Studying Pastoral Women's Knowledge In Milk Processing And Marketing — For Whose Empowerment?*

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ABSTRACT Studies of local knowledge and farmer participatory research tend to focus on raising crops and livestock. Little attention is given to processing and marketing farm products, an important source of income for rural households, particularly women.

This article presents the case of an investigation into processing and marketing of milk products by agropastoral Fulani women, which revealed how the women understand local market forces and recognize important social and even local political functions of their marketing activities. However, it also revealed the limits of their knowledge about how the local economy interlinks with national and international economies.

Reasons are examined why the study did not lead to local technical and institutional development in dairying. Differentiation is made between two types of research: "extractive" research to provide information for development planners and academics; and participatory or "enriching" research, in which data collection, analysis, and reporting are done with rural people, to use in their own problem-solving. It is argued that "enriching" research should be aimed at increasing rural people's present knowledge, so that they can better understand and cope with external influences on their activities. They could then better defend their own interests against the macroplanning State.

Finally, the ethics of documenting the research results are questioned. Documentation of conventional research is primarily for empowerment and enrichment of the extractive economic and academic systems. But there is also a danger that wider dissemination of results of participatory research and local knowledge will not benefit the rural participants but rather strengthen the information base of planners, so that they can better manipulate local economies.

Introduction[1]

Discussions of indigenous knowledge (IK) and farmer participatory research (FPR) tend to focus on production, with the exception of some work on crop storage.[2] Little attention is given to the processing and marketing of farm products, activities from which most small-scale farming households derive a considerable part of their cash income. This is particularly important for rural women, who often have few other ways of generating income. Much of the food they grow is for home consumption, and they rely on "off-farm" activities to gain the cash they need to purchase other foods and household necessaries that they cannot produce themselves.

The methods that rural people have developed to process foods are based on their knowledge of the availability and potential uses of local resources. The foods they produce reflect their knowledge of local needs and preferences. Their strategies in marketing farm products reflect indigenous economic knowledge, knowledge of how the local marketing system functions and how customers behave. This is very often women's

knowledge.

Why has so little attention been paid to IK in processing and marketing of farm products? It is not only because it is women's knowledge, which tends to be overlooked in still largely male-oriented agricultural research and extension. It is also because local markets for farm products appear so chaotic to the outsider as to defy analysis. Most people trained in Western agricultural sciences will have enough trouble identifying local crops. But at a local marketplace, the products — even from only one crop — are even more diverse and unfamiliar to someone who does not come from the area. Measurements are usually by volume or heap, rather than by weight or piece. Prices seem to be negotiated, yet there is often a mutual understanding about the appropriate price for the season or day. But what is most invisible is the value system underlying the negotiations — a value system that takes much more into account than merely the costs of raw materials, labor, transport *etc.*, and the situation of supply and demand.

A case example is given here of a study into processing and marketing of milk products by agropastoral Fulani women. This shows how their dairy business reflects their knowledge of local conditions, values, and possibilities, and how it has changed over time. Attention is then given to the outcome of this study, which might have had important implications for local technical and institutional development in milk processing and marketing based on IK, but did not. The reasons for this can be found in the purpose and methodology of the study. Differentiation is made between two types of research into IK: extractive research to provide information for development planners and academics; and enriching research, in which data collection, analysis, and reporting are done by and for local people, who use the findings to help solve their problems.

Finally, the ethics of documenting both extractive and enriching research are questioned: for what purpose, in what form, and for whose benefit should it be done?

Dairywomen's knowledge: a case study from Nigeria

In recent years, increasing numbers of Fulani cattle-keepers have been moving southward from the semi-arid savanna of northern Nigeria and settling as agropastoralists in the subhumid zone. Macroeconomic planners, who consider this zone to have great potential for mixed farming and dairying, encourage this southward shift of the so-called "national herd" (Jahnke, 1982; Olaluku & David-West, 1979). Throughout Nigeria's dairy development plans in recent decades (FAO, 1966; FAO, 1975; FLD, 1976; LRM, 1981; plans quoted in van Raay, 1975), the following aims were repeatedly mentioned:

- to increase the supply of animal protein in the Nigerian diet;
- to meet rising demand for dairy products, particularly in urban areas;
- to substitute for imports so as to increase self-sufficiency in dairy products; and
- to "modernize" dairying, to make it "more sophisticated" (thus making modernization an aim for its own sake).

In 1979 a livestock research program was set up to improve production in the subhumid zone by tackling the greatest constraint: poor animal nutrition in the dry season. Innovations were introduced to increase milk production: supplementary feeding with agroindustrial byproducts such as cottonseed cake, and dry-season grazing of improved legume-based pasture. It was thought that some of the earnings from the resulting increased sale of milk could be used by the Fulani men to pay for the additional inputs, as had often been proposed in dairy development plans (*e.g.*, FAO, 1975; Davies, 1979).

