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## What are Consumers in Moyale, Kenya Willing to Pay for Improved Milk Quality?

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*Pastoralists in northern Kenya and southern Ethiopia may be able to diversify income by selling milk to urban residents. However, milk sold in open-air markets is often low in quality because it has been transported long distances without refrigeration and is subject to spoilage, or because milk is adulterated prior to sale to boost volume or enhance appearance. Open-air markets are characterized by low-income consumers who must make choices about milk quality with virtually no information other than their own sensory perceptions. PARIMA researchers used an experimental-auction approach to determine what residents in Moyale, Kenya, are willing to pay (WTP) for improved milk quality. Researchers created milk samples that varied in taste and texture and asked participants to bid for them in order to reveal the value of their preferences. Results indicate that consumers are indeed willing to pay for improved milk quality. For example, compared to younger women, older women would pay a 20% premium for higher-quality milk. Furthermore, poorer consumers would pay a 19% premium simply for assurances on milk safety. These findings indicate that there are economic incentives to enhance milk quality and justify attention to basic technical and/or organizational interventions that could improve the quality of milk marketed to the residents of this border town.*

### Background

Milk is a primary food for people living in the dry lands of Ethiopia and Kenya. Fresh milk produced from livestock is typically consumed by pastoralist families who own animals, but surplus milk may be taken to nearby villages and towns to sell in open-air markets. The time between milking and sale can range from hours to over a day. Milk is not refrigerated and is susceptible to rapid spoilage from bacterial growth. Milk is often adulterated prior to sale via addition of water, fillers, or colors to boost volume and improve appearance.

Income diversification is an important risk management strategy for pastoralists in this region. Generating income from milk sales could be an important component of a diversification strategy for pastoralists living near villages and towns. However, efforts to expand milk markets depend on enhancing milk quality, being able to appropriately signal milk quality to consumers, and the consumers' "willingness to pay" (WTP) for improved milk quality.

Pastoralists and traders might be able to marginally improve milk quality for sale by using simple cooling technologies. For example, when milk is transported long distances to markets on the roof racks of public vehicles, plastic containers (jerry cans) wrapped with water-soaked hemp could be an effective means to reduce

milk temperatures compared to current practices, and hence delay milk spoilage. In terms of organizational interventions, agents working on behalf of consumers or producers could oversee markets to guard against milk adulteration. Higher-quality milk could be sold to local cooperatives where it can be pasteurized for sale to wealthier consumers. Producers could establish a certification system to assure buyers of milk quality. Any of these efforts, however, increase transaction costs for pastoral producers and traders that need to be covered by higher prices paid by consumers. In other words, economic incentives need to be in place to improve the quality of milk for sale in Kenya and Ethiopia.

Establishing willingness to pay for milk quality is important. It is, however, only a first step in such a market development process. This is because WTP does not consider how pastoralists and markets would need to be organized to provide higher-quality milk. If consumers are willing to pay for improved milk quality (and improved food safety) in these markets, overall milk quality should improve because these markets appear to be competitive. However, poverty characterizes most of the population in this region, and this raises questions about consumers' WTP for improved quality—in this case higher milk quality—because demand for higher quality is often thought to be associated with higher incomes.

## Methods

This study reports, based on experimental auctions, whether or not consumers in the border town of Moyale, Kenya, are willing to pay more for milk that is of higher quality. The demographics of participants were also used to determine the components (niches) of the market to identify those subgroups that might be willing to pay more for improved milk quality. This type of information is important for pastoral producers if they want to increase their incomes from milk sales. To the researchers' knowledge, no previous work has examined WTP for milk quality using this approach in this region.

The design for this study is described in detail by Wayua et al. (submitted), and the authors can be contacted for more information. Consumers representing several income levels, places of residence, and occupations were contacted through key informants and selected using stratified-random procedures. Persons so chosen were responsible for making decisions on food purchases.

