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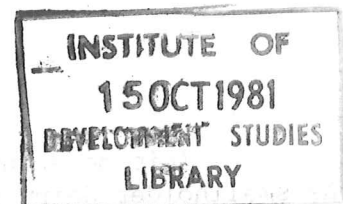
SMALLHOLDER MILK PRODUCTION AND MARKETING:
OPPORTUNITIES AND PROBLEMS

By

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WORKING PAPER NO. 286

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October, 1976

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ABSTRACT

This paper presents a brief summary of the major problems facing the smallholder dairy producers. Greater attention is given to the factors that determine the net price that the smallholder receives. The role of co-operatives in price determination is discussed. There appears to be great variability in their performance. While some are impressive in terms of their efficiency of operation, their low cost and quality of services to members others represent a source of inefficiency in marketing. Costs are high with concomitant low payouts to producers. The quality of milk does not appear to constitute a major problem. Many co-operatives maintain high quality of milk deliveries while KCC refuses to accept dairy produce that does not measure up to standard. Transportation appears to be a significant and costly problem.

Introduction:

Kenya's Development Plan 1974-78 (hereafter referred to simply as the Plan) stipulates that increased milk production of milk will be primarily based on smallholder production (p 245). The formulated strategy for expansion will be achieved by (i) an increase in number of grade cows (ii) normal increases in the existing smallholder herd (iii) increased purchases of breeding stock from large-scale farms and (iv) improvements of milk marketing facilities, continued favourable prices, credit programmes and extension for dairy farmers. Upgrading of local stocks via expanded artificial insemination is also envisaged. Nevertheless, increased output will be met "entirely through rapid increase in number of dairy cattle". This strategy is attractive primarily because it is extremely easy to increase the size of the national herd through upgrading stock using artificial insemination, while raising productivity through a combination of breeding and management is much more difficult. (12, p. 248).

The Plan forecasts that the production of commercial milk will increase by 6.8 per cent per annum over the Plan period as compared to an estimated 4.6 per cent per year in 1968-73. This target seems rather ambitious given past performance and represents an acceleration of 47.8 per cent on the experienced growth.

The demand for milk and milk products continue to grow rapidly. The Kenya Co-operative Creameries (KCC), a Co-operative monopoly, which processes 96 per cent of all milk and milk products which passes through known commercial channels, increased its sales of liquid milk at annual rate of 9.1 per cent over the 1968-1973 period. The sales of manufactured dairy products both for domestic consumption and exports to neighbouring countries have also grown substantially.¹

Although increased milk production is expected to rely on smallholder producers, there appears to be little concrete information concerning the basic production coefficients of small-scale production. Projections of increased dairy cattle number with concomitant increase in milk output are largely a matter of conjecture / (little exists by way of census or sample surveys). Cf Stolper's 'Planning Without Facts'.⁷ Such projections are usually made on the basis of different assumptions and therefore may differ by significant amounts among various government agencies.

1. Sales to Uganda had shown spectacular growth. Reliance on such market however is risky. Payment problems and trade impediments have recently disrupted this growth.

Milk Production Goals

An officer of the Ministry of Agriculture has argued that there are several reasons to believe that milk production goals may not be achieved unless "vigorous action is taken to promote production".² He cites sketchy information regarding availability of dairy heifers from large-scale for small-scale farmers as an important bottleneck. He draws attention to the fact that herds from large-scale farms have been allowed to decline and that although a rehabilitation scheme is underway, it too, may be slowed down by a shortage of suitable heifers. It may, therefore, take some considerable time before dairy heifers become available in sufficient numbers to meet the demand by smallholders.

It appears, therefore, that there may have been an oversight in the formulation of the Plan not only with respect to availability of dairy heifers (incidentally, Klans Meyn³ had argued that dairy heifers would be in surplus in 1973 but, indeed, the opposite was the case). Other factors seem to have been overlooked. One such factor is the prevalent high mortality rates of improved dairy animals under average smallholder conditions. Harmon and Zalla in their Vihiga Special Rural Development Programme (SRDP) evaluation Report (1) quote a mortality rate of about 20 per cent per year among IDA loan recipients and at least 30 per cent per year of the calves produced through artificial insemination. Most of the dairy areas has endemic tickborne diseases which can be controlled by regular dipping or sprays using acaricides. Some of the existing dips are 'hoplessly under strength and nothing better than dirt births' and consequently useless for tick control.

Partly because of the increased cost of food and partly because of changes in relative prices of agricultural products, farmers may have been substituting food crops for milk production (if milk output were to decline because of a lower relative price, output of crops will increase). Cowen has, indeed, noted a significant decline in milk output in Mathira Division of Nyeri District. The economic Survey of 1975 and 1976 also notes some decline in milk output. It explains the situation thus: 'the generally unfavourable weather conditions during the last two years and high cost of alternative feed inputs (emphasis mine) have been responsible for the continued decline in total dairy production. As can be seen in the table below output has as yet to recover to 1972 and 1973 levels.

2. privileged paper.
3. See IBRD. The study of the Availability of Fattening, Beef, Breeding and Dairy Breed Stock in East Africa. Permanent Mission for Eastern Africa, Nairobi, 1972.

Table 1 Milk output

Year	Whole milk equivalent* (thousand litres)
1970	232,013
1971	220,351
1972	268,437
1973	279,658
1974	249,843
1975	230,607

* Deliveries to KCC and other sales licensed by KDB.

Source: Economic Survey 1975 & 1976 Central Bureau of Statistics

Many smallholders raising dairy cattle are still beginners in the art of animal husbandry and are less than efficient stock managers. Production is low under average smallholder conditions. Nutritional, animal health and management standards have a lot of room for improvement.