However, the milk yield did not increase as expected. At this point, the research team realized that it needed to know more about the Fulani household economy, especially about the household economics of milk production and sales. This became one of my tasks as a socioeconomist within the interdisciplinary "Livestock Systems Research" team. Research methods included

- participant observation in Fulani and non-Fulani households and on markets;
- unstructured and semi-structured interviews;
- oral historiography and study of archival records;
- case studies of decision-making within 8 Fulani households over 2 years;
- a quantitative study of milk production, processing, home consumption, and marketing of dairy products in 11 matrifocal units (household subunits, each comprising a woman and her dependents) over 15 months, with measurements being carried out by the dairywomen or their children;
- a rapid survey of earnings and expenditures based on 12-month recall, conducted one year after the beginning of the quantitative study.

For more details about research methodology, see Waters-Bayer (1988b).

The study area was around the rural town of Zonkwa, in central Nigeria *ca* 180 km southeast of Kaduna. The annual rainfall of 1200-1300 mm is concentrated in 6 months. Human population density is about 70 people/km^2, of which Fulani cattle-keepers make up less than 10%. The main ethnic groups are Kaje and Kamantan, who rarely keep cattle themselves. The average Fulani household of 10 persons keeps 50-60 cattle. Live animals and processed dairy products are sold to both Fulani and non-Fulani traders

and customers. Some manure is also sold as fertilizer to local farmers.

The following description of the knowledge and skills of Fulani dairywomen does not refer to some minor activity of a handful of people. Throughout all of Nigeria, the most populous country in Africa with over 80 million people, the Fulani are the major smallholder milk suppliers. Most milk produced within Nigeria is handled by several hundred thousand Fulani women in the informal sector; only 10% enters formal marketing channels (Walshe *et al.*, 1991). Millions of dollars have been poured into the "modernization" of dairying, but the greatest wealth of knowledge about how to survive in the dairy business is still to be found in the "traditional" sector. This does not refer to traditional exchange relations in some distant past but rather to existing indigenous dairy processing and marketing, which has long been within a cash economy.

Milk processing

In the case study area around Zonkwa town, the women each work with 2-6 kg of milk *per* day, depending on the season. They process the milk into products that suit local climatic conditions, human physiology, and tastes. The most common products are mixtures of skim milk (*nono* in the market language, Hausa) or whole milk (*kindirmo*) and cooked cereal (*fura* or *dambu*), whereas the most lucrative products are butter (*man shanu*) and a soft white cheese (*wara*).

The women make these products with locally produced implements (*e.g.*, calabash bowls and churns, wooden mortars and pestles). They use the best possible technique of conserving milk with the means at their disposal: fermentation. The acidity helps conserve the milk, rendering the products highly suitable for rural areas where few people have access to cooling facilities. Fermented milk is safer than fresh milk, as the fermentation process kills or weakens many disease pathogens (Lerche, 1966). As fermentation lowers the lactose content, the products can be consumed without adverse effects by people with lactose intolerance, which is common among non-Fulani in Nigeria (Kretchmer *et al.*, 1971). The Fulani women thus make milk products that can be physiologically well-tolerated by non-Fulani.

The acidity of the fermented milk products also gives them a refreshing quality, particularly welcome in a hot climate. The major product made and sold by the Fulani women — *fura-da-nono*, spicy balls of cooked millet mashed into fermented skim milk — is a highly nutritious food (Weiner & Wheeler, 1979). It enjoys wide popularity in northern and central Nigeria, where it is commonly consumed as a noonday meal or snack.

In trying to meet the great demand for refreshments, the women seek to counterbalance the large seasonal fluctuation in milk supply. Demand is particularly high during harvest and in the dry season, when milk supply is lowest. The women then mix the fermented milk with a local refreshment made of *kuka* (pith of baobab pods) and water. This *kuka* "juice" has a similar taste and consistency to *nono*, and is often consumed with *fura* when *nono* is not available. It is also drunk on its own as a refreshing beverage, and as a medicine to treat intestinal disorders. Fermented milk mixed with *kuka* is consumed in the Fulani homes and is also offered for sale, and all regular customers know they are buying a mixed product.

The women demonstrate knowledge of the effects of temperature on milk processing. The milk is fermented at ambient temperatures. However, during cold spells in the dry season when night temperatures can fall below 10°C, the milk "does not sleep well", *i.e.*, fermentation and cream formation is not completed within the usual 24 hours. The women then heat the fresh milk before setting it aside to ferment.

