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## Supplementary paper 1: Dairy subsector of the agro- pastoral household economy

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### Abstract

A study was made of the dairy subsector of the agropastoral household economy. In contrast to reports on nomadic Fulani, milk was not found to be the basis for subsistence. The staple foods are cereals, provided primarily by the men from proceeds of cattle sales or from their own farms.

The pattern of resource control and decision-making in Fulani households is such that milk production is separate from milk processing and marketing. The women generally have little influence on decisions concerning cattle management. Milking is done by men and boys, who determine how much is extracted and how much is left for the calf.

The amount of milk a woman receives from the herd depends not only on the level of milk offtake but also on socio-economic variables. In the average Fulani household monitored in Abet, two women each receive about 3 kg of milk per day from the herd, more in the early wet season and less in the late dry season. Each woman decides independently how much of the milk allocated to her is consumed at home, how much is sold, the form of consumption and sales, and the extent of dilution.

The women try to generate more income from the portion of milk sold by diluting it when they expect demand to exceed supply on the market. The other major way of influencing nono (skimmed sour milk) income is to sell the milk together with prepared cereal foods, most commonly fura made from millet. If they sell milk with fura, the women can earn about one third more per measure of milk than if they sold it as nono alone.

Dairy products are not the sole source of income for settled Fulani women; they also sell prepared foods and occasionally small livestock, and engage in petty trading.

The women have complete control over their income. They are expected to use part of it for food purchases such as vegetables or seasonings to supplement the cereals bought by the

husband.

Because the men who pay for production inputs and manage the production and offtake of milk have no influence on milk marketing and the use of milk income, and expect little help from the women in meeting herd expenditures, it is unlikely that innovations to increase milk production will result in substantially higher milk offtake rates. The men express primary interest not in milk offtake but rather in calf survival and growth as a means of increasing herd size.

## Introduction

The agropastoral household is by no means in the complete control of the male household head. Decision-making and control over inputs, products and revenues of production are influenced by other household members and, in some aspects, are virtually out of the hands of men. In designing and extending innovations in the production system, the pattern of resource control within the household must be taken into account.

It was evident from previous research that Fulani women have rights to milk from the cattle herd: when Stenning (1959), Hopen (1958) and Dupire (1963) carried out their studies in the 1950s, the main source of subsistence for nomadic and semi-nomadic Fulani was milk, either consumed at home or exchanged for grain, and the women did the milking, processing and marketing of milk and obtained the grain for family consumption. Because ILCA is testing innovations for intensifying settled rather than nomadic pastoralism and because these innovations involve milk production, a study was made of the economic role of settled Fulani women with emphasis on dairying.

In-depth studies were made of eight Fulani households in the Abet case study area by means of informal interviews with active household members and observations of their economic activities and interactions within the family and with other members of the pastoral and farming communities. Particular attention was given to the 16 women who received milk from the herds. Additional data were obtained on other Fulani households in the area during occasional visits as well as through informants from the case study households. Beginning in 1984, measurements are also being made of milk products processed, retained for family consumption, and marketed by 12 Fulani women with whom close rapport had been established over the previous 2 years of qualitative studies. Dairy earnings are recorded and related to type of product and rate of milk dilution so that income per litre of processed fresh milk equivalent can be calculated.

Compared with nomadic Fulani groups described in the literature, the diversification in production and income-earning activities of the settled Fulani to include cropping, trading, paid employment, etc. has been accompanied by a change in cattle production orientation. Milk is not the basis for subsistence in the agropastoral economy in the study area. The main source of household income is the sale of livestock: cattle, sheep, goats and poultry. This change in the relative importance of milk in the household economy has implications for the influence of women in the production unit and for externally initiated efforts to develop dairy production.

In the households studied, the women's prime economic role is still in dairying but there are two significant differences from earlier descriptions of nomadic Fulani:

1. Men or boys rather than women usually milk the cows and can thus control milk offtake rates.
2. The staple foods - cereals - are provided primarily by the men from proceeds of livestock sales or from their own farms rather than by the women from dairy proceeds.

