Scaling up low-cost moisture meters to improve income, food safety and health.

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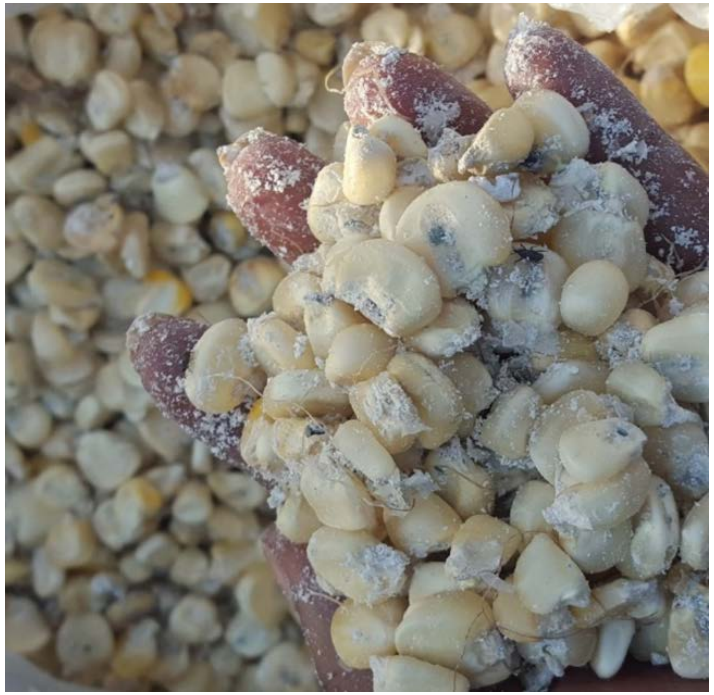
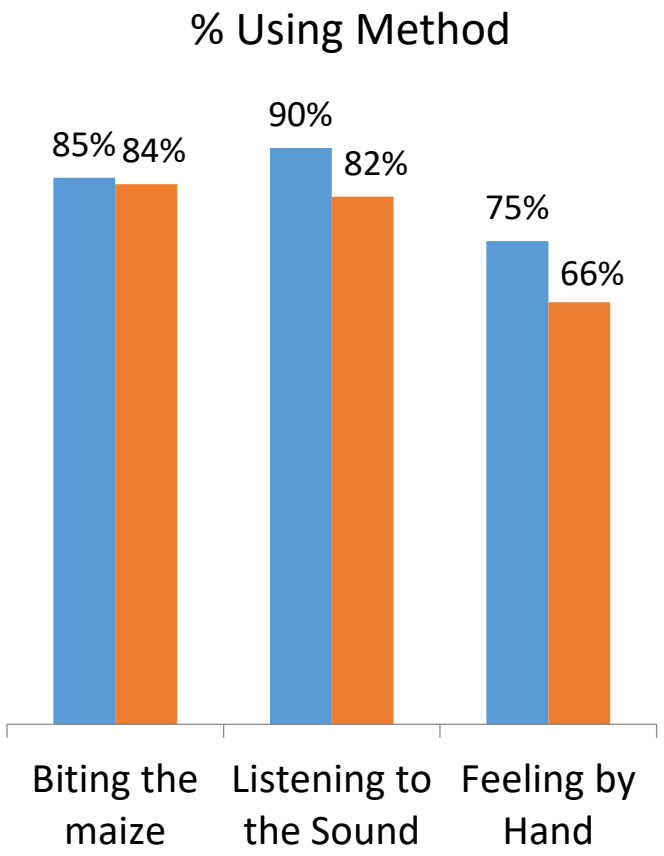
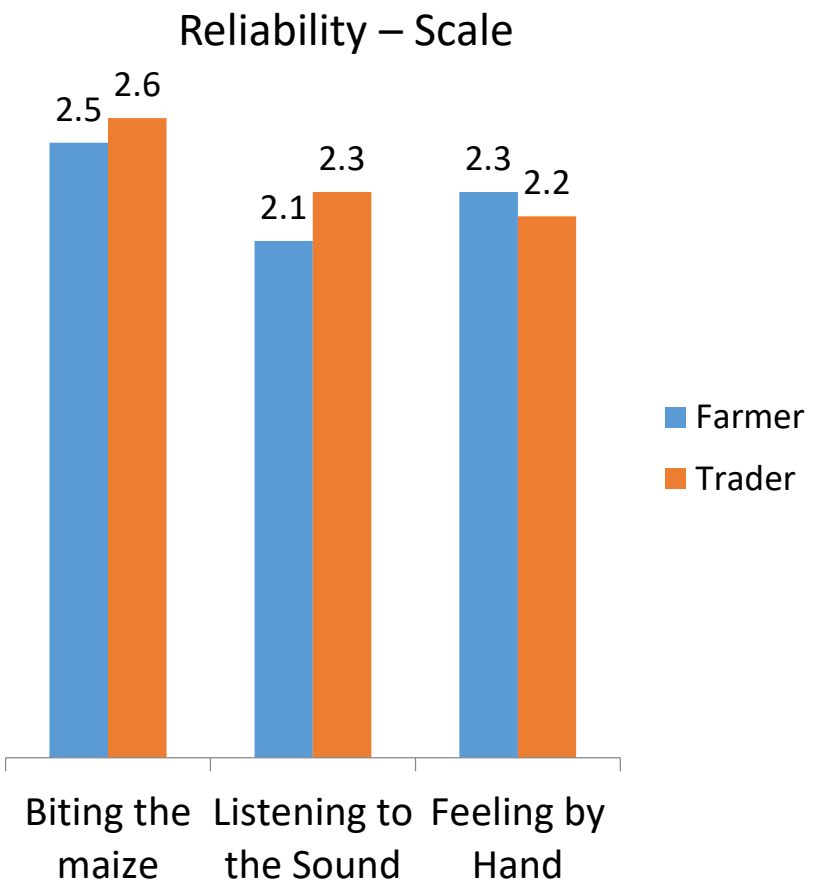
Motivation: why are moisture meters important?