Participants were engaged at two levels. Focus groups were used to determine general perceptions concerning milk quality and marketing. Some members of focus groups were asked to participate in experimental auctions. Three auctions were conducted. One was for owners or managers of small hotels and restaurants; one was for higher-income household consumers; and one was for lower-income household consumers. Researchers wanted 12 participants per auction. Auctions were conducted in Moyale, Kenya. Greater Moyale straddles the Ethio-Kenya border, includes Moyale, Ethiopia, and has a population of over 40,000 residents. There were 31 auction participants overall, including 17 females and 14 males. Almost all were married with an average of four children per household.

Auction participants were endowed with KSh 50 in cash for use in bidding along with a glass (one liter) of milk to be considered as a baseline. They were allowed to examine (taste, smell, visually inspect) this milk and estimate what they would pay for it. They were then given oral instructions as to auction procedures. These consisted of 10 rounds whereby the subjects bid in a demand-revealing (second-price) auction format. The rationale for using this approach is to more accurately reveal true valuation of the milk by the participants.

When subjects placed bids, they bid on what they would be willing to pay to exchange their endowed milk for one of four alternative milks that they could also inspect. The endowed milk was an experimental substitute for lower-quality milk available in open-air markets, having been fumigated and pasteurized and then diluted by water to 25% of volume. Descriptions of the other milks are shown in Table 1. Note that food-safety issues would not allow the

use of samples of milk actually sold in open-air markets. Thus, these auctions are only approximations of a general process of differentiation and valuation of milk quality by consumers. At the end of the experiment the winning subject had paid the second-highest bid price to exchange their original milk for other milks. At the end, all participants conducted a short interview to report their demographic characteristics and attitudes that might affect demand for milk quality, and hence auction results. A regression equation was used to estimate influence of various characteristics on participants' WTP for milk quality.

## Findings

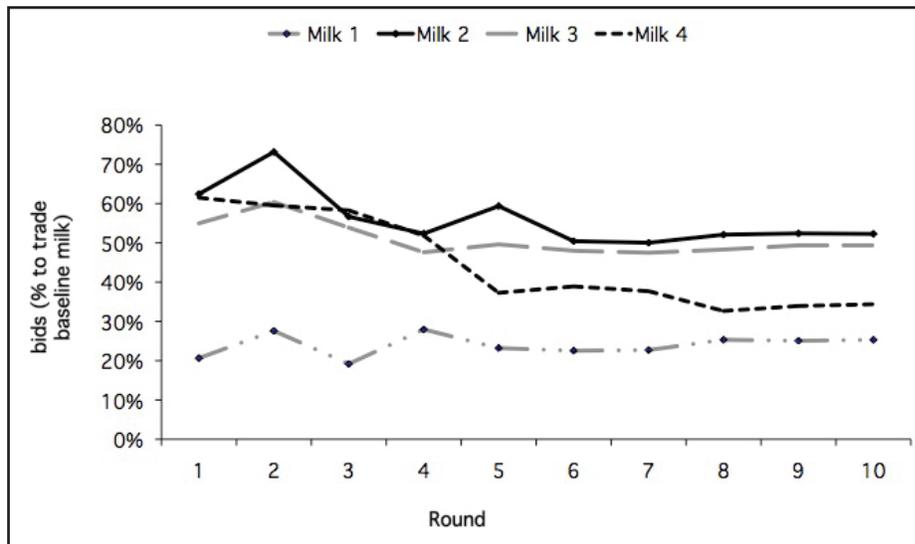
In summary, auction participants tended to be fairly young, poor [68% had a monthly income less than KSh 5000 (or US\$63)], with limited formal education. Less than half said they have confidence in the Kenya government's food-safety inspection systems. Nearly half had direct experience with food poisoning. Almost 60% said they would highly value more information concerning from where local milk originated and how it had been handled and processed. Over 80% said they would highly value assurances about the safety of marketed milk.

Figure 1 shows the average percentage bids of the experiments by round across all three auctions. Percentage bids were calculated as the actual bid made by participants divided by the estimated value of the endowed milk. On average this price was KSh 15.65 per liter over the 31 participants. Patterns of average bids are consistent with past studies where early-round bids tend to be higher and more variable compared with those of later-round bids.