## Herd management and milking

Herd management is a male domain. The extent to which a herd thrives, multiplies and produces milk is seen as a reflection of the herd manager's abilities. The women may have had some herding experience as unmarried girls but, as a rule, are not involved in herding or other aspects of animal care. They generally have little influence on such herd management decisions as selection of grazing sites, length of grazing day, supplementation of cattle diet (e.g. with salt), and breeding decisions, all of which could influence milk yield.

However, on decisions concerning cattle sales, women are consulted or make their opinions felt. Animals which belong to the women or their children cannot be sold without the women's consent and even in the case of cattle belonging to the male household head, the women participate in discussions about the need to sell. If a man sells so many productive animals that he drastically reduces the milk supply to a wife, then - in the eyes of the Fulani community - she is justified in leaving him.

Among these settled Fulani milking has become, like herd management, a male domain. The cows are milked only once a day, in the morning; the evening milk is left for the calves. Neither men nor women in the case study household could remember ever having discussed the merits of milking only once daily, as opposed to the twice-daily milking reported in the literature on nomadic Fulani. Invariably, they said this is done because they and their fathers before them have always done so. However, conscious decisions concerning milking are made in the late dry season, when many Fulani stop milking weaker cows and a few stop milking entirely for some weeks. The herd manager makes these decisions and the women seldom ask for justification, for they are aware that grazing is poor at this time of the year and that some cows cannot even produce enough milk for their calves. The women are very conscious of the relationship between fodder (both quantity and quality) and milk yield, and use these concepts to explain fluctuations in milk quantities received from the herd.

Only if the cow belongs to her or her child by a previous marriage does a woman feel she has the right to decide whether or not a cow should be milked - e.g. at times of feed scarcity, or in the first days or weeks after calf birth. The women are interested in the survival of their calves and generally rely on the judgement of the milker - the husband, son or hired herder - whether the cow is producing enough to be milked.

The decision as to how much is extracted at milking and how much is left for the calf is made primarily by the milker. The women feel they can exert little influence on their husbands but somewhat more on their children to milk more intensively, and therefore encourage them to help with the milking. The women believe that, if they were to do the milking themselves, they could extract more milk but still leave enough for the calves. The men, however, generally believe that the women would take more milk so they could sell more, and the calves would suffer.

These differences in viewpoint are related to different emphases given to production aims by men and women in the settled Fulani households. The men express primary interest in calf survival and growth as a means of increasing herd size. Larger herds are desired partially for reasons of prestige but also in order to have more animals available for sale when the man wishes to make large expenditures for himself or his family, e.g. purchase of bags of grain, bicycle or motorcycle, hiring labour, purchasing materials for house construction, marriage and child-naming ceremony expenses, or financing a pilgrimage to Mecca. Most of the women feel that the highest possible milk offtake is the most important production aim from their own point of view; some, nevertheless, consider the production of saleable animals to be more important for the family as a whole because of the greater income generated. All women are also interested in herd growth, reasoning that a larger herd would yield more milk. In summary, the

women generally lay more emphasis than men on milk offtake as a production aim, but can also recognize the longer-term benefits resulting from the men's concern for calf survival and growth.

## Allocation and utilization of milk

The amount of milk a woman receives from the herd depends not only on the level of milk offtake but also on the number of women in the household, their relationship to the household head, and the pattern of livestock ownership.

The manner of milk distribution from the husband's animals varies between households. The milk from specific cows may be given to specific women, or the combined milk from all cows may be divided among the wives, or all milk extracted on one day may be given to one wife and all milk extracted the next to another. The men point out that, according to Islam, co-wives must be treated equally; therefore, each wife receives an equal amount of milk from the husband's animals. Because no actual measurements were made of the milk allocated to each wife, this could not be verified. Only one man said he allocated milk according to need; i.e. according to the number and age of each wife's children.