- Grain stored in wet conditions allows mold to grow. Food safety risk
- Economic issues:
  - Moisture not fully observable without meter
  - Kenyan cereal board (NCPB) purchases only if moisture content is below 13%
- Moisture meters, used in developed world are expensive (> US $150)
  - Unattainable and unavailable for most smallholders and small-scale traders.



Variety of “local” methods used to test moisture (western Kenya)



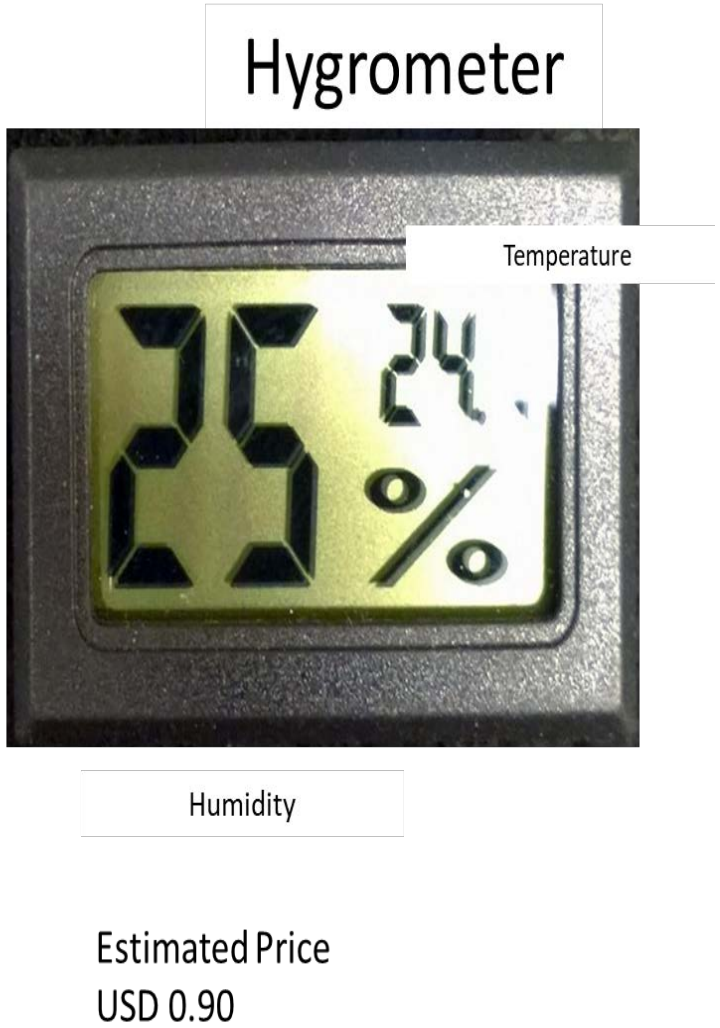


Very Reliable	5
Reliable	4
Somewhat Reliable	3
Can make mistakes sometimes	2
Not reliable at all	1

People recognize that traditional methods are error prone!

