypes in more intensive stall-feeding systems and local animals in the grazing areas. The predominant dairy breeds were Friesian (42%), Ayrshire (18%), Guernsey (12%) and Jersey (3%). The rest, representing local and other Bos indicus (Zebu, etc) accounted for 25% of the total number of animals. Herds were composed of mostly adult cows (44%) which together with heifers and female calves accounted for nearly two thirds of the animals in farm herds, while bulls comprised only 7% overall. However herd composition differs greatly across districts depending on level of intensification and orientation towards marketed milk production, with more males kept in areas with great land sizes such as in Narok.

Production practises were analysed both at the time of the survey and ten years previously, based on farmer recall. Overall the main production systems were semi-zero grazing for 38% of farms, zero grazing for 37% and grazing for 25% of farms mostly in Narok. Only in Nyandarua district did the study find evidence of improved pastures such as Rhodes and rye grasses. In other grazing-based farms in Narok and Machakos, natural pasture was used. The highest proportion of zero grazing farms was found in Maragua where 90% of farms relied solely on stall-feeding. The survey showed that there have been significant changes in feeding strategies compared to ten years ago (approximately 1988). Some farms in traditional grazing areas such as Machakos, Njoro, and Molo were found to have shifted towards stall-feeding. This is clearly related to shrinking land sizes and the consequent need for intensification of production. Further, farmers reported more dependence on Napier and crop residues now compared to use of roadside grass previously, such as in Machakos where 33% of dairy farms reported the introduction of Napier in the last ten years. A similar trend towards intensification was found in the changing patterns of crops.

The results of performance found in the survey are perhaps typical of smallholder mixed (crop-livestock) systems. The mean age at first calving was 32 months, calving interval and lactation length 519 days while the mean

milk yield was 5.9 litres/cow per day (for dairy cattle but lower for indigenous cattle).

An potential important constraint facing smallholder dairy producers may be decline in services due to the withdrawal of most of government support. In the case of artificial insemination (AI) for example, only 30% of the households reported its availability from the cooperatives and 25% reported its availability from private practitioners. For the majority of households, this service was simply not available. Overall, over 71% of the sampled households used bulls for breeding. As a result, lack of selective breeding may pose a long-term constraint to continued productivity increases if reduced use of AI leads to a degradation of the herd genotype.

In spite of known constraints to funding of public services, 80% and 85% of dairy farmers reported that government extension and veterinary services were available and 60% of farms reported using them. Private veterinary services were also available to 80% of farms, of which nearly 60% reported using them. Some 15% of farms reported that private extension services were also available.

In keeping with results of other studies, the survey found that most of the milk marketed by the farmers passed through informal channels and was not processed. The single largest market is sales to neighbouring households, which comprised the main outlet for 42% of the respondents. Of the others 22% sold to traders, 12% to co-operative societies and self-help groups and only 12% to processors (KCC and private processors). The remaining 11% sold to hotels and shops. Poor market access may be a considerable constraint to profitable dairy farming in some milk surplus areas. However the results suggest that in most areas local demand is strong enough to take up much of the milk. The market liberalisation of 1992 has apparently increased the market options for small farmers but has also introduced uncertainty and new risks. But it should be noted that sale of milk is not the sole farmer objective. Home consumption of milk is an important production aim and 37% of dairy households reported selling no milk. On average dairy producing households reported consuming some 2 litres per day.

Finally cluster analysis was conducted on the survey data to differentiate the surveyed dairy farms into characteristic types. A statistical method was used that focused on categorizing the farms according to several main themes: 1) the level of intensity of dairy production, 2) the level of household resources, and 3) access to markets and services. Based on this analysis, 4 main farm types were identified. The most important group, comprising 51% of the farms surveyed, are the Informal Resource Poor farms, which have the smallest land holdings, the largest proportion of female-headed households (25%), rely mainly on informal markets, and have poor access to markets and services. Other important groups are the Extensive Landed dairy farms and the Part-time or Peri-Urban dairy farmers, each of which make up 19% of farms. These have better access to resources and markets ether through having greater land holdings or by being located closer to urban centres. The last group identified was the Specialized Dairy farmer group, characterized by the high use of purchased feed and fodder inputs. Given the project goal of working towards the interests of the most resource poor, and also given their

predominant position in rural dairy production, the Informal Resource Poor farms are clearly the main targets for SDP research and development efforts.