A woman receives milk from all the cows which belong to her or which she is holding in trust for her children by a former husband as well as, in some cases, from animals which her present husband has given to their mutual children. A wife with more dependents might thus receive a greater proportion of milk from the total herd. Other women living in the homestead, e.g. mother or divorced sister of the husband, are also entitled to milk from the herd but, unless they own milking cows themselves, do not receive as large a share as the wives. Thus, every woman in the household has a right to receive milk but has little influence on the portion allocated to her unless she and her children own cattle within the herd.

To give an idea of the amount of milk a settled Fulani woman can expect to receive, the following calculations were made on the basis of production monitoring data. A herd of 40 cattle (average size of herds monitored in the Abet area) has 9 lactating cows on a yearly average. As the average settled Fulani household includes two women, each would receive milk from more or less 4.5 cows. At a mean milk yield of 0.7 kg/day, a woman would receive about 3 kg of milk per day - more in the wet season when production levels are higher and less than this average in the dry season.

Each woman decides independently how much of the milk allocated to her should be consumed in the household, how much should be sold, the form of consumption or sales (as whole or skimmed milk plus butter, fresh milk or soured), and the extent of dilution. Men appear to have little influence on the division between home consumption and sales. They may request their wives to give the children more milk, but they cannot demand this. The women's attitude is that the men have no right to complain if they are not managing the herd well enough or milking intensively enough to supply the women with sufficient milk for both family and sales.

According to estimates made by the women, they generally sell about half the milk they receive from the herd. Measurements of home consumption and sales have confirmed this. Milk is thus providing the average cattle-keeping household in the Abet case study area with less than 10% of daily energy requirements (2300 Kcal per adult equivalent), but a higher proportion of daily protein needs. The greatest part of total nutritional requirements is derived from cereals, which are the basis for all major dishes in these households.

## Milk processing and marketing

A woman has some degree of influence over the amount of income she can generate from the

portion of milk sold, depending on the products sold and the method of selling. In the study area, nono (skimmed sour milk) and butter are the most common dairy products; whole milk, either fresh or soured, is seldom sold and, then, only on special request by customers.

The value of nono depends greatly on the way it is sold. If the buttermilk is added to the skimmed milk, as is most commonly the case, the water which was added during the butter-making process increases the total volume of liquid. Milk can be further diluted with water and kuka, a thickening agent made from the pulp of baobab pods. Dilution may be practised throughout the year but is greatest in the late dry season: in February and March of 1984, over half the measured liquid sold as nono consisted of water and kuka. At a given time of year, the extent of milk dilution appears to have little effect on price per measure of liquid; it therefore affects the price per kg of actual milk in the liquid. For example, in March 1984, women selling in Zonkwa received around 0.40 Naira per kg of liquid but between 0.75 ₦ and 1.10 ₦ per kg of actual nono, depending on dilution. The women, all of whom sell mainly to regular customers, claim they dilute to the extent that their customers accept it.

The other major way of influencing nono income is to sell nono together with prepared cereal foods, most commonly fura made from millet. According to the women's estimates as well as current measurements, if they sell with fura they can earn about one third more per measure of nono than if they sold only nono. This is additional to profits made by processing purchased grains to fura. If few or no cows are being milked in her family's herd, a woman may purchase milk from households with larger herds and resell it with fura at a gain.

However, fura preparation (preparation of flour from grains, cooking, kneading, forming of balls) is demanding in terms of time and energy. The heading of the cocked fura mass is particularly strenuous work. The women in the case study households usually sell milk every second day and, because almost all sell with fura, they or their daughters must spend about 2 hours every second morning on fura preparation. Older women and women without daughters of working age are not always able, for lack of sufficient strength or time, to make fura to increase the sales value of their nono.

A woman can also generate more income from her dairy products if she is prepared to sell directly to consumers or sell at markets where more favourable prices can be obtained, rather than selling to intermediaries usually other Fulani women - who resell nono with fura, or resell nono alone at markets with higher demand than those close to the milk producers. In the study area, direct sales are far more common than sales to intermediaries.