Our technology: Hygrometer

- Hygrometer
  - Standard household device calibrated at Purdue University's Food Processing and Post-Harvest Handling (FPL) Innovation Lab
  - Provides a numeric reading
  - Imported from China
  - Est. Wholesale price = US $0.90



Demonstration

- Demonstrated hygrometer working and another technology the DryCard™
- Four bags of maize were carried by enumerator
  - 2 bags with dry and 2 bags of wet maize
- Hygrometer and DryCard™ were each put in a dry and wet bag of maize respectively

Becker De Groot Maschak (BDM) Auction

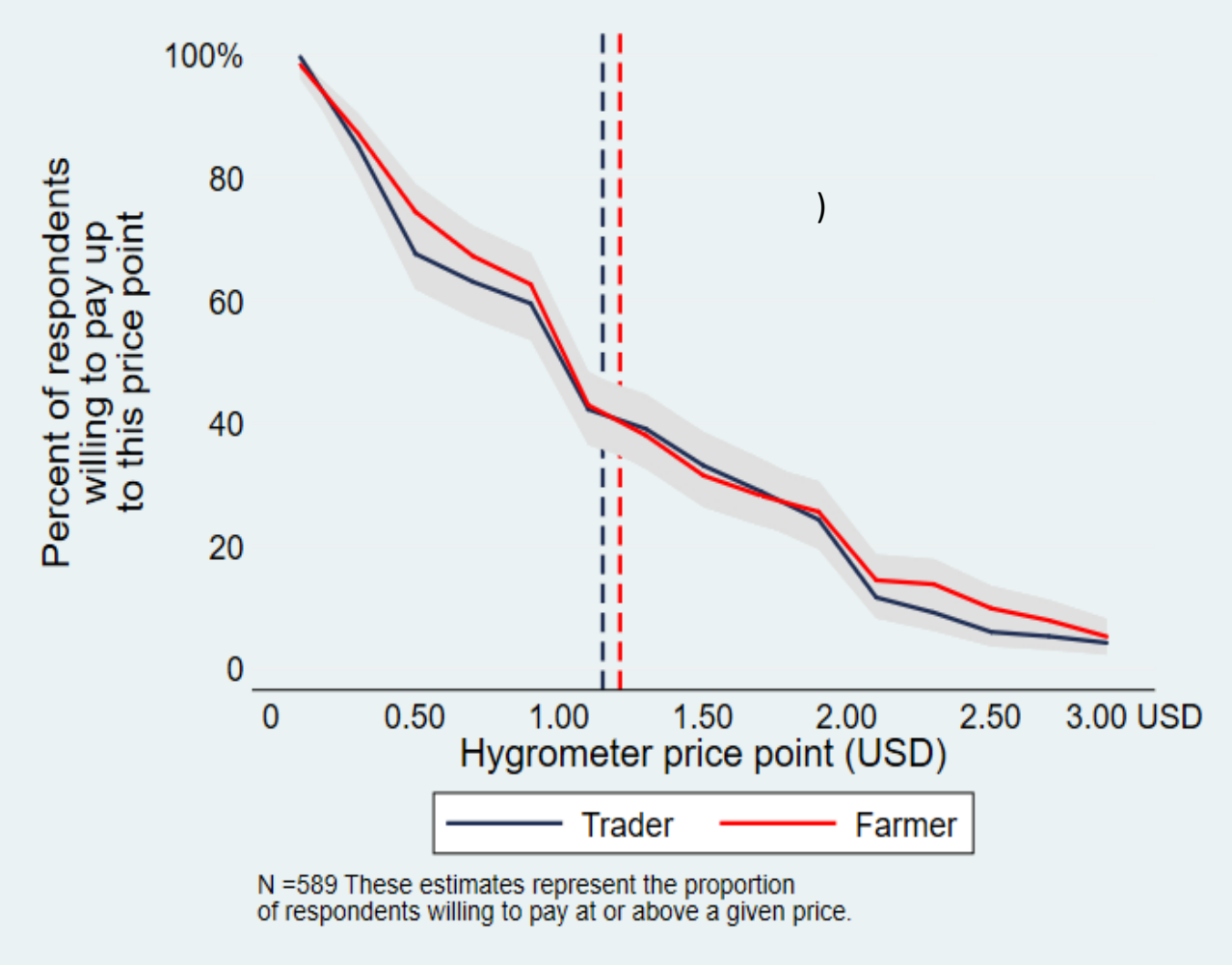
Benefit

- **Involves actual purchase**
- Possible on a one to one basis
- Price actually paid is random

Process

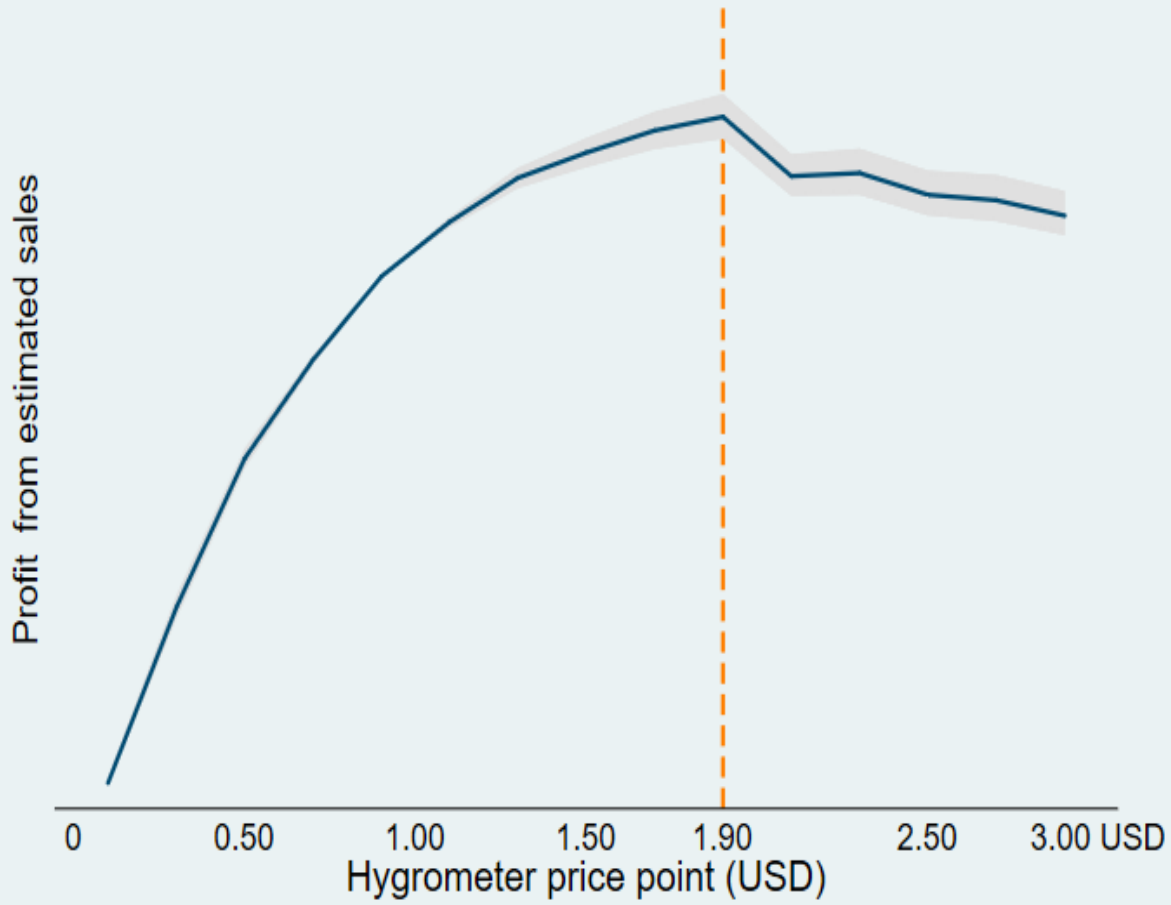
- Participant bid is compared to random price
- If random price is higher then no transaction

Demand Curves



- Involves plotting out percent of population purchasing on y axis and the price on the x axis
- The dotted lines display mean willingness to pay for farmers (USD 1.30) and traders (USD 1.20)
- Above the wholesale price of USD 0.90.