Importance of Smallholder Dairy Production

The smallholder dairy enterprise is an important supplementary enterprise-- to the extent that it contributes to farm income without curtailing productive activities; complementary enterprise -- to the extent that it uses by-products coming from the production of crops; and also a major enterprise in its own right helping generate regular and frequent income and employment. Smallholder dairy farming can and often is integrated with cropping in order to utilise by-products, and assist in some form of fertility maintenance rotation and to make use of non-arable areas. Lastly the dairy enterprise contributes significantly towards improved nutrition⁴. Milk consumed on the farms provides a regular source of protein.

The smallholder's share of total milk production in 1974 accounted for 40 per cent of all milk passing through known commercial channels and according to the Plan, it should reach about 50 per cent of all milk in the formal market is derived from large-scale farms. Table II shows the small-scale farms (excluding those under settlement schemes) account for 42.3 per cent of the grade cattle herd, large-scale farms for 33.8 per cent and settlement schemes for the remaining 23.9 per cent.

4. See appendix. III

Table 2: Grade Cattle Herd by type of Farmer 1974

Type of Farmer	Number of Cows (thousands)	Per cent of Total
Large-scale: grade cattle	164	33.8
Small-scale: grade cattle	140	28.9
Zebu crosses	65	13.4
Settlement-schemes: grade	116	23.9
Total	485	100

Source: Kenya Dairy Board.

Over 30 per cent of the smallholder cows consist of cross-breds. Even under smallholdings, commercial milk production is largely dependent on grade cattle. Of all Kenyan Creameries, only Mariakani Milk Scheme (the only non-KCC creamery in the country) is predominantly supplied from zebu cattle. It is owned by Kwale/Kilifi Co-operative Union which consists of eight primary societies.

As can be seen in Table III, over half of the milk output in smallholder areas is absorbed in the rural areas. Local consumption takes precedence over factory deliveries with concomitant improvement of diets in rural areas. Deliveries may dry out altogether in the dry season.

Table 3: Estimated production of milk & cream by Smallholders

	1970	1971/72	1973/74
Grade cows (thousands)	99	124	159
Production (million litres)	51	64	82
Rural supplies	35	38	41
Factory supplies	16	26	41

Source: extracted from de Jong, MOA, 1973. p.3

Redistribution of the dairy stock from large-scale farming areas to small-scale farm areas has been taking place since independence. In 1970, Peberdy (11) had warned that as a consequence of this redistribution, the danger existed that in the dry periods of the year, or in drought year, deliveries to KCC may fall below liquid milk consumption in large towns. He suggested that should such a situation arise then the KCC should be prepared to sell re-constituted milk. He maintained that the big fluctuations in co-operative

wet and dry season deliveries to KCC should not be construed to represent smallholder's ineptitude but as a consequence of the fact that local demand is met first. Local sales are more profitable and hence co-operatives put more emphasis on them. We can illustrate this point by taking Kiambu district as an example. Table IV demonstrates the greater cash returns obtained for local milk sales.

Table 3: Average Prices received for local sales by Kiambu Dairy Co-ops 1974/75.

Co-op. name	Price per Kgm cents	Shs/gallon
Githunguri	98.5	4.63
Limuru	100	4.70
Kiriita	72.9	3.42
Ndumberi	78.7	3.70
Kiganjo	231	10.85
Gatamaiyu	98.3	4.62
Kiambaa	98.4	4.62
Kabete	97.6	4.59
Kikuyu	78.2	3.67
Chania	100	4.70
Komothai	113	5.31
District Average	107	5.02

Source: Calculations from District Co-operative Officer's Annual report.

The importance of local sales cannot be overemphasised especially when we realise that the maximum price obtainable from the KCC at the factory gate was just over 74.5 cent per kilogram (Shs 3.50 per gallon) for the period shown. In addition, the Co-operative neither have to bear the transportation costs to the creamery, nor indeed, have to suffer any loss through downgrading of such milk that may occur at the creamery. It is thus a sound business practice, if not an imperative, that local sales be met first.

Aspects of production:

The field obtained by farmers is very variable and is determined by the genetic potential of the animal (breed) and management factors such as husbandry techniques -- forage production, feeding system, stocking rate, disease control -- and capital availability. 25 per cent of variation in Kenya cow's milk yield is due to genetic influences (11, p77) Survey results of artificial insemination indicate average yields of 1597-1724 litres (347-367 gallons) per lactation but with the wide range of 670-3525 litres (149-738 gallons). This indicates the great potential for improvement.

The calving interval in Kiambu smallholder areas was estimated to be 14.1 months⁵ (431 days). This a low figure since a calving interval of 17 months appears more common in other areas. Calf mortality was estimated to be 11 per cent for heifers of up to 9 months old. The corresponding figure for bull calves is 15 per cent. Overall, about 14 per cent of all heifers are lost before insemination at the age of 20.5 months. Heifers average about 30.6 months at first calving. Apparently two thirds of all heifers born come into production.

The problem of low productivity per cow is closely related to poor quality pasture available and few farmers use concentrates as a supplementary feed. The most common pasture grasses in Central Province are Kikuyu grass (Pennisetum clandestinum) and star grass (Cynodon Spp). They occur naturally or are planted from splits. For fodder crops, napier grass (Pennisetum purpureum) appear to be the most common but other by-products such as banana stems and maize stover are often used. Other grasses such as giant and Nandi setarias-- Setaria splendida and Setaria anceps are also found as by-production of soil conservation.

Prompted by drastic declines in milk output in the dry season, promotion of fodder crops is receiving emphasis as a part of animal production advisory work.⁶ The District Development Committees of Central Province have provided about Shs 350,000 which have already been distributed to farmers for fodder production. The district shares were as follows:-

Nyeri	Shs 220,000
Muranga	80,000
Kirinyaga	46,000
Nyandarua	89,000
Kiambu	125,000

The program may be continued in future.