The women in the case study households sell about twice a month at the local weekly market, whenever this falls on one of their normal selling days. They seldom visit more distant markets to sell dairy products, but more often to make purchases. Most of their selling is done about three times weekly in farmers' homes, fields, places of employment and meeting places within a few kilometres of the Fulani homestead. Most customers are regular, i.e. they buy from the same women at least once a week. In some cases the customer is regarded as a close friend, and prices charged tend to be lower than on the market. The Fulani women value the social contacts involved in selling to regular customers and also value the services and gifts, such as bundles of millet at harvest time, which they receive from such farming households.

Most of the dairy earnings are in cash; the women seldom exchange directly for grains as described in earlier literature on nomadic Fulani, and when they do, the grain is normally used to make fura to sell. Dairy income constitutes roughly one third of total cash income from the family herd (Table 1), and makes up a still smaller portion of total household income. However, it is significant that dairy earnings provide a steady source of cash, whereas the larger sums of money from livestock sales are available to the household only at lengthy and irregular intervals.

**Table 1. Estimated income of settled Fulani household from cattle herd<sup>a/</sup>.**

	Average herd in Zonkwa area	Average herd of ILCA participating Fulani
No. of cattle	50	40
Annual offtake	6	4.8
Annual income from cattle sales (N):		
50% @ 700 N/head	2100	1680
50% @ 150 N/head	450	360
	<b>2550</b>	<b>2040</b>
Annual income from manure (N)	50	40
Total annual non-dairy income (N)	<b>2600</b>	<b>2080</b>
No. of milking cows (23%)	11.5	9.2
Annual milk offtake (litres) (0.7 litre/cow/day)	2938	2350
Whole milk equivalent marketed (litres) (50%)	1469	1175
Annual household income (N) from milk marketed as butter and diluted <u>nono</u> with <u>fura</u> (0.80 N/litre)	1175.20	940.00
Annual dairy income/woman (N)	587.60	470.00
Total annual household income from cattle herd (N)	3775.20	3020.00

<sup>a/</sup> Average household: 10 persons, including 2 women receiving milk from herd.

## Other sources of women's income

Besides dairy products and prepared foods such as fura, the only other major source of income for women in this study is the sale of livestock sheep, goats, poultry and, more rarely, cattle. Of lesser importance is petty trade, e.g. buying kerosene, salt or palm oil in large quantities and reselling them in smaller quantities in the local market or to neighbours. Although the sale of dairy products is still the main source of income for the women in this study, settled Fulani women are diversifying into income generating activities other than dairying. This may be because they have little direct influence over the amount of milk they receive from the herd, but also because there are more opportunities to engage in other activities when settled rather than nomadic. Moreover, there is a greater tendency to buy consumer goods which would have encumbered a household that was still mobile. The reason most commonly expressed by the women for seeking other sources of income is that they are not receiving enough milk to meet their needs and desires. Whatever the reasons for diversification, the facts remain that:

1. The agropastoral production unit as a whole is not primarily a carry enterprise.
2. Even the women's subsector is not exclusively concerned with dairying.

## Types of expenditures by women

The Fulani women have complete control over their income; they are not obliged to inform their husbands about their earnings or expenditures. The major food expenses of the household are for grains purchased in bulk by the husband. The women are expected to use part of their dairy earnings for small daily or weekly food purchases such as vegetables and seasonings to supplement the grains. However, in the dry season when milk production is low, the husband may also have to provide some money for such purchases. In any case, the largest category of expenditures by women is for foodstuffs and food preparation, e.g. machine-grinding of grains in the village or town.

In order to reduce food expenditures, most settled Fulani women keep kitchen gardens with a variety of vegetables, spices, and shrubs and trees bearing edible leaves and fruits. Some women also have small plots of okra, cocoyam or rice, although little money is invested in gardening. The small quantities of seed involved are usually saved from previous years or obtained as gifts from neighbours. Labour for making ridges is usually provided by husband or son, although some women reported having hired local farmboys to do this work.