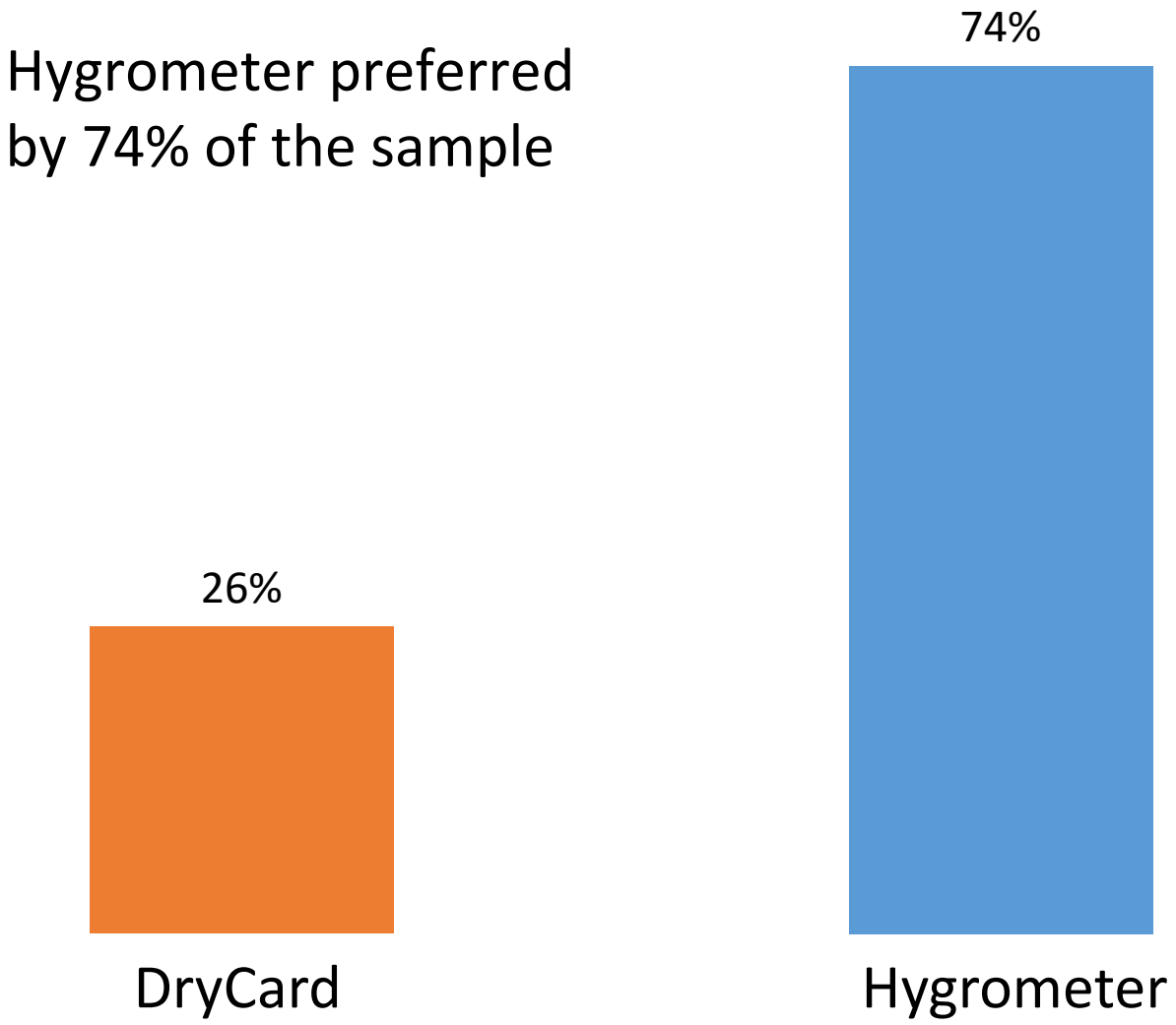
Profit for Retailers



N = 589. These estimates are calculated as the sales - cost of goods sold per hygrometer times the proportion that is likely to buy at that price point

- Assuming constant cost USD 0.90/hygrometer, estimated profit calculated by multiplying the proportion of population likely to buy at each price with the margin at each price
- Profit for Hygrometer can be maximized by selling at $ 1.90 to 25% of the population

If both devices were available to you at the price you bid which one would you prefer?