Also butter-churning is timed for the cool early mornings; when a woman is delayed for some reason, she adds some water (kept cool in a clay pot) to lower the temperature of the cream. Butter is usually made every second day, and the butter is collected over several days or weeks before selling. At warmer times of the year, salt or water is added to conserve it better. When butter is being saved over a longer period for a large ceremony, it is usually made into burnt ghee with chopped onion, thus improving the keeping quality and giving it a caramel flavor.

None of the women in the study had been in contact with extension workers teaching dairy hygiene. But — from their own experience and perhaps also from Moslem teachings in cleanliness — they have learned to operate as hygienically as possible under the circumstances (Zonkwa town and the surrounding villages having no public water-supply system). They wash their hands before handling milk or butter directly. The dairy utensils are regularly washed and dried in the sun. The inside of the calabash bowls is scrubbed with pumice stone to prevent mold formation. A milk calabash is used until it breaks or until the milk no longer ferments properly, in which case the woman assumes that the calabash is not sufficiently clean and starts to use a new one. All milk processing is done inside a thoroughly swept hut, except the outdoor churning of butter inside a closed bottle calabash. When work is not in process, all milk and butter bowls are kept covered.

The women have developed various techniques to manage with different quantities of milk. Women receiving less than *ca* 2 kg each day collect milk over two days before skimming it. When cream quantities are very small in the dry season, they sometimes make butter only every third day so as "to have enough cream to work with". Women who receive very little milk put the cream into a small calabash bowl with a hole in the

bottom, so whey can drain into another bowl beneath, and churn the accumulated drained cream after several days. Women working with large quantities of milk use a large calabash which is rolled back and forth on the ground to churn butter, instead of the small hand-held bottle calabash.

The women are thus able to cope with changes in milk quantities within normal limits. The processing capacity in the traditional system would not be exhausted even if women were to handle double the amount of milk they are currently processing. At the height of the wet season, one of the women in the study was handling over 10 kg of milk *per* day (instead of the average 4 kg), which she processed with traditional equipment, with the help of only one daughter.

Marketing dairy products

The women have little influence on supply of milk from the cows, as this depends on such factors as the agroclimatic conditions, the season, herders' skills, and motivations of the (male) milkers. However, the women can determine how much of the milk they receive from the milkers is given to the family and how much is supplied to the market. This decision is affected by other social obligations or investments, such as collecting butter (instead of selling it) for a large family celebration, or selling more dairy products than usual in order to finance a daughter's dowry.

'The women normally spend 4-5 hours every second day selling to regular customers in their neighborhood and at various sites in town, not only marketplaces. They have a good understanding of local market forces in terms of the effect of supply and demand on prices. On days when many transhumant Fulani ("Bororo") are passing through the area and an unusually large number of Bororo women are selling at the local market, some of the settled Fulani women wait until the next day before selling their own milk, explaining that the flood of Bororo milk pushes the prices down. Some settled women even buy Bororo milk to resell it one or two days later after the Bororo have moved on.

The site and timing of selling are strategically chosen and adjusted to the season and day of the week. During the cropping season, when farmers usually work in their fields in the morning, milk is sold at the markets only in the afternoons, but some women go directly to the fields to sell *fura-da-nono* as refreshment where a work party has been formed. But on Sundays, women are selling already in the morning, in order to catch the churchgoers. Favorable selling sites chosen by the women include road junctions, taxi stops, meeting places, and opposite mosques, churches, schools, and places of regular employment at the appropriate time of day.

The women in the study were aware that market demand and, therefore, the prices of dairy products are higher in larger towns than in the nearby village or rural houses in the immediate neighborhood of their homes. Their choice of selling point depended partly on the availability and cost of public transport services. They would walk several hours carrying butter or, more rarely, milk to a larger town market only if they intended to make some extraordinary purchase, such as fine cloth.

A conscious choice is usually made to sell directly to consumers, rather than to intermediaries, not only to gain higher prices but also for the socioeconomic benefits that the producer-customers relations bring (see below). In the study area, only richer women working with large quantities of milk or the few women living in seclusion regularly sold their milk to intermediaries who came to their homes to buy it. Commonly women from Fulani households with few or no cattle, these intermediaries make *fura* out of purchased grain and sell this at a profit together with the purchased *nono*.

Women who sell milk directly to consumers are usually obliged to offer *fura* for sale as well. Fermented milk is rarely drunk on its own. As *nono* is easier to sell and brings a higher price when sold with *fura*, which is itself a source of income for the women, the settled Fulani women regard *fura*-making as an integral part of their dairy business.