Each woman purchases goods and supplies needed for her own hut and dependents, including cooking utensils, kerosene, toiletries and medicines. They buy all that is required for processing and marketing milk, including calabash bowls and butter churns, *kuka* to stretch the milk, and lime to paint the calabashes taken to market. Of their non-food expenditures, the largest are for clothing (in addition to that bought by the household head for his wives and children).

## Investment in agropastoral production

Occasionally, a woman uses her savings to buy a sheep or a goat. The former is kept by her husband or son with his own sheep; the latter is most commonly kept by the producer from whom it was bought. Most Fulani women regard small ruminants as a profitable form of investment, but regret that they can seldom accumulate enough to purchase animals. Only one case was encountered of a Fulani woman purchasing cattle (two head).

Most Fulani women in the study area personally own no or few (less than five) cattle, usually received from their parents, and make no contribution towards expenditures for cattle husbandry or grain farming. This is thought to be the man's responsibility. The women see little reason even to help pay for inputs such as supplementary feeds to increase milk production. However, in the few cases where women own or hold in trust a substantial portion of the herd (a quarter or more), the women contribute towards the purchase of the traditional salt supplement *kanwa* and towards cattle vaccination costs.

The main reason given by the women for their unwillingness to invest in the herd is that they cannot be sure that the benefits of their investment will be returned to them in the form of milk. Longer term benefits from herd growth are rendered uncertain by the possibility of divorce. The women also point out that the men's income from animals is considerably more than their own income from milk; thus, the men are better able to pay for production inputs. The Fulani men say they see little reason to extract more milk to give to their wives, because the women are not helping to buy feed and medicines for the animals or grains for the family. Investments in milk production which may appear profitable if calculated on a household basis could therefore encounter cash flow problems on account of the decision-making patterns and largely separate cash cycles in men's and women's spheres within the Fulani household.

## Implications for development of dairy production

Innovations, such as dairy crossbreds, supplementary feeding or fodder banks, require expenditures by the production unit for inputs. In the study area, such innovations are not likely to increase milk offtake for human consumption as projected because the men who pay for the inputs have control over their allocation to specific animals as well as over milk offtake, and can direct the benefits of higher milk production into their own sphere, the production of animals per se. If the men were to extract the additional milk and give it to the women, they could exert little influence on the utilization of the additional income and could expect little help in meeting milk production expenditures. Better family welfare would be possible if higher milk extraction would lead to more milk being consumed in the household and/or additional dairy income being used to meet family needs rather than the women's personal wants, but this is not in the direct control of the men who make the investments in the herd.

Innovations in animal nutrition and breeding could lead via higher milk production to faster rates of calf and herd growth so as to permit higher rates of animal offtake from the herd. At prevailing prices in Nigeria, the sale of one additional healthy bull would bring the family more income than the entire annual dairy earnings of an average settled Fulani woman in the study households.

However, even if developments in agropastoral production lead to a greater emphasis on beef, the Fulani households will continue to take off milk and the women will continue their dairying activities, as long as they have access to dairy customers and have no other major source of income. If the men were to stop milking the herd entirely - and this has been considered by some Fulani men in the study area - they could achieve better calf nutrition, greater calf survival and possibly also higher fertility rates. However, for most Fulani men, this is not a realistic alternative over longer periods than a few weeks in the dry season, because a wife feels she has rights to some milk from the herd and might leave her husband if she were not satisfied in this respect. Moreover, the men value milk as part of their own and their children's diet. Innovations to increase milk production could help to ensure that at least some milk can be extracted from the herd at all times of the year, even in the late dry season - in other words, that the milk demands of wives and children are met more adequately than at present - yet still permit the men to leave more milk for the production of animals.

However, such innovations are unlikely to permit the success of dairy development schemes based on production by settled Fulani pastoralists in the study area, because substantially greater quantities of milk will not be extracted from a system in which the men who manage the production and offtake of the milk have little or no influence on milk marketing and the use of milk income.

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