Conclusions

Important implications from the findings can be drawn in four key areas: a) intensification of smallholder systems; b) constraints to dairy productivity; c) access to services; and, d) identification of target groups.

The results point clearly to the rapid intensification of smallholder dairy production that is occurring in the central part of Kenya apparently as a result mainly of shrinking land holdings. Over the last ten years farms have shifted increasingly to the use of stall-feeding and to planting of fodder, and now rely less on natural fodder. Also clear, however, are the wide differences in levels of intensification across the area depending on agro-climate and market access. The main implication is that while improved technologies for sustained intensification are needed, they cannot be applied uniformly. Blanket recommendations for intensive production strategies should be avoided. A difficult challenge may be to assist the appropriate intensification of farms in those outlying areas where many of the resource poor farmers are found, which do not have high agro-ecological potential, yet which need to improve productivity due to shrinking land holdings.

Constraints to dairy productivity continue to centre around inadequate and seasonal feed resources. Solutions to these problems will have to keep in mind the limitations to opportunities for intensification outlined above. For example the use of planted grass fodders for stall-feeding may be limited in extensive areas where labour rather than land is the limiting constraint. Threats to productivity over the long term may be posed by the constraint to breeding. AI services continue to be used by only a relatively small proportion of farmers and the long-term trends in herd genotype are unclear. Private veterinary services of indeterminate quality are now available to most farms across the area. Perhaps surprisingly, most farms report continued contact with government extension services. Few co-operatives offer breeding or vet services. The status of access to services is thus mixed with apparently successful private sector entry into vet services, but less success in the private provision of AI services. However, these services are used mostly by the more privileged or advanced dairy farmers.

The cluster analysis shows that about half the dairy farms in central Kenya remain resource-poor with small land holdings and are located far from formal market services and urban areas. Improving the sustained productivity and profitability of this large majority group of farms and households will be key to success in rural development, poverty reduction and environmental protection in the region.

1. Introduction

It has been estimated that smallholder dairy farmers produce over half of total milk production in Kenya and 80% of the total marketed milk (Peeler and Omore, 1997). Milk production systems vary widely in the breeds of animals used, intensity of land and labour use, and feeding systems. The 1992 milk market liberalisation gave impetus for the increased off-take of milk, by improving opportunities for dairy co-operatives and private entrepreneurs to market dairy products. As a result, changes are apparent in production and marketing in the greater Nairobi milk-shed. Yet little is known about these patterns of change and the effects of various determinants on them.

A collaborative study by KARI/MOA/ILRI was undertaken to characterise the Nairobi milk-shed, with a view to identifying constraints and opportunities in dairy. The study was conducted in Central, Eastern and Central Rift Valley Provinces of Kenya. These are areas that represent a wide range of levels of dairy productivity potential and market access within the Nairobi milk-shed.

Prospective study sites were grouped according to production potential and market access into High-High, High-Medium, High-Low, Medium-High, Medium-Medium and Medium-Low. Sub-locations to be sampled were selected randomly from pre-selected Divisions in each District, on the basis of the land-use systems (as classified by Jaetzold and Schmidt, 1983) namely Sheep-Dairy, Tea-Dairy, Coffee-Dairy, Horticulture-Dairy, Wheat-Dairy and Urban. The number of households to be surveyed in each Sub-location was taken as a proportion of the number of households obtained from 1989 census figures (C.B.S, 1994). The total required sample of 1401 households was obtained from estimating the number of observations potentially needed to distinguish between the land-use systems.

By surveying randomly-selected households within areas stratified by land use zones, and by applying a combination of GIS-based spatial analysis techniques and statistical methods, this study provided detailed system and farm-level analysis across a wide range of farm and livestock sub-systems within the Nairobi milk-shed. Ministry of Agriculture MOA frontline staff supervised by MOA Divisional and District staff and the KARI and ILRI researchers conducted the surveys, between March and April 1998

This systematic characterisation describes the wide variability of production strategies present in a relatively small area, and the growing competitiveness of less-intensive dairy production. It also applies in the Kenya setting some of the new methods available through linking GIS-based and farm-based analysis.

The results showed that a majority of rural households are agricultural and many practice dairy farming. There is an increasing shift towards intensification of dairying through growing of fodder crops with “cut-and-carry” feeding systems and keeping of improved dairy breeds on the ever decreasing land available for agriculture. The importance of direct milk sales