Selling dairy products directly in their customers' homes is a form of trading that many Fulani women value highly, as it is linked with other socioeconomic benefits. From their regular customers, they receive occasional gifts (*e.g.*, bundles of millet at harvest time, or seed for their kitchen gardens); to their customers, they make gifts of milk or butter on special occasions. Particularly trusted farmwomen also take care of the goats in which some Fulani women invest part of their dairy earnings. The Fulani also deliver milk for sale regularly to the farm households of Kaje and Kamantan (holders of traditional land rights) who loan them land for dwelling or cropping.

These links form part of a web of relations between the immigrant settled Fulani and the indigenous Kaje and Kamantan, together with manuring and crop residue grazing arrangements, exchange of livestock and crop products, herding contracts, exchange of knowledge in livestock and crop husbandry and food processing, and land-use agreements. One Fulani woman even suggested that the bonds made through milk marketing helped keep the peace between the ethnic groups. At a time of increased tension between the Kamantan and Fulani, she was confident that — because she sold milk products regularly to her Kamantan neighbors — they would not "chase away" her family. She proved to be right, and when I returned to visit her seven years later, she was still living at the same site and selling to the Kamantan.

In addition to their links with their customers, milk

marketing gives the women an opportunity for communication, entertainment, and relaxation. Sellers usually sit together in small groups. Even if a woman has sold all her products on the way to town, she may still sit and talk with the other women selling in the marketplace, and help them sell. In some cases, groups of 4-6 women, usually neighbors, arrange to sell at a common site, *e.g.*, near an office or school, where customers can always be sure that at least 2-3 women are selling each day. However, each woman still runs her independent dairy business. Thus, the marketing activities are basically individualistic. Besides such informal selling groups, cooperation is confined to arrangements between women for purchase and resale of milk, and acts of mutual help between individuals, such as when a woman or her child is ill and another woman sells temporarily in her behalf.

These innumerable micro-enterprises run by Fulani dairywomen comprise a relatively efficient marketing system that operates at extremely low material costs and which supplies dairy products at considerably lower prices than can modern high-technology dairy plants (Waters-Bayer, 1986). Moreover, the women's expertise in managing finances and contributing to family well-being through their dairying activities is a source of personal satisfaction and self-esteem.

Acquisition and differentiation of knowledge

Technical knowledge and skills in milk processing are transmitted through processes of socialization and apprenticeship. It is customary that children (most commonly daughters but in some cases also sons or hired herd-boys) assist in dairy work from an early age. They learn by observing the dairy-woman and doing assigned tasks under her supervision. Likewise, the economic and social knowledge and skills involved in milk marketing are mainly learned informally by growing up as the daughter of a milk seller or as a helper on "loan" to an older or childless woman.

The women who possess and transmit this knowledge are almost exclusively of the Fulani ethnic group, although non-Fulani wives of Fulani cattle-keeping men can also acquire this knowledge from their mothers-in-law or, more rarely, co-wives. Although the sharing of this knowledge creates competition in marketing dairy products, the Fulani women readily let others learn from them. This is in contrast to Fulani men's ethnoveterinary knowledge, which is less widely spread and is carefully guarded as a source of income and influence.

Through their years of apprenticeship and practice, the girls or young wives develop their entrepreneurial capacities. Although information about processing techniques and marketing opportunities is readily shared among the women, differences in knowledge and skills arise out of differences in natural ability, personality and need. Some more enterprising women explore selling possibilities at more distant markets or at newly established offices or institutions in town. Some more sociable women are able to develop particularly favorable marketing contacts. Fulani women with access to little or no milk from the family herd are obliged to develop skills in buying and retailing milk from other women.

Only in the few cases where women are kept in seclusion by their husbands — a phenomenon related, at least in the study area, to the man's religious fervor rather than to social or economic status — are the women not in a position to develop their entrepreneurial abilities to the same extent as the majority of Fulani women, who are free to sell dairy products at their own discretion.

Local experimentation, innovation, and adaptation

The indigenous methods of milk processing and marketing are very adaptable to changing market conditions, and many Fulani women have recognized and responded to new opportunities and to changes in customer demand. As plastic and metal containers (made in Nigeria) appeared on local markets, these are increasingly used for transporting milk. With improvements in roads and bus-taxi services to larger town markets, the women are trying out new ways of transporting the milk to decrease spillage by, *e.g.*, using flat- instead of round-bottomed bowls, floating large leaves in the milk, putting the milk into securely tied plastic bags inside the large milk bowl, or using plastic canisters or buckets with lids.