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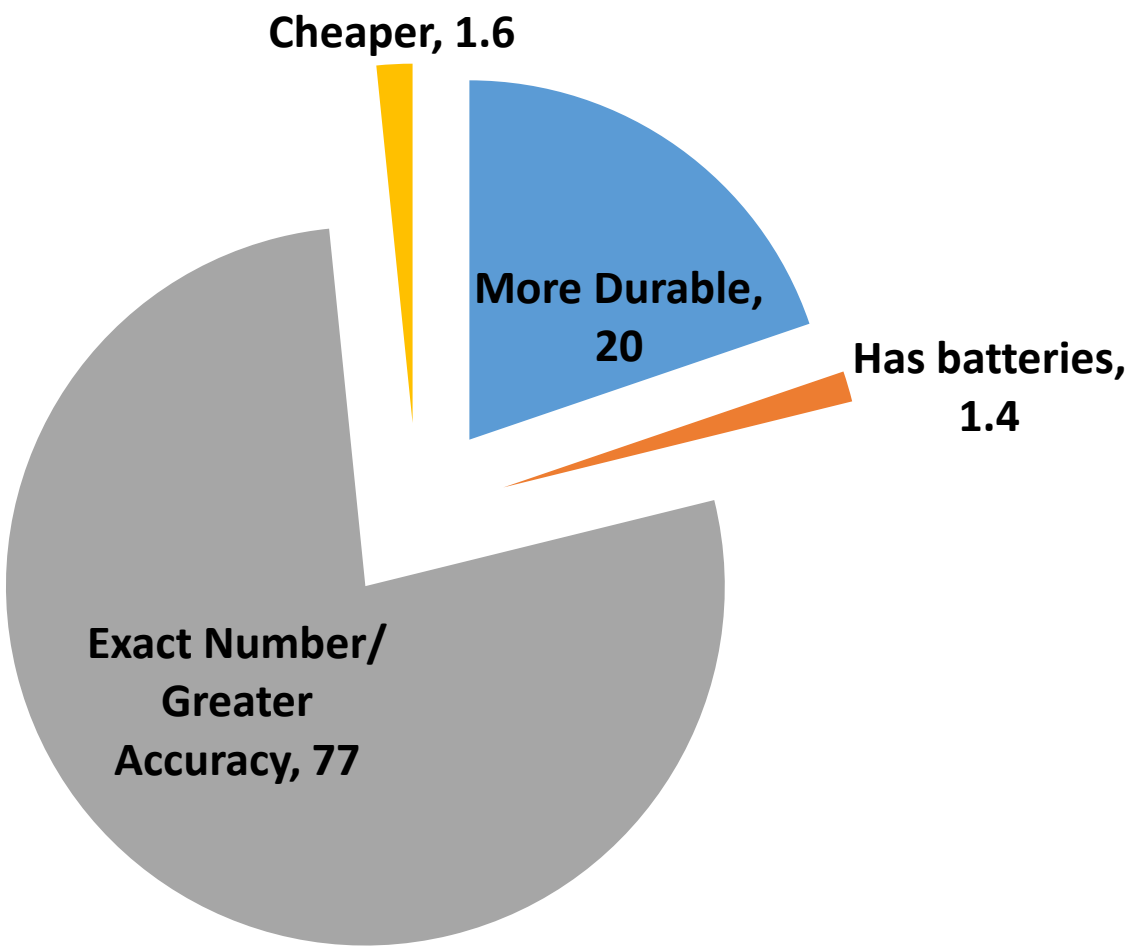
Reason for preference of Hygrometer, %



