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Maize Safety in Kenya: The Role of Traders

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Background

Aflatoxin and Maize in Kenya

- Maize is the primary staple crop in Kenya and much of sub-Saharan Africa.
- Maize is very susceptible to contamination with aflatoxin, an unobservable fungal byproduct.
- Health effects associated with aflatoxin include: cancer, depressed immune response, child growth faltering.
- Human exposure occurs through direct consumption of contaminated crops, and consumption of milk or meat products from animals raised on contaminated feed.
- Occasional outbreaks of aflatoxicosis receive media attention, but awareness of chronic effects is low.
- Recommended practices to avoid contamination: thorough drying and careful storage of grains.
- Consumers place a premium on self-produced maize (Hoffmann and Gatobu, 2013)
- Observable attributes (rotten, broken grains) have a negative effect on price, but unobservable attributes (aflatoxin contamination) do not (Hoffmann et al., 2012)



Fig.1: Contaminated maize cob

Fig.2: Cereal markets in Kenya

Local Regulations and Maize Trade

- Maximum **aflatoxin** content allowed: 10ppb
- Expensive to test → not enforced → there is no market for uncontaminated maize
- Moisture content is correlated with aflatoxin and cheaper to test
- Maximum **moisture content (MC)** allowed: 13.5%
- Much cheaper to test
- Tested by formal buyers (large millers, national cereals board) at time of purchase
- No enforcement in informal maize markets
- Moisture meters are out of reach for most, but less accurate methods are used (e.g. biting grains)

Research Questions

Broadly: How to improve food safety in developing countries?

- What is the role of market intermediaries in preserving or diminishing maize quality once it leaves the farm gate?
- Are there opportunities to reduce information asymmetries in this market by providing traders with maize quality information?

Methodology

371 traders were interviewed at 9 open-air cereal markets across Kenya and participated in maize auction (convenience sampling) during September-November 2011.

Maize auction:

- Second-price sealed-bid auction for six 90KG bags of aflatoxin free maize: 2 low MC (13.5%), 2 medium MC (14-15%) and 2 high (17-19%)
- Information on moisture content and aflatoxin contamination of maize auctioned was varied experimentally using labels to assess WTP (in each moisture pair, information was provided for only one bag; which bag was labeled varied randomly across customers)



Fig.3: Labeled 90KG maize bags in bidding area

Results

Traders' practices & knowledge

- 73% of traders reported covering their maize during transport to protect it from rain.
- 69% of traders typically dry and sort the maize they purchase.
- 22% of traders add preservatives to their maize.
- 75% know what aflatoxin is.
- 16% know the moisture content regulation.

➔ Informal traders are investing in the quality of their maize

Traders' WTP for aflatoxin safe maize

Traders' Willingness to Pay for Maize Bags Labeled "Aflatoxin-Safe"

Moisture Ranges	# Bids	Average Bids		Aflatoxin Info vs No Info	
		No Aflatoxin-Info (KSH)	Safe Info (KSH)	Difference (KSH)	Difference as % of No Info (%)
Low Moisture (<13.5%)	62	2917	3098	181***	6.2%
Medium Moisture (14-15%)	62	2746	2938	192***	7%

*** p<0.01

➔ Providing information that maize was NOT contaminated with aflatoxin increased traders' WTP by 6-7%

Results

Traders' WTP for low moisture maize

Traders' Willingness to Pay for Maize Bags With and Without Moisture Labels

Moisture Ranges	# Bids	Average Bids		Info vs No Info		With Information		Without Information	
		No Moisture Info (KSH)	Moisture Info (KSH)	Difference Moisture Info vs No Info (KSH)	Difference as % of No Info (%)	Difference wrt Low Moisture (KSH)	Diff as % of Low Moisture (%)	Difference wrt Low Moisture (KSH)	Diff as % of Low Moisture (%)
Low Moisture (<13.5%)	309	2867	2945	78***	2.72%	-311***	-11%	-165***	-6%
Medium Moisture (14-15%)	309	2702	2634	-68***	-2.52%	-1012***	-34%	-923***	-32%
High Moisture (17-19%)	309	1944	1933	-11	-0.57%				

*** p<0.01

- Providing moisture information has a significant positive effect on WTP when moisture is below regulatory standard (13.5%), and a significant negative effect when above.
- For highest category of moisture content, providing information has no effect.

➔ Providing moisture content information has a significant impact on traders' WTP (≈3%)



Conclusions and Policy Implications

- Most traders report investing in the quality of the maize they handle by drying it prior to re-sale.
- Information on moisture content significantly affects traders' WTP: suggests observability of moisture content is limited
- Improving information on moisture content could strengthen the price-quality relationship, improve maize handling practices throughout the value chain and reduce the risk of fungal growth.
- The impact of providing information on aflatoxin contamination is over twice as large, and could have an even stronger effect on maize handling practices, but the current price of testing is likely a barrier.