There are always some women who experiment with shifting to new products when an influx of immigrants opens up new markets. The women estimate demand against the possibilities and costs of making a new product and, if they judge recompensation to be sufficient, they include the new product in their offer — if necessary, approaching another woman to learn how to make it. For example, a few women began to make and sell *kindirmo* (fermented whole milk) and *wara* (soft cheese) to sell to immigrants from areas where these products are popular. These women commonly sell at bus-stops where also passing strangers seeking such "exotic" products can be expected. When richer minorities moved into a nearby town and sought fresh milk, some women found that boiling the milk helped keep it fresh longer, so that it did not sour during the long walk to market. They then started to carry separate containers of fermented and fresh milk to sell to different customers.

The Fulani women now living in the subhumid zone also entered into the *fura* business because of customer demand. Further north in Nigeria, the traditional *fura* sellers are Hausa women, but because there are relatively few Hausa in central Nigeria, the Fulani found they had to offer *fura* themselves, if they wanted

to sell *nono* at a good price directly to consumers.

Individual women also experiment with new ways of increasing profits. For example, when subsidized powdered milk from, *e.g.*, EEC countries was available in the 1970s and early 1980s, women experimented with different mixtures of powder, local milk, and *kuka* to produce a fermented product acceptable to their customers.

Innovations have also been made in the organization of marketing. For example, one group of neighboring women arranged to ensure a regular supply of milk to the kitchen of a boarding school in a nearby town.

As increasing numbers of people are hired by government agencies as salaried workers paid once a month, the women have found that they must sell more of their dairy products on credit, to be repaid at the end of the month. Some women then saw a need for keeping notebooks in which to record sales, and began to learn basic reading and writing skills in their own homes from older children who had attended school for a few years.

The informal face-to-face marketing relationships between Fulani and farm women permit dissemination of IK and innovations even across ethnic groups. It was, for example, through small gifts of seed from Kaje customers and through discussion and observation of their cultivating and processing soybean that many Fulani women in the study area learned how to make the local soup seasoning *daddawa* out of soybean instead of the traditional locust-bean. This was an innovation of Kaje farmwomen (Waters-Bayer, 1988a).

Limits to women's knowledge

The study also revealed the limits to the women's knowledge of how the local economy is inter-linked with wider regional, national, and international economies. The women expressed confusion about the coming and going of various dairy schemes over the decades without any reason apparent to them. They regarded such "government" activities as unpredictable and undependable.

They understand well the mechanisms at work within the local markets and in traditional long-distance trade in, *e.g.*, kolanuts, *daddawa* or ginger. Also in the milk trade, intermediaries buy up in villages and sell in larger towns, or buy in areas with many animals and sell in tsetse-infested areas with few livestock or in areas with dense human population. However, the workings of the "modern" Western market appear arbitrary to the women, *i.e.*, they feel much the same as Western-trained economists faced with the indigenous economy. The women do not understand where and how decisions related to modern milk marketing are made, and feel powerless to influence them. They can only choose between taking advantage of favorable opportunities (*e.g.*, butter collection for export to England in the 1940s, temporary availability of cheap milk powder in the 1980s), or refusing to join a scheme because it appears to offer no advantages (*e.g.*, fresh milk collection).

The women are largely unaware of sources of information for new technology, other than relatives, neighbors, and women visited in other areas or coming from other areas. They learn of new products and adaptations in technologies more by chance than by design.

Neither the Fulani nor their customers seem to be aware of the high food value of their products, which are in danger of being ousted by manufactured soft drinks and white bread. Even in Fulani homes, such "modern" products are sometimes offered to guests at child-naming and marriage ceremonies, instead of the traditional milk products. There is great need to promote the indigenous foods and reinforce the women's self-esteem in their achievement of producing tasty, nutritious products with local resources.

Extractive research into indigenous knowledge

The study of traditional dairying by the Fulani in central Nigeria revealed that extracting milk from the "national herd" is a much more complex undertaking than had been assumed. As it became obvious that the innovations promoted *via* the male household heads were leading to higher rates of animal survival rather than higher rates of milk off-take and sales, the emphasis was shifted to promoting meat production by the Fulani. Dairy development activities became increasingly focused on non-Fulani cattle-keeping farmers, particularly in peri-urban areas. Thus, the Fulani women in the rural areas were left to their own devices to develop their knowledge and skills in processing and marketing agricultural products — a process which might have been enhanced if another approach to research had been taken.

This study into IK formed part of conventional research into existing farming systems. It was conducted within the paradigm of agricultural modernization and was intended primarily:

- to explain to outsiders (other researchers, development planners) why the innovations they proposed were not working; and
- to gain sufficient understanding about the traditional system to make the interventions work, or to be able to choose or develop interventions more likely to work.

In this case, an attempt was made to extract sufficient information about traditional dairying to explain why innovations designed to increase milk production for the market had failed.