Supplementary feeding cannot be overemphasised if greater milk yields are to be achieved. There is sufficient evidence to show that a further utilization of genetic potential exceeding 2000 kg per cow per lactation is highly dependent on feeding. Natural grazing (Kikuyu and star grass) cannot provide adequate digestible energy and crude protein to sustain milk output

5. MOA. Veterinary Services Division National AI Annual Report. various issues.

6. The Kenya Dairy Board is planning a package program for improving forage production that will entail provision of credit for pasture improvement.

above 2000 kg. Small farmers also purchased factory waste e.g. mashisha (brewery waste) and pineapple (canning waste).

Lindstrom & Lindstrom (8) found that 82 per cent of small-scale farmers use ground maize, various vegetables and scraps, bean, dairy cubes and pollard for supplementary feeding. He concluded, however, that no worthwhile relation could be made between amount of concentrate fed and production of milk. He estimated the amount of concentrates fed to be 150-300 kg in Kisii and Kericho.

Animal health considerations are paramount if production is to be maintained. Spraying or dipping arrangements have to be sustained. The most serious tick-borne diseases are East Coast Fever (Theilariasis) -- mortality can reach 100 per cent-- and Anaplasmosis with a 50 per cent mortality as well as decreased productivity among survivors. Several authors have recently noted the unsatisfactory conditions of disease control. Hopcraft et al⁷ for instance, state that "in a number of high potential areas of Kenya we found tick-borne diseases to be virtually out of control with no prospect, given existing dipping arrangements, for significantly reducing mortality rates." Livingstone terms the situation in Special Rural Development Areas as "atrocious". The financial costs to the farmer incurred as a consequent of mortality losses, are very significant (and especially so, for borrowers - 75% of AFC loans given to small-scale farmers are used to buy grade cows.) Disease control is thus an important problem.

Marketing Channels for Milk and Milk Products

The smallholder because of his low output has necessarily to market his milk through co-operative societies. Starting from the farm level where some milk may be sold to neighbours, the marketing channel begins with the smallholder delivering milk to the local dairy of the primary co-operative society (or to the roadside shed to be collected for delivery to be collected for delivery to the same.) At the local dairy, the milk is checked for adulteration (sometimes a lactometer may be used to detect any augmentation by addition of water), smell churning, hairs, colour etc. Weighing then follows. The producer obtains a receipt for his milk but does not obtain cash payment on delivery (payments are usually made monthly). Cooling then follows (if the co-operative owns a cooler) after which the milk is put into 45-50 litre cans for delivery to the KCC plants. Raw milk handling is done almost entirely in

7. See An Evaluation of the Kenya Dairy Production Improvement Program. Report presented to the Govt of Kenya 1976.

cans. Bulk handling is done by KCC & some large-scale farmers. The co-operative may own a delivery truck or hire one on a regular basis. In addition to assembly of milk the co-operatives sell milk locally to individuals, restaurants and institutions.

The distance that each co-operative has to ship its product for sale, the mode and condition of transport constitute an important marketing cost and may indeed, determine the amount of product delivered. Different co-operatives operate in more severe environments in terms of infrastructure and physical environment. Some co-operatives are constrained to deliver their morning milk and are unable to deliver any of their members afternoon and evening milk.

Some co-operatives, on the other hand, deliver their milk twice daily. Delivery of milk twice daily, of course, contributes to higher transport costs but in absence of efficient cooling systems, it makes possible higher quality milk. About 25 per cent of all milk sold by smallscale farmers is marketed through primary co-operatives. Table 4 shows co-operative milk deliveries to the KCC for the financial year 1974/75. As can be seen co-operatives of the Coast and North Eastern Provinces did not deliver any milk to the KCC. In 1975, however, the eight primary co-operatives of the Kwale-Kilifi Co-operative Union delivered 2.6 million litres of milk to the Mariakani Milk Scheme in Coast Province.