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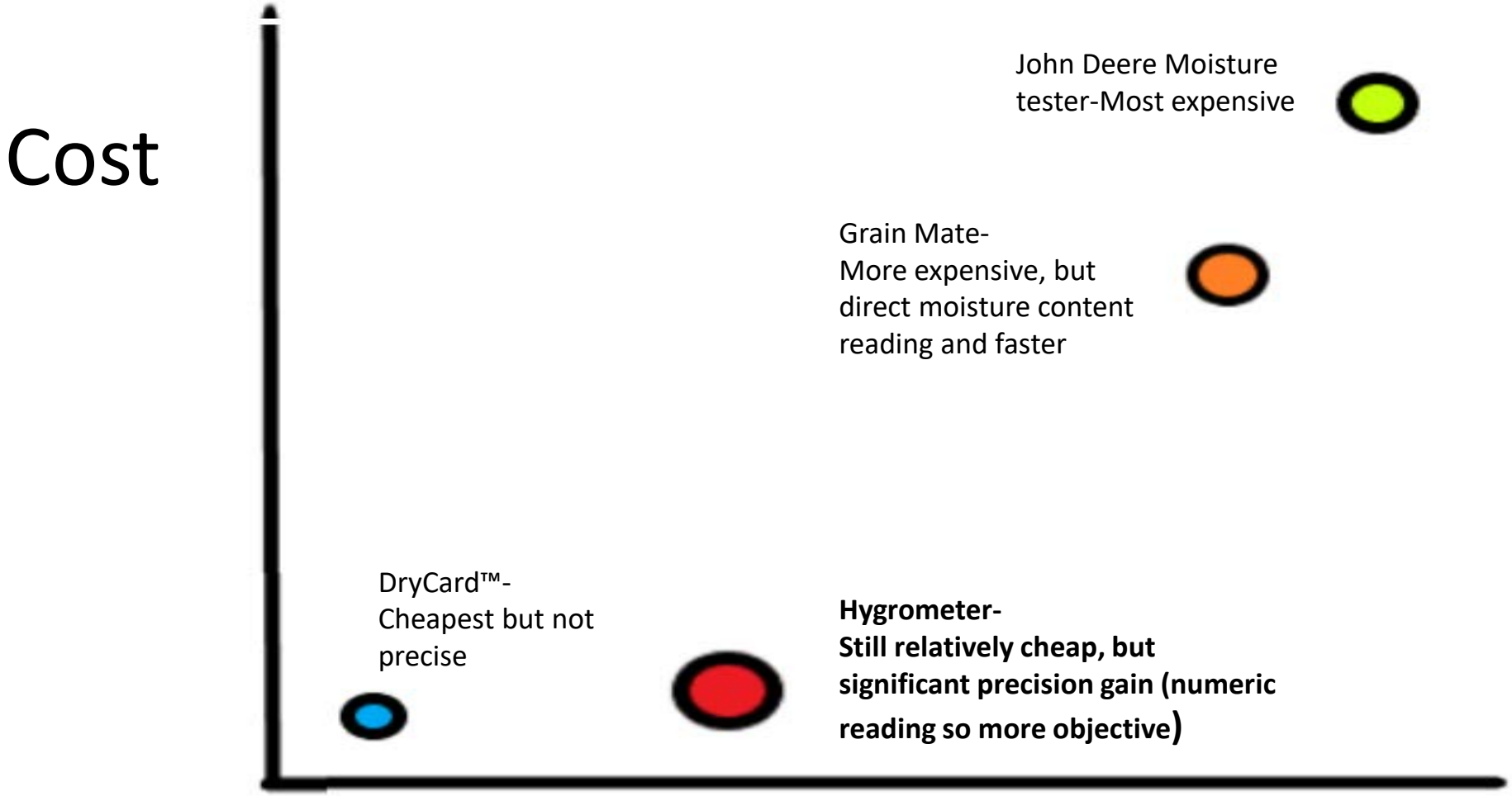
How does the hygrometer compare?



Effectiveness=Precision+Time

Future Steps

- Household device-Available for purchase from multiple manufacturers
  - If a bulk purchase is made directly from the manufacturer, the per-unit price of the hygrometer can be lowered below $0.90.

- Plan to use the input supply chain for the Purdue Improved Crop Storage Bags various countries (currently under way in Kenya, Bell Industries, and Senegal, SEDAB).

- In Kenya, Bell Industries will look into getting permission to classify each commodity as an agricultural input in order to gain import tax exemption.

- Train extension workers on the usage of the product in the areas where we are piloting the product.

- Need to recognize that extension and public investments needed to promote this new technology that offers public goods of improved food safety and health.