The vision which catalyzed the dairy promotion program was that of urban-oriented development planners, rather than the rural people. In Nigeria, the planners' dream is milk collection at rural buying points for processing in high-technology plants designed to make Western-type milk products to be distributed to city

dwellers (*e.g.*, Alfa-Laval, 1978; Mani, 1983; Olaloku & David-West, 1979). Efforts to modernize dairying elsewhere in Africa have pursued a similar vision (Walshe *et al.*, 1991). Where such research and development (R&D) in agro-processing and marketing designed to serve urban people and large-scale industry is "successful", it stifles local home- or village-based industry and deprives independent micro-entrepreneurs — especially women — of their income and relative autonomy. It also deprives them of any opportunity to further develop and apply their own knowledge and skills in processing and marketing.

"Successful" modernization of milk processing and marketing disadvantages not only the rural producers but also the rural consumers. Collection of milk by dairy plants diverts milk supply away from villages and rural towns. The consumers for whom the modern dairies cater are high-income urban dwellers, on account of the high costs for milk collection, processing, packaging, and distribution, and the urban-oriented marketing channels (Wilson, 1978). The Fulani women, by contrast, with their low-cost system of micro-scale processing (using basic household equipment) and primarily local marketing, can sell their products at lower prices than the dairies and can include lower-income earners among their customers.

The dairy modernization schemes have failed because the planners lacked knowledge (or ignored available information) about the existing system of milk processing and marketing and because they did not comprehend how the indigenous economy functions. It was assumed that male household heads would buy modern inputs such as feeds on credit, to be repaid upon delivery of the milk to a collection center. It was not recognized that the men are responsible for buying herd inputs but do not earn from milk sales, which are controlled completely by the women.

The Fulani rejected the dairy schemes not only because of the gender-related division of responsibilities and control within the household. Other reasons why the women were not eager to sell to collection centers were

- they would have to deliver every day early in the morning, whereas in the indigenous system, based on fermented products, they enjoy more flexibility in choosing when and how often to sell;
- delivery to a collection center would deprive them of the social contacts involved in traditional marketing and gave them less opportunity to maintain important socioeconomic and sociopolitical links;
- selling only fresh milk would deprive them of the additional income they gain from processing cereal to sell together with fermented milk;
- they could earn 3-4 times the price of raw milk by processing it themselves into traditional products in high local demand;
- the collection centers did not pay more for the milk in the dry season, when the women can compensate partially for lower milk off-take by selling a different mix of products. As a result, their earnings over the year do not fluctuate as greatly as milk yield.

In view of the failure of large-scale modernization of milk processing, some attempts were made in Nigeria in the mid-1980s to set up smaller-scale processing facilities in grazing reserves where Fulani were expected to settle. However, also these schemes revealed the planners' lack of understanding of the traditional system. Male and mixed male-female groups for cooperative processing and marketing were promoted, without giving consideration to women's informal ways of cooperating and motives for these, and to the value they place on maintaining individual autonomy in their dairy business.

In the Zonkwa area where the research into traditional dairying was conducted, it was not followed up by development-oriented activities with the Fulani dairywomen; instead, the R&D activities were refocused on other objectives and areas. The women involved in the study received only a few minor benefits at the time of the actual study. These included payment for measuring and recording the dairy products processed and sold, for which purpose some women learned to read numbers on the weighing scales and write them into the recording forms. In a couple of cases, the women continued to find these skills useful in recording what customers owed them. The women also prided themselves in their newly acquired skills. The photographs showing them measuring and recording milk were displayed in prominent places in their homes, still seven years after completion of the study.

The interaction between researcher and researched over more than three years also seemed to have an entertainment value. The women enjoyed discussing and showing what they could do well: running a dairy business. They also appeared to derive some entertainment from paying return visits to my own home and satisfying some of their curiosity about how "the Europeans" live.

But doubtless the major benefits from the research into IK were enjoyed by the external researcher. Besides gaining from the experience of interacting with very hospitable, interesting, and intelligent people, I derived a salary and material for a doctoral thesis as well as several conference papers and journal articles such as this one. Without the cooperation of the Fulani women around Zonkwa who allowed me to delve into their IK system, I would not hold my present position. But the women did not benefit directly from my approach to the study of their IK, the form in which I documented the results, and the type of activities that followed my research.

Thus, although the Fulani women may have gained some minor short-term benefits, the example given here is of research which was "extractive" in several ways that are probably typical of much research into IK:

- technical research that extracts information about IK so as to explain or improve project results and, if the findings are indeed incorporated into further technical research and "validated", to develop "scientized packages" for wider dissemination (*cf.* Thrupp, 1987);
- socioeconomic research that extracts information about IK in order to find ways to increase production for a national or global market, so as to extract a larger surplus production from the people possessing this knowledge (*cf.* O'Brien & Butler Flora, 1992);
- academic research that extracts information about IK for analysis and publication in order to "advance"[3] Science and Philosophy and one's own career.