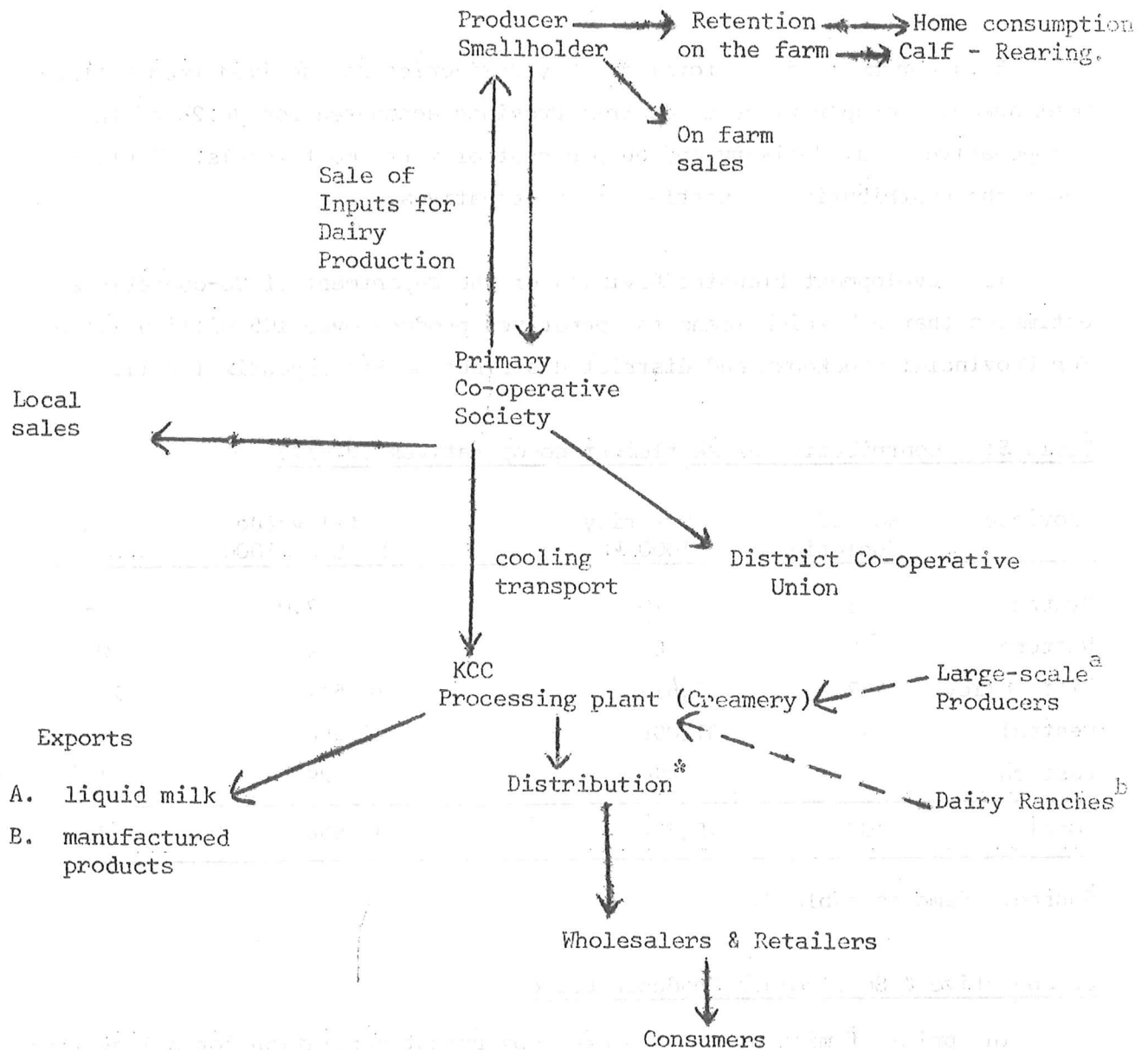
Table 4: Co-operative milk delivery to KCC by Province, 1975

Province	No. of Societies	Quantity of Milk ('000 kgs)	Cream ('000 Kg)	Value Milk	KShs Cream	Total
Nyanza	1	10	-	7.0	-	7.0
Western	3	88	-	68	-	68
Rift Valley	133	25,272	3.5	18,894	23	18,917
Central	83	52,317	6.1	38,381	44	38,425
Eastern	10	1,511	-	1,129	-	1,129
Total	230	79,138	9.6	58,479	67	58,546

Source: Department of Co-operative Development, Development Planning Division, Statistics Section File, 1976.

A total of 230 co-operatives sold their milk to the K.C.C. About 58 per cent of these Co-operatives are located in Rift Valley Province while 36 per cent are in Central Province. In terms of actual production however, Rift Valley Province delivered 32 per cent and Central Province 65.6 per cent of the total.

Figure I: Marketing Channels for Milk



a & b are not part of the smallholder sector

* pasteurized milk (in tetrapaks) distribution in urban areas is well organized by KCC distributors and retailers.

According to KCC's annual report for the same period, the total amount of milk delivered was 231.6 million kilograms. This means that approximately 34 per cent of the annual KCC intake is supplied by co-operative Societies.

57.4 per cent of the total society deliveries was derived from Settlement areas. Co-operatives in Central Province accounted for 38.2% of the Co-operative total delivery and 66 per cent of settlement totals. Table 5 shows the contribution of settlement co-operatives.

The Development Planning Division of the Department of Co-operatives estimates that 25% which means co-operatives produce over 105 million litres. For Provincial Breakdown and district distribution See appendix I & II.

Table 5: Contribution of settlement co-operatives 1974/75

Province	No. of Societies	Quantity '000 kg.	Total value K. Shs. '000.	%
Nyanza	1	10	7.0	-
Western	2	69	54	0.1
Rift Valley	47	13,617	10,512	18
Central	47	31,098	22,356	38.2
Eastern	5	840	629	1.1
Total	102	45,634	33,558	57.4

Source: Same as table 3.

Co-operative & Smallholder Producer Price

The price of milk has been under government regulation for a long time. Some of the major influences in the past have been economic as well as the political power of milk producer groups. No attempt will be made to trace the history of dairy pricing in this paper. Suffice it to say that until 1970 prices paid to producers depended on a system of quotas and contracts which is discussed elsewhere (see for instance (2,14)). Since 1971 and subsequently producer prices have been set by a presidential decree. In that year a decree was issued establishing a factory-door price for all grade a Milk of Shs.0.745 per kilogram (or Shs. 3.50 per gallon). This price is reduced by ten cents per gallon for second grade milk and one shilling for low grade.

The price that the farmers receive is very important in providing incentives for sustained and increased output. Farmers respond to price

changes. As long as supply elasticity is non zero, interference with price mechanism will have an output effect. At this point we can only make the apriori statement that output will respond positively to prices because of lack of quantitative information regarding supply responses in Kenya. Undoubtedly, the substantial boost in producer price promoted milk production. There are some relevant factors too. The availability of resources to the agricultural sector in general, and to the dairy enterprise, in particular, has important implications for the level of milk output. The ability of farmers in different localities can be influenced by the level of infrastructure and other services provided by the government and hampered by absence of cooling plants, poor roads, lack of AI service, access to credit, acaricides, cattle dips, provision of water etc. While taking cognizance of these important factors, we shall nevertheless concentrate on the pricing questions.