*Table 1. Descriptions of milks used in the Moyale experimental auctions. PARMCO stands for the Pastoral Resource Marketing Cooperative located in Moyale, Kenya.*

Milk type	Description
Baseline Milk	Fumigated, pasteurized, fresh milk processed at PARMCO. It was later adulterated (diluted) for this trial by adding bottled water to obtain a milk:water ratio of 75:25 (Taste/texture: smoky and diluted)
Milk 1	Factory-processed UHT milk purchased from shops in Moyale (Taste/texture: fresh milk having a "UHT processed flavor")
Milk 2	Cultured, fermented milk (soured, no sugar added) processed at PARMCO (Taste/texture: sour and curdled)
Milk 3	Non-fumigated, pasteurized fresh milk processed at PARMCO (Taste/texture: Fresh milk and undiluted)
Milk 4	Fumigated, pasteurized fresh milk processed at PARMCO (Taste/texture: smoky and undiluted)

Figure 1. Average percentage bids to replace baseline milk with four alternative milks in the Moyale experimental auctions. The baseline milk was fumigated, pasteurized, and diluted fresh milk. Milk 1 was UHT (ultra high temperature processed) milk. Milk 2 was cultured, fermented, and undiluted. Milk 3 was non-fumigated, pasteurized, and undiluted. Milk 4 was fumigated, pasteurized, and undiluted.



The average percentage bids from Figure 1 provide evidence for the consumer's WTP for milk quality. For example, Milk 1 (UHT-ultra high temperature processed milk) was eventually valued 25% higher than the baseline milk, Milk 2 (cultured and fermented) was valued 30% higher than the baseline milk, and Milks 3 and 4 (fumigated or non-fumigated, but both pasteurized) were valued at 50% higher than the baseline milk. The baseline milk was the least desired overall, confirming that the dilution was an effective treatment.

Taste of the milks likely affected how they were ranked. For example, processed fresh milk from PARMCO was perceived as being higher quality than the UHT milk. Although UHT milk is typically more expensive, this makes sense when one considers that UHT milk can sometimes have a "slightly off" flavor resulting from processing at very high temperatures.

Statistical results also provided evidence that certain subgroups of consumers may be willing to pay for higher quality milk, and this helps to reveal niche market opportunities. For example, compared to the younger females in the auctions (about 20 years of age), older females (about 40 years of age) were willing to pay 20% more for milk quality. The poorer consumers indicated that they would pay a 19% premium for milk if they simply had some assurance of food safety. There was only weak evidence that participants with no formal education were less willing to pay for milk quality as compared to participants with some formal education. This suggests that literacy may be important in becoming

informed about milk quality. Somewhat surprisingly, level of income, numbers of children in the household, and type of buyer did not affect average bids. Therefore, results from all three auctions could be combined.

### Practical Implications

While this experiment was only an approximation for actual market conditions, the results imply that WTP exists for milk that can demonstrate improved quality characteristics. Because the milk actually sold in open-air markets is likely of much poorer quality than that used as the baseline milk, these results may actually underestimate the actual premiums that might be paid for improved milk quality in the authentic local setting.

There appears to be adequate incentives for pastoral producers and milk traders to consider technical or organizational interventions to improve milk quality. This could include appropriate means to keep milk chilled and reduce contamination when it is transported from pastoral settlements to markets. It may also merit use of milk inspectors or certification schemes to ensure that milk has not been adulterated. One consumer target for this approach could be older females who have had some formal education.

Finally, this study demonstrates that experimental auctions can be successfully conducted in this part of Africa to determine WTP for food characteristics.

## Further Reading

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The GL-CRSP Pastoral Risk Management Project (PARIMA) was established in 1997 and conducts research, training, and outreach in an effort to improve the welfare of pastoral and agro-pastoral people with a focus on northern Kenya and southern Ethiopia. The project is led by Dr. D. Layne Coppock, Utah State University. Email: Layne.Coppock@usu.edu.



The Global Livestock CRSP is comprised of multidisciplinary, collaborative projects focused on human nutrition, economic growth, environment and policy related to animal agriculture and linked by a global theme of risk in a changing environment. The program is active in East and West Africa, Central Asia and Latin America.

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