Possibilities of enriching research

The study of traditional dairying described above did point to some promising directions for developing local processing and marketing systems. Many women were interested in trying out less laborious ways of separating butter from cream and of processing cereals to sell together with fermented milk: specifically, ways of grinding the millet flour fine enough for *fura* and kneading the dough. The women's informal marketing groups could have offered a basis for cooperation in partially mechanized processing of milk and cereals. The groups might have experimented with different ways of reaching more lucrative markets, or of arranging to use better equipped marketing sites, *e.g.*, with a shade roof and a source of water for cleaning the serving bowls and spoons. The interest shown by women in buying their own animals, for the benefit of themselves and their children, might have laid a basis for a somewhat more intensive form of milk production in which women pay for the inputs for their own animals milked by their sons.

Such small-scale improvements in the local, low-cost system of milk processing and marketing are not of interest to national bureaucrats, who are keen on capital-intensive investment with a large flow of funds from which they can derive benefits. If research into indigenous systems is to bring benefits to the local people — in this case, the Fulani dairywomen — then these people must be encouraged and supported in investigating their own situation and possibilities and in following these up themselves.

Marketing research with the primary aim of improving the livelihood systems of rural households and communities should enrich rural people's present marketing knowledge so that they are better equipped to cope with external influences on their activities and to take advantage of opportunities. The research should be conducted by the local micro-entrepreneurs themselves: identifying marketing constraints and opportunities as they see them, assessing strengths and weaknesses of their present marketing system, making marketing channels more transparent for themselves, identifying what they have already accomplished in experimenting and innovating in processing and marketing, and following up on these initiatives. This would have corresponded more closely with the type of research into IK espoused by Cashmann (1991): empowering local people by helping them understand the links between their own experience and its broader context.

Some aspects of conventional research into IK can be useful in a locally enriching approach. For example, researchers coming from outside the community can make ethnolinguistic studies (local terms *re* types of markets, types of transactions *etc.*) not only to be better able to describe local perceptions to other outsiders. In participatory research, such studies that help outsiders understand how local economic concepts can improve communication with local people in the process of supporting them in planning and implementing their own research.

Such participatory research has been described, *e.g.*, by Ledesma (1983) with reference to communities in the Philippines. This involved a combination of methods such as small group discussions, random surveys, notebook record-keeping, community mapping, chronological documentation, and individual narratives by participant-observers. Community members kept a record of price variations between markets and throughout the year. The research findings and price-monitoring records were recorded in reports and information sheets, which were given back to the community for their reflection and action, and served as decision-making tools. By objectifying, measuring, and pinpointing their problems through the research process, the local people became more conscious of their situation and more ready to respond to their perceived problems.

Also among the Fulani in central Nigeria, similar techniques that suit their skills and availability of time could have been applied. Market research for the benefit of these women may not require literacy. Information is conveyed through informal meetings, particularly when visiting between households and at their regular selling points. And where the women recognize some benefit in literacy — for their dairy business or for whatever other reason — they already take initiatives to learn from relatives or neighbors who have attended school. Such initiatives could be supported.

Widely respected and trusted Fulani women, such as the treasurers of the informal savings and credit groups, would be effective contact persons for facilitating

research into new techniques and organizational forms of processing and marketing foodstuffs. Links could be established with women who are processing different products and using different methods, and to organizations with technical expertise, *e.g.*, in appropriate technology, which women could draw on for information and advice. In view of the great mutual support between mothers and their adult children, also as part of the Fulani social security system, the women may prefer to assign their sons the task of establishing links with some external sources of information.

Where individual women can recognize benefits of collaborating in processing and/or marketing dairy products above the level of the immediate matrifocal family, the forms of this collaboration would have to be determined by the women themselves. Externally-imposed forms of cooperative marketing are often aimed at supplying foodstuffs to distant urban markets. In locally-enriching market research, the women would be encouraged to create their own economic development strategies — by reinforcing and, to the limited extent that is possible while maintaining personal links, expanding these personal links that typify their marketing relationships.

Ethics of documenting indigenous knowledge

Before detailed research was made into the traditional dairy sector, development planners in Nigeria had so little knowledge of this that their interventions had no positive — but also no negative — impact on it. Government officials armed with more knowledge about the indigenous systems — and under pressure from private large-scale entrepreneurs — will be in a stronger position to hinder the local trade in milk. Good documentation of how the informal dairy sector operates could reveal possibilities for formalizing it, for bringing it under government control and thus curtailing the independence of the micro-entrepreneurs. Much the same process occurred in Europe, where women were pressed out of the small-scale dairying business by government regulations, *e.g.*, in connection with milk hygiene.