We have alluded to the fact that the price of milk is fixed at the factory gate. This price however, is neither what the smallholder nor what his primary co-operative society to which he delivers his milk gets. There are several factors that determine the net price realized by the farmer. The primary co-operative society often belongs to a district cooperative union which provides centralized services for the primary societies including book-keeping, transport at times, storage, credit and saving facilities. Before the producer is paid, the primary and Union, Societies deduct their various costs (the societies' commission) incurred in handling milk. Unlike the case of maize, these Societies' costs are not fixed by authority.⁷

Once the various co-operative societies (primary and union) costs have been deducted from the price received from the KCC, the farmer receives whatever is left. This residue is the producer price in stricto (i.e the price after all mandatory deductions including any local government cesses). It is the key price in providing incentives necessary for increased production. The difference between KCC price and the producer price is what we shall call the co-operative mark-up or Commission. The regulated price is the same at all factory gates for the same quality of milk. The KCC operates a transport pool which implies a subsidy for the remote areas, some of which may be on the extensive margin of agricultural production and where the consequent increase in milk output may exceed the cost of the subsidy.

The producer prices paid to the smallholder differ to the extent that the costs of various primary co-operatives societies and unions differ. Such costs are influenced by such factors as location, distance from KCC plants,

type of transportation and size of trucks, road conditions (infrastructure) quantities and grades of milk handled, quantities of milk sold in the more lucrative local market, other services rendered and, management capabilities of co-operative officials. In theory, we can expect as many producer prices as there are co-operatives (there were 230 active dairy co-operatives in 1975). Some of the co-operatives are multipurposes co-operatives and the national trend may have been in that direction. Indeed, a government sessional paper points towards the multipurpose otype of co-operative society. It states that:

"At the village level, the policy is one of developing viable primaries on a multicommodity, multipurpose pattern so that the one village society may, in the long-run meet all the economic needs of its members." (12, p.3)

There are several advantages of a multi-purpose co-operative society: the farmer belongs to only one co-operative which market his agricultural produce. At the same time it provides benefits in that administrative and overhead costs will be spread over several activities. It will be possible to achieve economies of size i.e. there will be a reduction in costs per unit (e.g per kilogram milk) of the total turnover. (Some single-purpose co-operatives are too small that means that per unit costs are too high). There are disadvantages of multipurposes as well. In a situation where entrepreneurship is limited the burden of management which is likely to become greater, is likely to lead to a greater danger of maladministration. For a fuller discussion of organizational problems see Hyden (3) and Karanja (5). Economic performance may thus suffer and maximization of returns will not be achieved.

The problem of allocation of joint costs arises in multipurpose cooperatives. It is difficult to determine the exact costs of certain activities. Peberdy (11) claims that "for multi-purpose cooperatives too much time is spent on crops using the dairyman's finance the societies day to day running costs. Inefficiencies are common with funds being used for other co-operative enterprises with no hope of return." (11, p.80)

Co-operative margins

There is no conclusive evidence concerning whether the margins are reasonable or excessive or just right although informed opinion tend to lend support to the margins being high. The ILO report (4) for instance stated that "many co-operative marketings e.g. coffee, pyrethrum and milk are inefficiently managed and have a low turnover so that a large proportion of the

producer's gross returns is deducted to meet the Societies' and union overhead expenses. Some co-operatives have suffered mismanagement of funds and outright misappropriation (this is especially so, for land purchase here) while others have been doing a good job. Good management is a function of the kind of education acquired (business accumen, knowledge of co-operative principles etc) by, and the personal integrity of the staff employed. Studies of most business enterprises (of which co-operatives should be part of) demonstrate that the basic prerequisite to success is the quality and leadership of (senior) management.

Before we can determine whether margins are reasonable or excessive or just right we have to take all intermediate costs into account. We have to determine whether the marketing and other services the co-operative render warrants the price differential. We must note that in addition to collecting, cooling, and transporting small-scale farmers' milk to the KCC most primary co-operatives engage in a number ancillary activities such as supply of dairy inputs e.g. feeds, spray chemicals, etc., provision of credit, land purchasing and farming etc. Whether each function is performed economically and whether it is paid accordingly will determine the value added by co-operatives and concomitantly determine the net price the farmer receives.

We are thus mainly concerned with the cost of marketing which could eliminate efficiency in dairy production. If the cost of getting milk to the KCC takes too high a proportion of the decreed price, then production may be uneconomical. Undoubtedly, greatly improved marketing organizations may be essential in order to take full advantage of favourable productive opportunities.

Experience of the Dairy Co-operatives

We shall attempt an assessment of the economic performance of dairy cooperatives. We recognise that cooperatives have socio-economic roles (and that these are important) but we shall regard the economic efficiency as the crucial factor in maximization of economic returns. As a starting point we shall examine dairy co-operatives in Kiambu, Murang'a and Nyeri in the traditional African areas and then turn to Nyandarua and Uasin Ghisu as examples of dairy co-operatives in settlement areas.

The performance is very mixed. Indeed, some co-operatives are performing their jobs efficiently and well while others are struggling with one or more problems that affect their efficiency adversely. We shall consider the

net price realisation by farmers (the price farmers receive after all mandatory payments have been met) to be a good measure of performance.

Average costs of operation (Society's overhead) vary widely among societies, largely because of volume differences (economies of size) but also reflect managerial skills and other factors such as penalties incurred by downgrading milk on quality basis and lack of integrity among employees (cash embezzlement and maladministration). Theoretically we would expect inefficiency of many co-operatives to arise from the fact that they handle too small a quantity of commodity to be economic;⁸ we would expect unit costs to increase sharply below a certain minimum volume of commodity (ies) and vice-versa.

We shall now turn to the experience of the various districts. In 1975, Murang'a had only one active dairy co-operative, Kiriti, which did not deliver milk to KCC in the months of January, February and March. Instead some milk had to be imported from Nyeri to meet local demand of liquid milk in Murang'a Town in February and March. Payments paid to the farmers are lowest when most milk is delivered to the co-operatives. Operations costs are high but because of wide collection area but because of the large local sales, 76% in 1973/74, the price paid to the growers compares fairly well with those of other districts. (See table 5) Nevertheless the percentage accruing to the farmers appear to be inordinately low, 45%, and there is room for savings. Until recently the Co-operative after some spells of maladministration and cash embezzlement has been run by a commission.⁹

Table 5 includes Murang'a and Kiambu dairy co-operatives by quantity of milk handled. It is interesting to note that the price realised by farmers vary somewhat throughout the year and the monthly range is given. No clear pattern emerges, and it is therefore not possible to conclude that prices paid in the dry season differ substantially from those paid in the flush season.

As can be seen the smaller co-operatives tend to have the highest overhead costs (society's commission) but nevertheless, they tend to pay prices

8. As analogy from Tanzania we can cite. Laurent (7) who showed that inefficiency of many co-operatives arose from the fact that they handled a quantity of commodity/too small to be economic. To exacerbate the situation, many co-operatives are manned by persons of no experience, little training and questionable integrity. Undoubtedly, some dairy co-operatives in Kenya suffer these maladies.

9. The duration of the commission has since lapsed.

almost as high as the bigger co-operatives because of their bigger sales in the more lucrative local market. Komothai co-operative, however, is the exception. It is a very small co-operative, with minimal local sales. Its farmers realise the lowest prices. We should note at this point, that the highest price possible in this eperiod was 74.5 cents per kilogram at factory gate. The farmers gate. The farmers of Komothai at one point realised a meagre 11 cents per kilogram.

Table 6 shows the prices realised by farmers of Nyeri district. We have not attempted a breakdown into KCC and local sales but local sales are important especially for Mathira.

Generally we can see that unit costs per kilogram of milk handled increase with decreasing size of co-operative throughout. The average payout to producers for Kiambu, Murang'a and Nyeri is 65.1 cents per kilogram while the society's Commission amounts to 12.8 cents per kilogram of milk. The gross realisation by the Co-operatives is thus 77.9 cents per kilogram of milk.

We shall now turn our attention to two settlement areas, Nyandarua and Uasin Ghisu and examine their realizations. We are not concerned with land purchase Co-operatives, which although supplying some milk, the quantity is not all that significant have some special problems of their own. It's also generally true that the predominant number of these co-operatives are multi-purpose. In addition to milk they handle pyrethrum and sometimes wheat or maize.

We begin with the case of Nyandarua district. Table 7 shows some of the pertinent features of Nyandarua co-operatives, quantities of milk and pyrethrum handled, their value and gross price realized for milk. All the co-operatives except Ngarachi have pyrethrum as one of the major activities but milk appears to be the dominant commodity except perhaps for Shamata where pyrethrum was worth more in the period studied.

Table 6. Milk deliveries & Prices Received by Murang'a and Kiambu Co-operatives, 1973/74.

Name of Cooperative	Total delivery	Sales to KCC	Local sales	Local sales/total sales per cent	Gross sales per kg.	Payment to producers cts/kg.	Society's Commission	Producer price monthly range
<u>Murang'a District</u>								
1. Kiriti	598,143	144,645	453,498	75.8	117	64	53	50-82
<u>Kiambu District</u>								
1. Githunguri	5,594,444	5,185,587	390,258	7.0	70.9	65.0	5.9	65-90
2. Limuru	3,059,744	2,571,939	480,409	15.6	73.7	68.0	5.7	65-70
3. Kirita	2,006,951	1,761,547	245,404	12.2	75.0	62.0	13.0	59-63
4. Gatamaiyu	1,442,735	1,312,032	130,703	9.0	71.1	59.0	12.1	55-65
5. Ndumburi	1,376,115	1,075,029	461,308	33.5	98.2	65.0	20.0	65
6. Kiganjo	1,048,559	720,154	304,181	31.9	77.2	61.0	11.2	61-64
7. Kabete	643,836	496,356	149,859	23.3	75.8	59.0	16.8	55-60
8. Kiambaa	643,593	304,039	339,554	52.8	79.6	65.0	14.6	65
9. Kikuyu	371,916	279,764	89,948	24.2	73.0	61.0	12.0	59-64
10. Chania	215,295	37,550	177,745	82.6	1.0	67.0	33.0	65-68
11. Komothai	76,796	65,448	6,952	9.0	N/A	38.0	N/A	11-52

Source: Computed by the author from Kiambu Dairy Co-operative Union and Dept. of Co-operative Development, Kiambu figures.

Table 7: Milk deliveries and prices received by Co-operatives and Farmers of Nyeri District 1974.

Name of Cooperative	Total delivery	Gross Price cents/Kg.	Payment to producers cents/Kg.	Society's Commission cents/Kg.
Mathira	8,544,654	78.6	66	12.3
Tetu	3,695,332	78.0	63	15.0
Ihururu	1,610,023	81.3	62	19.3
Mathingira	1,379,256	83.5	66	17.5
Kieni	624,911	72.7	58	14.7
Mukurweini	568,880	78.0	59	19.0
Ngukurani	182,391	74.9	52	22.9

Source: Computed by author from Nyeri District Dept. of Co-operative Development figures.

Table 8: Commodities handled by Nyandarua Cooperatives, 1974/75

Name of Co-op.	No. of Staff.	Total delivery, kg.		value Shs.		Price/kg. (cts)
		Milk	pyrethrum	milk	pyrethrum	milk
Marmanet	15	806,357	13,236	607,364	65,909	75.3
Mukeu	15	628,178	110,507	487,124	132,167	77.5
Lesirko	13	593,028	92,822	497,366	109,325	83.9
Oraimutia	19	587,817	58,544	449,307	97,348	76.4
Losogwa	14	559,615	45,746	412,148	61,936	73.6
Nyairoko	10	513,098	67,024	398,441	49,014	75.0
Pesi	15	486,771	142,833	386,759	199,552	79.5
Ol Joro Orok	20	457,215	148,367	351,979	184,044	77.0
Kanyagia	7	244,626	59,544	187,678	71,816	76.7
Simbara	6	242,009	108,867	186,944	157,476	77.2
Shamata* ¹	13	209,185	271,129	163,643	298,258	79.5
Ndaragwa	11	185,984	47,354	160,064	72,882	86.0
Karagoini	9	126,634	96,347	99,795	131,542	78.2
Ngarachi* ²	8	55,801	-	39,398	-	70.6
District Total		5,696,319	1,262,320	4,428,010	1,631,270	77.7

Source: Compiled by writer from Co-operative Officer, settlement figures.