If, in the example of central Nigeria, milk collection prices had initially been set high enough to attract Fulani women and they had neglected their personal marketing ties and had lost their ability to judge local market conditions and to process milk and grains into locally preferred products, the women would have become dependent on the collection centers. If the prices were then lowered or stricter hygienic regulations demanding costly investment by the women were enforced, then many would be forced out of business.

To some extent, documentation of the findings of extractive research into IK can bring some indirect benefits for the researched. It can make governments more sensitive to the importance of creating conditions that allow self-directed development in indigenous marketing. This would mean refraining from imposing price regulations and health standards, but rather:

- attempting to create conditions that allow more choices for sellers and consumers (marketplaces, better roads and transport systems) and allow more hygienic processing and marketing (water supply in villages and at marketing sites, making loans available to women's groups to construct protection such as roofing and wind walls);
- building up women's capacity to obtain and give credit for inputs, products, and services;
- promoting women's literacy, preferably within the framework of their own enriching research;
- providing technical support to women in acquiring information about improved technologies applicable by individuals or small groups and in adapting technology to their needs.

And in the case of documenting enriching research into rural people's knowledge? Is it to the benefit or detriment of, *e.g.*, the Fulani dairywomen, if the results of their own research are made more widely known? The results of participatory research are likely to be more reliable than those of extractive research by outsiders, as the researchers and the researched know and trust each other. Does this better-quality information about IK strengthen the position of urban-biased macroplanners and large-scale entrepreneurs in an extractive economic system, so that they can better manipulate the local economies? Also O'Brien and Flora Butler (1992) point to the danger that documentation and dissemination of IK can be used against farmers, as the insights gained by external agencies may enable them to manipulate farmers more effectively.

For the purposes of the local people involved in research aimed at enriching their own knowledge, what forms of "documentation" are most useful? Copies of publications coming out of the study into Fulani dairying were sent to English-speaking relatives of the women, who sent back messages that they were pleased to see the depictions of their work. One of the local Fulani leaders who is active in organizing adult education courses expressed his thanks at receiving the publications, but finds them too difficult for most local people to read. A booklet in simple Hausa or Fulfulde would have been more useful for schools and adult education classes, to raise local self-esteem and to serve as a basis for discussion among women and men, adults and youths (*cf.* Watson & Erukudi, 1991). More visual or oral ways of documenting and sharing knowledge are needed, such as collections of photographs or drawings, slides, video, songs, theater, dance — praising not only traditional knowledge but also indigenous innovation. In many cases, these media are used rather to disseminate messages by external "developers" rather than to express the achievements of local people, for their own enrichment and to exchange with people in

similar situations.

Documentation of the results of both extractive and enriching research can heighten public, academic, and government awareness of the wealth of indigenous knowledge and innovation, and the potentials that could be squandered if these were to be ignored. But it will always be difficult to find the balance between extolling indigenous accomplishments and making valuable knowledge available to be expropriated by others. Detailed descriptions of indigenous techniques invite such expropriation. For example, after publication of a small piece about how Nigerian women had developed techniques to make the widely-popular local maggi (*daddawa*) out of fermented soybean, numerous letters arrived from businessmen/ industrialists in West Africa — especially from Nigeria — asking for an exact description of the procedure. *Daddawa*-making is a lucrative business for thousands of women in central Nigeria — and I have no intention to make it easier for urban businessmen to capitalize on these women's innovations. Will documentation of IK break down the barriers of defense around indigenous and informal systems of processing and marketing?

Regional centers for investigating and documenting IK are being established in various parts of the world. It is important that these not become banks to which only the better educated and economically more powerful have access — leaving out the illiterate and particularly the women, as is usually the case with banks. These centers should rather become developers and promoters of *methods* to increase local people's awareness of the wealth they possess and to help them enrich it further.

Notes

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2. For example, Bunch (1985), Farrington (1988), Farrington & Martin (1988), McCorkle *et al.* (1988), Richards (1985), Tillmann *et al.* (1991) and throughout the journals *CIKARD News* and *Indigenous Knowledge & Development Monitor*; see also Chambers *et al.* (1989) and the contributions to the IIED/IDS "Beyond Farmer First" Workshop in 1992. Only six of the 340 abstracts on FPR compiled by Amanor (1989) refer to post-harvest systems, and all six are by Rhoades on potato storage.

3. Particularly this concept was stimulated by a remark of an anonymous reviewer.

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