*1. 8 months totals for milk (no records for April, May, June and July).

*2. 5 months figure for milk (July, August, September, October, November).

Losogwa, Karagoini, Marmanet, Shamata, Lesirko Ol Joro Orok and Mukeu serve high density schemes, while Ndaragwa, Kanyagia, Pesi, Simbara, Oraimutia, and Nyairoko serve low density schemes. Ngarachi is the only co-operative serving Harambee Settlement Scheme. Local sales of milk are not very substantial (Nyahururu is a scheduled town). We are concerned with a period in which the KCC price of milk was fixed at 80 cents/kg for about six months. The co-operatives charges 13 cents commission per kilogram of milk and about 20 cents per kilogram of pyrethrum and 10% per cent of the selling price for wool. The Commission covers the societies expenses as well as transport charges of milk and pyrethrum and all marketing expenses for wool. The low density co-operatives realised a higher gross price (87.6 cts/kgs) than high density coops (77.5 cts/kg). Ngarachi, a Harambee Settlement Co-operative realised the lowest price. This may reflect greater managerial ability of the low density co-operatives.

We now turn to the co-operatives of Uasin Gishu. Many of these like their counterparts in Nyandarua district tend to be multipurpose, with dairy being, more often than not, the major activity. As can be seen in table 8 the prices realised by these co-operatives are not very different from those received by co-operatives in other areas: The only difference is that the figures for Uasin Gishu are for 1975 when the KCC factory-gate price was fixed at 80 cents per kilogram.

Table 9: Milk deliveries and prices received by Uasin Gishu Co-operatives, 1975

Co-operative	Members delivery Kg	Delivery to KCC, Kg	Gross Price received	Producer price	Society Commission
Ainabkoi	1,594,515	1,556,869	80.2	64	16.2
Lessos	1,431,357	1,400,735	80.2	67	13.2
Ndalat	603,279	595,288	80.8	68	12.8
Elgeyo border	454,022	440,101	79.3	64	15.3
Kaptagat	367,786	362,016	80.0	65	15.0
Sosian	350,327	350,637	81.8	66	15.8
Tapsagoi	299,667	282,468	79.1	57	22.1
Olare	76,993	73,787	79.1	56	23.1
Chepsaita	13,840	14,244	84.1	58	26.1
District Total	5,597,339	5,484,971	80.1	65.4	14.7

Source: Computation by the author from Co-operative Settlement File Rept/2, Co-op Officer's Annual Report.

Milk quality:

We alluded to the fact the societies are likely to sustain losses if the quality of milk delivered falls below the first grade. We also mentioned that the price is reduced by 10 cents per kg for second grade. Downgraded milk is paid at the meagre rate of 20 cents per kg. Obviously, reject milk receives zero payment. (It's unfit for human consumption) Some of the factors that influence milk quality include bacterial count, smell, taint, butter fat content, solids not fat etc. Milk is likely to be downgraded if, yfor instance, it is low in butter fat (i.e less than 3.5 % Butter fat) and/or low in solids not fat (i.e. less than 8.5% SNF).

Nyeri Co-operative Union figures indicate that less than three per cent of milk delivered to Kiganjo creamery in the 1974/75 financial year was downgraded. For the second quarter of 1976 KCC figures indicate that of the total co-operative deliveries 2-3 precent was downgraded. The comparable Nairobi Creamery figures indicate that 2.7% of the milk was downgraded in the last quarter of 1975, 1.8% in the first quarter and 3.6% in the second quarter of 1976.¹⁰ At Nyahururu the quality of milk delivered at KCC plants is sometimes below required standards and it is evident that farmers could increase their income by improving the methods of handling. The main reason for the low quality of milk produced is the bad transport situation and the mixing of un-coaled evening milk with fresh morning milk.¹¹

We have noted that the cash returns to the producers depend on the milk reaching the factory in wholesome form. The success of delivery depends on effective organization and especially the possession of a cooler. The Rural Dairy Development Programme which was initiated in the sexties is still active and has been assisting the establishment of dairy centres. By continuing the provision of coolers land/or separators (in the remote areas) it can improve the situation significantly.

Transportation Problems

We stated earlier on that transport costs are major factor in operation costs of co-operatives. Transport costs are influenced by many factors such as terrain and topography, type of carrier, total amount of traffic, product bulkiness, value, perishability, type of container and size lots and the institutional setting.

10. This might be an underestimate since co-operatives prefer to take back the downgraded milk to redistribute to their members.

11. Since the opening of new factory KCC no longer accept downgraded milk. Hence there has been marked improvement in the quality of milk handled. Many Co-operatives neither collect nor deliver evening milk.

Co-operatives operate in different environments regarding existing infrastructure - transport networks and modes of transport. This might be reflected in their costs. We shall use Nyandarua district as a case study to illustrate the problem since a transport survey has been carried out there.¹² With the exception of Ngarachi where transport relies completely on private means, the transportation of products (milk, pyrethrum, wool etc. and agricultural inputs such as fertilizers) is provided by the societies themselves. Stacher contends that when visiting the co-operative societies, one has the feeling that cost consciousness is not very developed amongst the management (*italics mine*).

For many societies, transportation problem does not arise out of shortage of vehicles. Indeed, the societies may own 'too many' vehicles or vehicles of inappropriate capacity, many of which are not being used economically and hence are running at a loss. In some instances, the societies have over-invested in heavy transportation equipment which concomitantly involves high operating costs. Societies not only have inappropriate means of transport, but also practise poor transport management. Sometimes they even make unjustified changes for internal transport, i.e. they make insufficient charges on milk and pyrethrum produced in the societies - sometimes not even sufficient to cover running costs. The societies also lack supervision of transport staff, that is, they have no time and kilometre controls. Maintenance of the vehicles is also poor. Consequently, transportation costs represent a heavy burden for the societies.

Table 10 presents some aspects of the transport set. As can be seen under the column of highest daily delivery of milk there is considerable overcapacity in vehicles. Pyrethrum and wool should not determine the size of vehicle because they are not regular products and since transportation can be hired easily. The quantity of milk should be the criterion that determines the vehicle capacity. Co-operatives try to reduce their costs by providing their vehicles for hire to non-co-operative members.

There is considerable room for streamlining transportation. Societies could pool their transportation equipments, share the overhead costs, achieve greater kilometre runs per year and thus ensure costs saving.¹³ This would mean greater returns for the members of the societies.

12. See Stacher, U. Transport Survey for Thomson Falls Settlement Co-operatives Societies (1974). From which the following section borrows heavily. Also the minutes of Thomson Falls Union meeting 17-10-74 - Discussion paper on Transport matters (author unknown)

13. The Kenya Dairy Board is contemplating a loan program to supply trucks to the dairy societies. Hopefully this will also involve extension advice.

Table 10: Salient features of transport of Nyandarua Settlement Co-operatives 1973

Name of Co-operative	Milk	Commodities (kg) pyrethrum	Wool	Highest dairy milk intake (kg)	Distance from Nyahururu	Vehicles owned lorry/pickup/tractor	Estimated annual Km-run	Estimated cost per km.
Losogwa	563,914	60,754	3,849	NA	11	1 F/up (2 tons) 2	20,000	1.80
Karagoini	111,039	12,596	-	NA	14	1 P/up (1.5 ") 1	20,000	1.60
Marmaret	724,676	5,849	-	3,000	20	1 P/up (2.5 " each)	20,000	2.00
Ngarachi	123,392	4,202	-	1,300	38	None	-	-
Ndaragwa	348,948	25,076	5,314	1,700	31	1 F/up (2.5 tons) 1	35,000	1.80
Kanyagia	174,451	17,368	-	1,000	-	1 P/up (1.3 ") 1	25,000	1.80
Pesi	483,436	38,136	3,104	1,900	38	1 P/up (2 tons) 1	45,000	1.60
Shamata	373,339	94,172	8,930	1,600	38	1 P/up (2.5 ") 1	45,000	1.60
Simbara	190,000	21,574	4,612	900	28	1 P/up (1.5 ") 1	30,000	1.40
Oraimutia	761,966	20,110	2,090	3,300	22	1 lorry (7 ") 1	40,000	2.50
Nyairoko	628,864	38,921	1,898	2,700	24	1 lorry (3 ") -	30,000	2.00
Lesirko	844,001	34,175	-	3,700	19	1 lorry (3 ") 2	30,000	2.00
Ol Joro Orok	720,323	67,017	-	3,400	20	1 lorry (6 ") 1	30,000	2.60
Mukeu	778,429	69,006	-	3,500	15	1 lorry (7 ") 1	25,000	2.80

Source: Condensed from Stacher, U.

"Transport Survey for Thomson's Falls Settlement Cooperative Societies. (mimeo) Nyahururu Makao Co-operative Union, 1974.

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Appendix I

Milk Deliveries to KCC and local sales by Co-operatives by Province (thousand Kgs): 1975.

Province	delivery to KCC	local sales.
Central	52,317	10,245
Rift Valley	25,272	5,272
Eastern	1,511	5,609
Western	88	902
Nyanza	10	1,758
Coast	-	2,186
Total	79,198	25,972
Percentage	75.3	24.7

Source: Dept of Co-operative Development.
Development Planning Division, Statistics section.

Appendix II

Distribution of Dairy Societies by District, 1975

District	No of Societies	Quantity of Milk (thousands)	Cream
Kisii	1	10	-
Nyanza Province	1	10	-
Kakamega	1	19	-
Bungoma	1	50	-
Western Province	2	69	-
Nakuru	36	4,143	3.0
Baringo	3	730	-
Kericho	32	5,861	0.5
Uasin Gishu	37	8,740	-
Elgeyo-Marakwet	3	712	-
West Pokot	1	64	-
Laikipia	4	833	-
Narok	1	64	-
Nandi	8	2,972	-
Trans Nzoia	8	1,153	-
Rift Valley Province	133	25,272	3.5
Nyeri	19	17,291	6.0
Muranga	1	36	-
Nyandarua	39	23,291	0.1
Thika	6	738	-
Kiambu	16	10,622	-
Central	81	51,994	6.1
Coast Province	8	2,618	-

Appendix III

Essential Amino acids in half-litre of Milk compared to minimum daily requirements.

Amino acids	Content of $\frac{1}{2}$ litre of milk (grms)	Minimum daily requirements grms/day	
		men	women
Isoleucine	1.15	.70	.45
Leucine	1.73	1.10	.62
Lysine	1.41	.80	.50
Methionine & Cystine	.60	1.01	.55
Phenalanine & Tyrosine	1.89	1.40	1.12
Threonine	.83	.50	.31
Tryptophan	.25	.25	.16
Valine	1.24	.80	.65

Source: Newer Knowledge of Milk, National Dairy Council, Chicago, 1965.
p 16 (converted to metric system) Amino acid content is based on
milk of 3.5% Protein. Amino acid requirements are based on
American Standards.

